

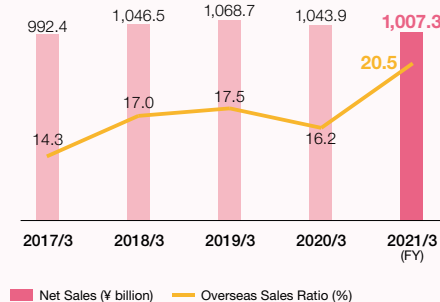
# Shaping the Future with Trees

## More Profitable

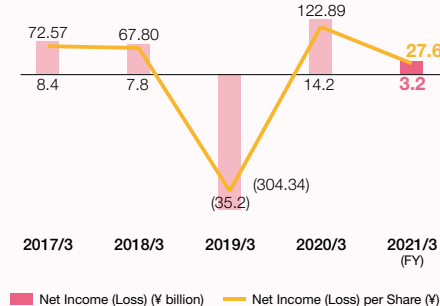
- 026** Financial Highlights
- 027** Message from the Executive Officer Responsible for Finance
- 032** The Nippon Paper Group at a Glance
- 034** Feature: A New Approach to Respond to Changes in Society
- 036** Each Business's Strengths and Future Strategies
  - 036 Paper Business
  - 038 Paperboard Business
  - 040 Domestic Packaging Business
  - 042 Opal
  - 044 Household Paper and Healthcare Business
  - 046 Chemical Business
  - 048 Energy Business
  - 050 Wood/Building Material Business
- 052** Accelerate Business Transformation  
Launch of the Biomass Material Business Division
- 054** Research and Development for Further Growth

# Financial Highlights

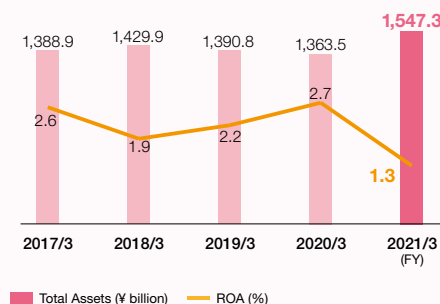
## 01 Net Sales and Overseas Sales Ratio



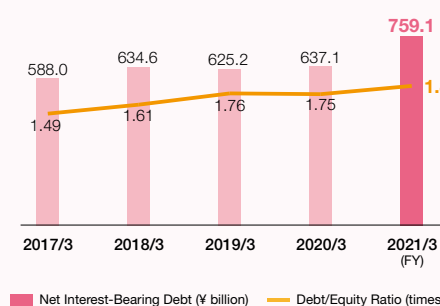
## 03 Net Income (Loss) and Net Income (Loss) per Share<sup>\*1</sup>



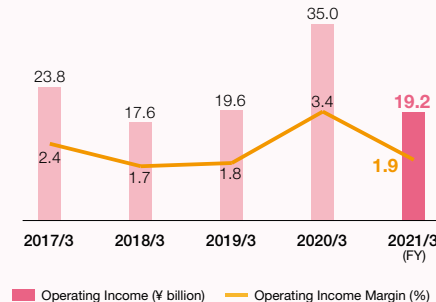
## 05 Total Assets and ROA<sup>\*3</sup>



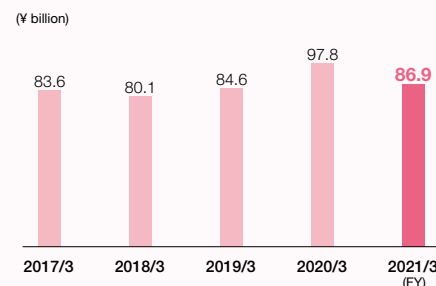
## 07 Net Interest-Bearing Debt and Debt/Equity Ratio<sup>\*5</sup>



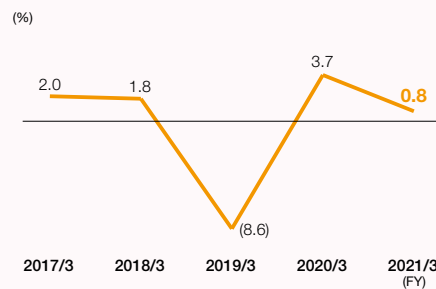
## 02 Operating Income and Operating Income Margin



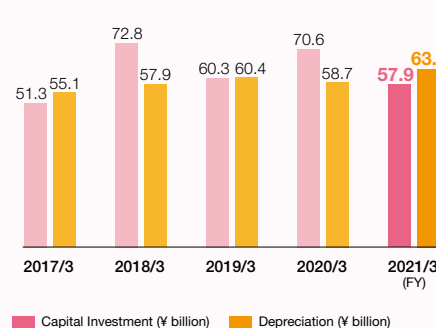
## 04 EBITDA<sup>\*2</sup>



## 06 ROE<sup>\*4</sup>



## 08 Capital Investment and Depreciation



## 01 Net Sales and Overseas Sales Ratio

Net sales in the Daily-Life Products Business increased by ¥47.7 billion due to the consolidation of Opal, leading to an increase in the overseas sales ratio for the Nippon Paper Group as a whole. However, net sales in the Paper and Paperboard Business decreased by ¥78.4 billion because of a large decline in domestic demand for paper due to the impact of COVID-19. As a result, net sales for the Group as a whole decreased from the previous year.

## 02 Operating Income and Operating Income Margin

Operating income in the Paper and Paperboard Business and Daily-Life Products Business decreased due to the impact of COVID-19. In addition, acquisition-related expenses of ¥6.0 billion were recorded in connection with the acquisition of Orora Limited's paperboard and fiber-based packaging business in Australia and New Zealand. These expenses were incurred as one-time expenses.

## 05 Total Assets and ROA

Total assets increased by ¥183.8 billion in connection with the consolidation of Opal, while efforts were made to reduce inventories. Additionally, ROA decreased in comparison to the previous year as a result of a decrease of ¥18.2 billion in ordinary income.

## 07 Net Interest-Bearing Debt and Debt/Equity Ratio

Net interest-bearing debt rose by ¥122.0 billion due to the borrowing of funds for the acquisition of Orora Limited's paperboard and fiber-based packaging business in Australia and New Zealand. The Group raised ¥60.0 billion of these funds through a hybrid loan.

<sup>\*1</sup> Profit (loss) attributable to owners of parent

<sup>\*2</sup> EBITDA = Operating income + Depreciation + Interest income + Dividend income + Amortization of goodwill

<sup>\*3</sup> Return on assets (ROA) = (Ordinary income + Interest expense) / Total assets at end of fiscal year x 100

<sup>\*4</sup> Return (loss) on equity (ROE) = Profit (loss) attributable to owners of parent / [Average of balances at the beginning and end of fiscal year (Shareholders' equity + Accumulated other comprehensive income)] x 100

<sup>\*5</sup> The FY2021/3 result for the debt/equity ratio represents the adjusted net debt/equity ratio. Adjusted net debt/equity ratio = (Net interest-bearing debt - Equity-type debt) / (Shareholders' equity + Equity-type debt). Equity-type debt: The amount of debt financed by hybrid loans that has been recognized as equity credit by ratings agencies (50% of the financed amount)

# Message from the Executive Officer Responsible for Finance



Steadily implementing the initiatives laid out in Medium-Term Business Plan 2025 with the aim of increasing corporate value

Tomoyasu Itakura

Executive Officer and General Manager, Financial Division  
Nippon Paper Industries Co., Ltd.

With an unwavering resolve, the Nippon Paper Group will strive to increase its corporate value by accelerating the transformation of its business structure and strengthening its profitability

First, I would like to explain the results of our Sixth Medium-Term Business Plan (hereinafter, the "previous MTBP"), which covered the three-year period beginning in FY2019/3.

## Underperformed Financial Targets Amid a Challenging Business Environment

In FY2021/3, the final year of the previous MTBP, net sales decreased by ¥36.6 billion year on year to ¥1,007.3 billion and operating income declined by ¥15.8 billion year on year to ¥19.2 billion. In FY2020/3, the Group delivered a solid performance, with operating income reaching ¥35.0 billion against the backdrop of steady progress on initiatives. However, as we entered FY2021/3, net sales and earnings both decreased as the Group was severely impacted by the COVID-19 outbreak. Consequently, the Group finished FY2021/3 with both net sales and operating income falling below the previous MTBP's targets.

The Group estimates that COVID-19 had an impact of approximately ¥69.0 billion on net sales and approximately ¥22.0 billion on operating income. Notably, demand decreased for newsprint and printing and business communication paper in Japan and Opal Limited's copy paper, which had a large impact on the Group. On the other hand, dramatic changes in people's lifestyles meant that demand increased for some paper carton, household paper and healthcare, and chemical products. In addition, interest-bearing debt increased due to the acquisition of Orora Limited's paperboard and fiber-based packaging business in Australia and New Zealand. Although the Group made use of a hybrid loan for this acquisition, the adjusted net debt/equity ratio still rose to 1.86 times.

ROE stood at 0.8%, far below the Group's target. In terms of ROA, the Group strove to streamline assets, which are in the denominator of ROA. To this end, we worked to reduce assets through such means as inventory reductions. We also

## Message from the Executive Officer Responsible for Finance

reorganized our production structure by shutting down facilities that did not generate profits, while striving to step up investment in the growth of the Daily-Life Products Business and reshape its asset portfolio. However, growth in profit, which is in the numerator of ROA, remained sluggish. Consequently, ROA fell to 1.3%.

As discussed above, we underperformed on all the financial targets laid out in the previous MTBP except for the overseas sales ratio. This was a disappointing finish to the plan.

### Steady Progress on Initiatives to Address Two Themes

We deeply regret that we underperformed on our financial targets. On the other hand, the Group achieved steady progress on forward-looking initiatives. Under the previous MTBP, we tackled the following two themes: “reorganize the production structure of the Paper Business and make maximum use of in-house facilities” and “expand businesses in growth areas and achieve early commercialization of new businesses.”

Regarding the first theme of “reorganize the production structure of the Paper Business and make maximum use of in-house facilities,” the Group made a difficult decision to resolutely push ahead with a drastic restructuring of its business. Specifically, we shut down eight paper machines and two coating machines as planned, thereby completing the reorganization of our production structure. The Group withdrew from the paper business at the Yufutsu Mill. However, we decided to commence the biomass mono-firing business and shifted business over to the functional specialty material field, which offers strong prospects for market growth. In addition, the Fuji Mill’s business was shifted from the paper business to the household paper business. Furthermore, against the backdrop of a larger decline in demand for newsprint

and printing paper due to the impact of COVID-19, we decided to withdraw from the paper and pulp business at the Kushiro Mill.

The second theme was to “expand businesses in growth areas and achieve early commercialization of new businesses.” Initiatives were steadily implemented to address this theme. The Group carried out capital investments in growth areas such as the Packaging, Household Paper and Healthcare, and Chemical Businesses largely as planned. It also established a production structure in anticipation of growth in demand. In new businesses, mass production machines for cellulose nanofiber (CNF) were installed at the Ishinomaki Mill and Gotsu Mill, and a demonstration test machine was installed at the Fuji Mill. In these and other ways, the Group has added variation according to each mill, thereby expanding product applications while meeting a wide range of customer needs.

One example of a large investment undertaken during the period of the previous MTBP was the acquisition of Orora Limited’s paperboard and fiber-based packaging business in Australia and New Zealand. In terms of the amount of investment, this deal far surpassed the strategic investment budget of ¥25.0 billion that the Nippon Paper Group had originally anticipated. However, we determined that this was a business investment essential to the Group’s future growth. While interest-bearing debt will temporarily increase, we decided to move forward with the acquisition because we judged that we could generate solid profits and recover the invested funds. In FY2021/3, the acquired business faced a challenging operating environment due to the impact of COVID-19. Nevertheless, the Group has begun initiatives to capture synergies with this business.

Next, I’d like to discuss Medium-Term Business Plan 2025 (hereinafter, the “new MTBP”), which is a five-year plan beginning in FY2022/3.

### Accelerate the Transformation of the Business Structure

In May 2021, the Nippon Paper Group unveiled the 2030VISION and new MTBP. The 2030VISION anticipates what the Nippon Paper Group should be like in 2030. In response, new MTBP provides a roadmap for the first 5 years of the 10-year 2030VISION period. Under the new MTBP, the basic strategy is to accelerate the transformation of the business structure. The Group has adopted the following as its priority tasks: reallocate management resources to growing businesses, accelerate the commercialization of new businesses, and reinforce the competitiveness of the foundation businesses.

As for the financial targets of the new MTBP, the Group aims to achieve net sales of ¥1,100.0 billion in FY2026/3, and operating income of ¥40.0 billion or more at an early stage. The Group’s depreciation amounts to around ¥60.0 billion. Therefore, if operating income of ¥40.0 billion is achieved, EBITDA will amount to approximately ¥100.0 billion. If the Group can build a framework where it can steadily generate EBITDA of ¥100.0 billion, it will have a broader range of options to use cash for purposes such as investing in growth, reducing interest-bearing debt, and returning profits to shareholders. The Group will also be able to improve the debt/equity ratio, a measure of financial discipline, to the level of 1.5 times. That said, the Group seeks to steadily generate EBITDA of ¥100.0 billion not as a target, but as a bare minimum level of profitability.

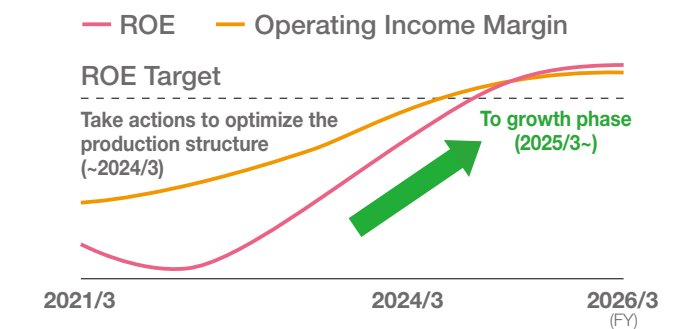
The Group will aim for an ROE of 5.0% or more. In the first half of the new MTBP, the Group will need to carefully assess its course for optimizing the production structure of its foundation businesses. On the other hand, the seeds of growing businesses will not necessarily lead to profits immediately after they are

sown. Although the Group may incur temporary losses in the first half of the new MTBP, we will steadily implement the plan’s initiatives. Therefore, we expect ROE to worsen in the first half but improve during the second half.

### Strategic Investment to Accelerate the Transformation of the Business Structure

Under the new MTBP, we have adopted a basic strategy to accelerate the transformation of the business structure. With a greater sense of speed than before, we will shift from its foundation businesses to growing businesses. To make this happen, investment in growing businesses will be essential. That requires us to grasp trends in society such as lifestyle changes caused by COVID-19 and moves to reduce plastic and shift to paper, and firmly capture the tides of demand. The Group has established a budget of ¥350.0 billion for strategic investment over the next 10 years. During the new MTBP, the Group plans to use ¥210.0 billion of this amount. It is thus assigning a greater weighting of

#### ROE Illustration

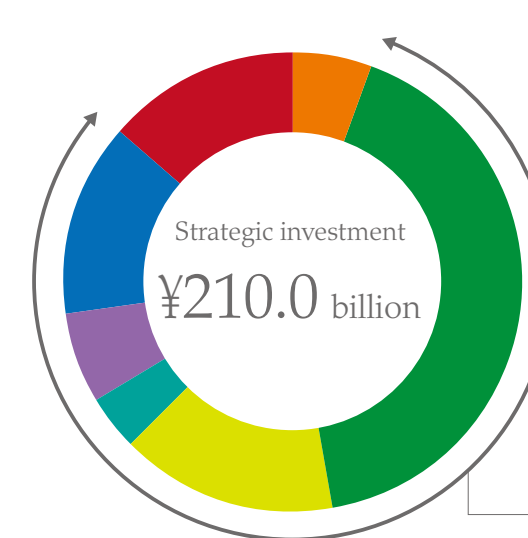


### Targets and Results of the Sixth Medium-Term Business Plan and Targets of Medium-Term Business Plan 2025

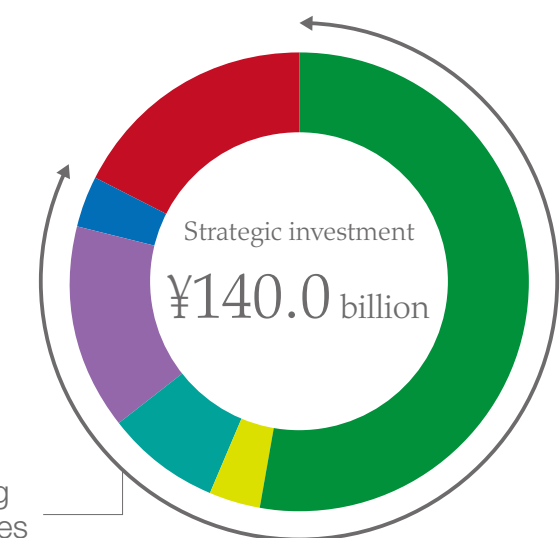
	Sixth MTBP Targets	FY2020/3 Results	FY2021/3 Results	MTBP 2025 Targets
Net Sales	¥1,115.0 billion	¥1,043.9 billion	¥1,007.3 billion	FY2026/3 ¥1,100.0 billion
Overseas Sales Ratio	19.0%	16.2%	20.5%	—
Operating Income	¥47.0 billion	¥35.0 billion	¥19.2 billion	At an early stage ¥40.0 billion or more
EBITDA	¥110.0 billion	¥97.8 billion	¥86.9 billion	Stably ¥100.0 billion
Debt/Equity Ratio*	1.5 times or less	1.75 times	1.86 times	FY2026/3 1.5 to 1.6 times
ROA	3.8%	2.7%	1.3%	—
ROE	5.0% or more	3.7%	0.8%	FY2026/3 5.0% or more

\* The net debt/equity ratio of FY2021/3 result is after adjustment

### Medium-Term Business Plan 2025: FY2022/3–FY2026/3



### FY2027/3–FY2031/3



Paper and Paperboard Packaging Household Paper and Healthcare Chemical New Materials Energy Environmental Initiatives



## Message from the Executive Officer Responsible for Finance

investment to the first 5 years of the 10-year period than it has done for the second half of that period. This signals the Group's intention to make investments with a greater sense of speed. In order to achieve sustainable growth, it is imperative to make investments ahead of schedule. Naturally, these investments are premised on our steadfast commitment to maintaining financial discipline. Under the new MTBP, we will actively carry out investments in growth, and will transform our business structure at an accelerated pace.

In making investment decisions, we will adopt business viability as our decision-making criteria. This means that we will consider whether we can nurture a business into one of our core pillars, whether we can recover the cash we have invested, and whether the business can generate a level of profit commensurate with the investment. In the 2030VISION, we have set a target of raising the operating income margin in the Daily-Life Products Business to 7% or more. To reach this target, we will remain strongly aware of the importance of investing in high-value-added businesses with a high profit level above a certain threshold.

## ■ Establishing an Environmental Investment Budget

Additionally, in the 2030VISION, the Group has established an environmental investment budget of ¥52.0 billion. Society urgently needs to reduce greenhouse gas emissions. This has already

become a minimum requirement for the survival of business enterprises. Based on this awareness, the Group has set a target of reducing greenhouse gas emissions by 45% compared with FY2014/3. We see environmental investment as a "positive investment," not as a negative one. We believe that proactive investment in key technologies will lead to the solution of environmental issues and pave the way for the Group's sustainable growth.

## Emphasis on Financial Discipline

While undertaking bold strategic investments, we will emphasize financial discipline to ensure that we maintain financial soundness.

For the acquisition of Orora Limited's paperboard and fiber-based packaging business in Australia and New Zealand, the Nippon Paper Group raised funds of ¥60.0 billion through a hybrid loan (subordinated loan), which has characteristics similar to equity, for the first time. This hybrid loan was taken out from the standpoint of maintaining financial discipline. Accordingly, the adjusted net debt/equity ratio, which takes into account the amount of debt financed through hybrid loans that has been recognized as equity credit by rating agencies, stood at 1.86 times as of March 31, 2021. I believe that the use of long-term, stable funds to finance this acquisition was a major achievement.

In terms of fund procurement, we have worked to diversify fund procurement methods to ensure stable financing. In the past few years, fund procurement methods based on environ-

mental perspectives have emerged, so we intend to use these sorts of methods to further enhance stable financing. One of the advantages of so-called transition financing, which supports the shift to a low-carbon society, is that the purpose of the use of funds is clearly defined. In other words, transition financing allows the Group to outwardly promote the fact that funds are being used for environmentally friendly projects. In addition, the use of funds is also closely aligned with the direction of the 2030VISION the Group seeks to realize.

From the standpoint of securing cash flows, a sound approach would be to secure profits in advance, and then allocate the surplus funds from those profits to investment. However, if this approach were applied to the current Nippon Paper Group, it would run the risk of leading the Group to a state of contraction and stagnation. For this reason, rather than emphasizing only financial discipline, the Group will simultaneously reorganize its production structure and invest in growing businesses. Although the Group's indicators related to financial discipline will temporarily deteriorate slightly, we believe that this is the best way to lay the groundwork for the Group's growth. The Group's basic policy on dividends will be to provide stable dividends as before.

Moreover, we will flexibly procure funds in the event of an emergency. In response to the COVID-19 outbreak in 2020, the Group increased its short-term credit line, including foreign currencies, and raised the balance of cash and deposits on hand. At its peak, the balance of cash and deposits on hand surpassed ¥100.0 billion for the Group as a whole. The Group secured liquidity on hand and prepared for unpredictable conditions. Leveraging its experience from the Great East Japan Earthquake, I believe that the Group has addressed the situation promptly.

We are also focused on maintaining our ratings from external evaluation agencies and improving them where possible. Indicators such as the debt/equity ratio and the debt repayment period are used to evaluate ratings. If the Group can build a framework for steadily generating EBITDA of ¥100.0 billion as planned, we will be able to create a positive cycle in various areas, including the repayment of loans payable. In growing businesses, specifically the Packaging, Household Paper and Healthcare, and Chemical Businesses, some investments were decided during the previous MTBP, so we expect the positive effects of those investments to emerge going forward. On the other hand, unless the Group speedily assesses the demand forecast for the post-COVID-19 period in the Paper Business, we run the risk of generating an additional supply-demand gap. Optimizing the Group's production bases is therefore an urgent priority. We would like to deliver solid results one step at a time as we move closer to achieving the new MTBP and the 2030VISION.

Striving to Increase Corporate Value  
by Strengthening Profitability

The Nippon Paper Group's vision for 2030 is to be a comprehensive biomass company shaping the future with trees. Strengthening profitability is essential to achieving sustainable growth as a comprehensive biomass company. Under the new MTBP, with an unwavering resolve, we will accelerate the transformation of our business structure dramatically. This means that we will consider ways of resolving the supply-demand gap in the Paper Business and make decisions accordingly. If decisions are postponed, we will only fall behind and repeat the setbacks of the past. We need to formulate demand forecasts well in advance and devise our plans from a long-term perspective. This was partly why the period of the new MTBP was set as five years. In terms of capital efficiency, the Group will steadily implement initiatives, even if it incurs temporary losses. Furthermore, we will give priority to strategic investments in growing businesses and put the Nippon Paper Group on a firm growth trajectory, as part of our efforts to lay the groundwork for increasing the Group's corporate value.

With dramatic changes in the social landscape, events may not necessarily proceed according to plan. I believe that the Financial Division's mission is to swiftly address changes in the environment, and run businesses, including those on the front line. We will consider how to best achieve the Nippon Paper Group's goals. From this perspective, we will make steady strides toward increasing the Group's corporate value.

## Financial Strategy

## Financial Policy

The Nippon Paper Group's financial policy is to enhance cash-flow generation capabilities by carrying out appropriate fund procurement to finance investments that enable sustainable growth, and to provide stable profit returns to shareholders, while maintaining a sound financial position.

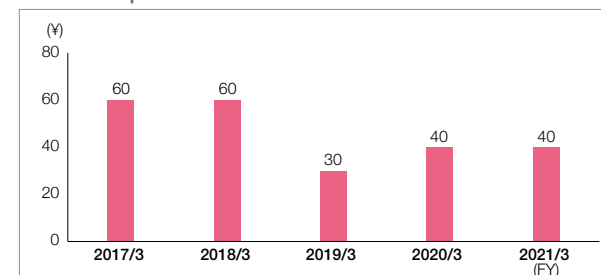
## Fund Procurement Policy

In the course of undertaking fund procurement, the Nippon Paper Group strives to diversify its procurement methods to ensure stable financing. Concurrently, the Group seeks to extend repayment terms and standardize repayment amounts. Specifically, the Group procures funds through various sources when necessary, including borrowings from financial institutions and the issuance of commercial paper and corporate bonds, by estimating their amount based on the capital investment plan for the entire Group. Moreover, in order to maintain the liquidity of fund procurement, the Group has concluded commitment line agreements of ¥50.0 billion in total with major financial institutions.

## Shareholder Return Policy

The Nippon Paper Group's basic policy on shareholder returns is to continuously provide stable dividends based on a comprehensive consideration of business results, increases in internal reserves, and other factors, and by taking into account the Group's management soundness and increases in shareholder value over the long term. The Group will put internal reserves to good use in expanding its business and strengthening its management foundation going forward, as it strives to increase its corporate value.

## Dividends per Share



## Policy on Ensuring Financial Stability

Nippon Paper Industries closely monitors (1) EBITDA, (2) the net debt/equity ratio, and (3) the debt repayment period as important indicators of financial discipline. The Company seeks to maintain stable credit ratings and improve them by upholding and enhancing financial discipline. The Company believes that keeping stable credit ratings and improving them are important management issues. Please refer to page 16 for the Company's targets under Medium-Term Business Plan 2025.

As of July 2021, the credit ratings acquired by the Company are as follows.

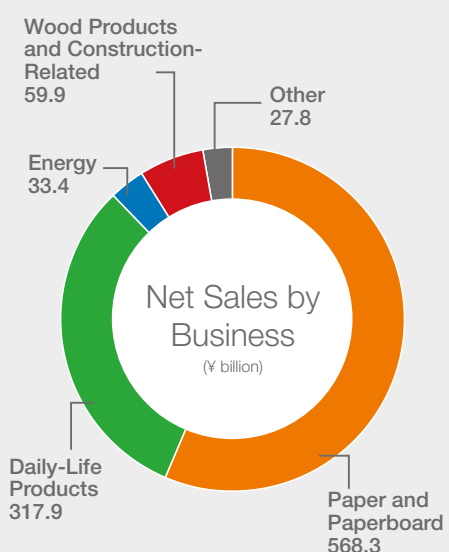
	Long-Term Bonds	Short-Term Bonds (CP)
Rating and Investment Information, Inc.	BBB+	a-2
Japan Credit Rating Agency, Ltd.	A	—

# The Nippon Paper Group at a Glance

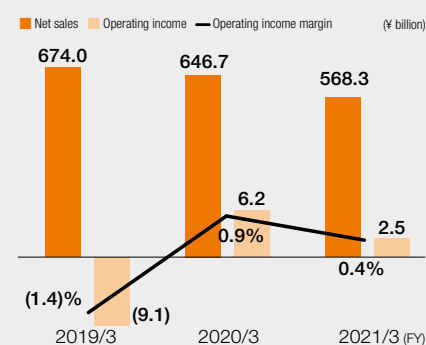
## FY2021/3 Results

[Net sales]  
**¥1,007.3**  
billion

[Operating income]  
**¥19.2** billion



### Paper and Paperboard Business



[Net sales]

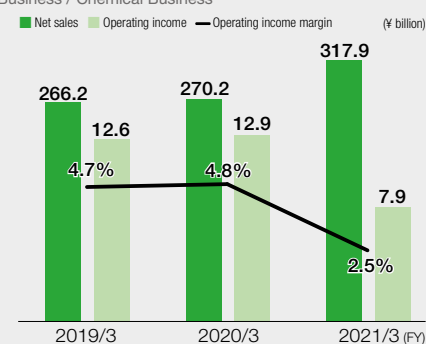
**¥568.3** billion  
(Down 12.1% YoY)

[Operating income]

**¥2.5** billion  
(Down 59.6% YoY)

### Daily-Life Products Business

Packaging Business / Household Paper and Healthcare Business / Chemical Business



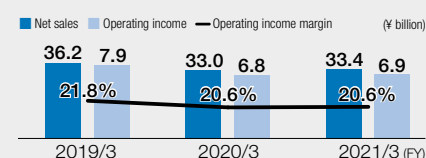
[Net sales]

**¥317.9** billion  
(Up 17.6% YoY)

[Operating income]

**¥7.9** billion  
(Down 39.0% YoY)

### Energy Business



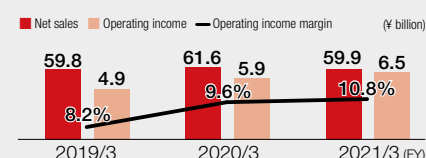
[Net sales]

**¥33.4** billion (Up 1.2% YoY)

[Operating income]

**¥6.9** billion (Up 1.2% YoY)

### Wood Products and Construction-Related Business



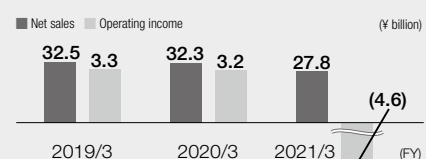
[Net sales]

**¥59.9** billion (Down 2.8% YoY)

[Operating income]

**¥6.5** billion (Up 10.1% YoY)

### Other Businesses



[Net sales]

**¥27.8** billion (Down 13.9% YoY)

[Operating income]

**¥(4.6)** billion (—)

#### Business Overview

**Paper Business:** Provides a stable supply of products in pursuit of conveying information, the function of paper, by leveraging papermaking technology and expertise cultivated over many years. While seeking out new types of needs that leverage paper's features of recyclability and biodegradability, product development is carried out to contribute to environmentally friendly, affluent lifestyles by maximizing use of existing facilities and resources.

**Paperboard Business:** Provides containerboards for cardboard using the latest environmentally

friendly technologies to meet a wide range of needs with outstanding safety, adhesion and ease of converting. Moreover, from fields related to daily living to advanced industries, product development that responds to the changing times is being carried out, such as paperboard packaging that improves logistical efficiency.

#### Main Products

**Paper Business:** Newsprint, printing paper, business communication paper, industrial paper, specialty paper, functional paper

**Paperboard Business:** Containerboards, white paperboards



#### Business Overview

**Packaging Business:** In Japan, provides liquid packaging cartons with a three-pronged marketing approach involving machine sales, carton supply and maintenance services. Overseas, produces and converts materials for packaging at Opal, NDP and TS Plastics.

**Household Paper and Healthcare Business:** Provides a wide variety of products, including household product brands Kleenex® and SCOTTIE®, healthcare products and business-use products.

**Chemical Business:** Provides chemical and other products leveraging technologies to utilize woody resources for various materials and coating technology developed through paper production.

#### Main Products

**Packaging Business:** Liquid packaging boards, liquid packaging cartons

**Household Paper and Healthcare Business:**

Facial tissues, toilet paper rolls, adult diapers  
**Chemical Business:** Dissolving pulp, chemical products, functional coating resin products, functional films



#### Business Overview

Engages in the power generation business proactively using woody biomass energy, leveraging operational expertise from in-house power gener-

ation at paper mills. Also develops effective new woody biomass fuels for GHG emission reduction toward building a carbon-neutral society.



#### Business Overview

Buys and sells lumber and building materials from Japan and overseas, fully utilizes the Nippon Paper Group's domestic wood materials and imported materials procurement networks to supply items such as wood chips for fuel. Also

conducts afforestation businesses in Brazil, producing and selling wood chips.

#### Main Products

Lumber, building materials, raw materials and fuel for papermaking



#### Business Overview

The leisure business utilizes Company-owned land to operate sports clubs and leisure facilities such as ski resorts, campsites and golf ranges. The

logistics business transports paper products shipped from Nippon Paper Group mills and warehouses in consumption areas and provides storage services at warehouses in major cities.



\* Results from FY2019/3 and 2020/3 are restated in FY2021/3 segment results

\* Operating income in other businesses for FY2021/3 results includes ¥6 billion in expenses related to the acquisition of the packaging division of Orora Limited in Australia and NZ



# Envisioning the Ideal Toilet Paper Roll Is the First Step toward a Sustainable Society

Nippon Paper Crecia ended production of common 12-roll toilet paper products on March 31, 2021. The share of 12-roll products in the toilet paper roll market is 80%. It made the bold decision to switch to long-lasting rolls to reduce the burden on the global environment, and has taken the first step as the industry's leader to realize a sustainable society.

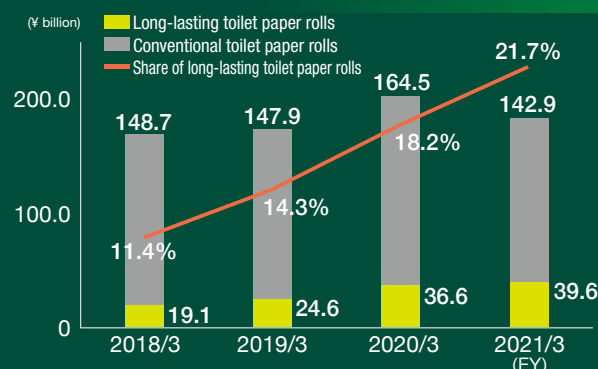


CO<sub>2</sub> emissions from transport compared to 12 toilet paper rolls **43%** reduction

\* Nippon Paper Crecia's calculations

CO<sub>2</sub> emissions from (some) raw materials\*1 **40%** reduction

\*1 Reductions from toilet paper cores, film, and containerboards



**Toilet Paper Roll Market and Share of Long-Lasting Toilet Paper Rolls**

• Source: INTAGE SRI+ data (aggregate sales, toilet paper market, April 2017–March 2021)  
 • Long-lasting is defined as toilet paper rolls that are 1.5 times longer than a conventional roll, based on 50 m for a single-ply roll or 25 m for a two-ply roll (excluding Premium 4R) (defined by Nippon Paper Crecia)



“The SCOTTIE® Toilet Rolls FLOWERPACK 3 times long use 4 Rolls” contains the length of a conventional 12-roll product in 4 toilet paper rolls, about one-third the size\*2. That means more products can be transported at one time, raising transportation efficiency and cutting CO<sub>2</sub> emissions. It also reduces plastic film used for outer packaging and paper resources used for toilet paper cores. Switching from conventional rolls to long-lasting toilet paper rolls will reduce the burden placed on the environment.

When the product was first placed in stores there was initially some confusion and complaints from customers, but long-lasting toilet paper rolls have expanded their share of the toilet paper roll market

year by year. In FY2018/3, long-lasting toilet paper rolls had a share of about 11%, but this grew to approximately 22% in FY2021/3. Long-lasting toilet paper rolls are steadily and assuredly becoming a part of people's daily lives. “The SCOTTIE® Toilet Rolls FLOWERPACK 3 times long use 4 Rolls” is a product that realizes the company's aim for products with value that create better lifestyles and products that contribute to the global environment.

Going forward, the company will continue expanding business by creating products to realize a sustainable society as a company trusted by customers.

\*2 Comparison between “The SCOTTIE® Toilet Rolls FLOWERPACK 3 times long use 4 Rolls” and SCOTTIE® 12-roll FLOWERPACK

## Marketing

### Wow! Such a Compact Roll Contains the Same Amount as 12 Regular Rolls?



When switching to long-lasting toilet paper rolls, we first thought about naming as a way to easily convey the benefits. By analyzing reviews and comments, we learned people most appreciated products that were long-lasting and had to be replaced less frequently, so we straightforwardly called them long-lasting toilet paper rolls. We used one side of the packaging for advertising, and introduced the product with the copy “Wow! Such a compact roll contains the same amount as 12 regular rolls?” to emphasize it contains the same length as the conventional 12-roll product. Then, we aimed to maximize synergetic effects by linking the packaging to information media like TV commercials.

The company focuses on improving brand power and maximizing profits by rapidly picking up on trends in society and through marketing by thinking outside of the box. Looking ahead, we want to make similar efforts not just in household products but also for things like healthcare products, and move ahead on product development responding to changing consumer needs.



**Yuta Saito**  
 Supervisor  
 Marketing Department  
 Sales Promotion Division  
 Nippon Paper Crecia Co., Ltd.

## Technological Capability

### Paper Density × Embossing × Winding = Toilet paper rolls that are 3 times longer

When it comes to toilet paper rolls, softness and comfort are highly valuable to customers.

“The SCOTTIE® Toilet Rolls FLOWERPACK 3 times long use 4 Rolls” is two-ply and measures 75 meters in length, but the issue for us was how to fit three times the length of a conventional toilet paper roll on a toilet paper roll holder. We solved this through a perfect balance between the Nippon Paper Group's papermaking technologies of compressing thickness to reduce air between fibers, embossing to create softness through uneven layers and then winding rolls without compromising those uneven layers. To reach that perfect balance, it required numerous prototypes and two and a half years from the start of development to make a satisfactory product.

We have acquired tens of patents for this combination of paper density, embossing and winding that realizes long-lasting, soft and compact toilet paper rolls with long length and fine quality, that differentiate us from other companies. We will continue to evolve and remain meticulous about quality.



**Yasunobu Ooka**  
 Section Manager  
 Product Development  
 Department  
 R&D Division  
 Nippon Paper Crecia Co., Ltd.

## Future Prospects

### Providing Comfortable and Convenient Products and Contributing to a Sustainable Society

Demand for disposable products is expected to increase in conjunction with changing lifestyles, and there will be a challenge going forward to build a recycling system so those products do not go to waste and materials can be reused. “The SCOTTIE® Toilet Rolls FLOWERPACK 3 times long use 4 Rolls,” which are symbolic of long-lasting toilet paper rolls, are manufactured using recycled pulp as a raw material made from high-quality pulp using recyclables

such as milk cartons. The paper industry is one with an established recycling system and a high degree of sustainability. The Company has experience and techniques honed over many years through its use of fine-quality pulp from paper cartons. To achieve both comfort and convenience for customers and a sustainable society, the Company will make efforts to build a recycling system so that disposable products need not become waste.

[Each Business’s Strengths and Future Strategies]  
Paper Business



Aiming to optimize the production structure  
with an eye to future demand

Atsushi O’haru  
Managing Executive Officer  
General Manager, Sales Planning Division, Nippon Paper Industries Co., Ltd.

Link strengths to opportunities		Address challenges and threats	
<ul style="list-style-type: none"><li>• Production bases located with good balance throughout Japan and robust production capacity</li><li>• Technological capabilities to accommodate diverse production facilities</li></ul>	Strengths	Weaknesses	<ul style="list-style-type: none"><li>• High fixed costs due to extensive facilities</li><li>• Need for time to change the production structure</li></ul>
<ul style="list-style-type: none"><li>• Trend of shift from plastic to paper</li><li>• Customer needs for products that reduce environmental impacts</li></ul>	Opportunities	Threats	<ul style="list-style-type: none"><li>• Shrinking market for conventional paper media and digitalization</li><li>• Rapid changes in the world that are difficult to predict</li></ul>

■ Optimizing the Production Structure  
Based on Demand Forecasts for Each Grade

Looking to 2030, the market for products such as newsprint, printing paper, and copy paper is likely to continue to shrink due to digitalization and other changes in the demand structure. Naturally, we need to think about rightsizing the production structure to match demand. That said, many of Nippon Paper Industries’ main paper products hold top market shares. Also, some products such as business communication paper and industrial paper are seeing almost no decline in demand. Therefore, securing profits while fiercely protecting our market shares will be important.

Meanwhile, there are also markets that are likely to grow moving forward, driven by the trend toward replacing plastic with paper. We will capture demand where paper is an alternative to materials such as plastics and films, including packaging paper, white paperboards, and base paper for paper cups.

The Sales Planning Division was newly established in June 2021. Its biggest role is to devise medium- to long-term strategies. Its top priority is to figure out how to optimize the production structure in light of each sales division’s sales plans. We will rightsize the production structure based on demand forecasts for each grade, including facility-related actions like revamping paper machines that make

grades with shrinking demand to manufacture grades that are promising for the future.

In optimizing the production structure, we also need to think about reducing GHG emissions. Furthermore, we must strengthen our business continuity plan (BCP) as a measure to mitigate impacts from disasters such as earthquakes and heavy rain. Three key steps to that end span a variety of fields. The first is having another mill temporarily make products for a mill should it sustain damage. The second is strategically holding inventory. The third is securing diverse modes of transportation for logistics. Strategic inventory entails thinking about when, where and how much of each product we should store and in what kind of packaging. Moreover, short-term financial impacts need to be considered when optimizing the production structure.

The entire industry has sustained considerable damage from COVID-19 over the past year. The Company’s paper sales volumes have also been affected significantly, including by a decline in inbound demand. However, we expect domestic demand to pick up to some extent as vaccination progresses going forward. Additionally, inbound demand could come back if COVID-19 treatments become available. Since we are making long-term

forecasts about demand growing, holding steady, or declining for each grade, we will advance initiatives in

line with those forecasts looking ahead a decade.

■ Importance of Anticipating the Market  
Five Years from Now

The Sales Planning Division’s basic policy for Medium-Term Business Plan 2025 sets measures to be taken during the first five years of the 2030VISION. Each sales division will look at changes in demand, and formulate an action plan. During the process, they will think about the best way to sell their products, naturally with an eye to medium-term earnings but also to factors such as environmental issues. Based on that, we will consider what kind of production structure is desirable and proceed with optimization. I believe that is how the process will work.

Making market projections about five years from now is not easy, but we will start with demand forecasts based on major trends. The production structure cannot be changed overnight. This is partly because we have social responsibilities and cannot immediately carry out any decisions to end

production. Moreover, recent social conditions call for companies to address a wider variety of issues, such as reducing GHG emissions, than before. This will take some time and money. Since the times will change quickly going forward, we will delve into how to address those changes.

Along the way, our many production bases located with good balance throughout Japan, production capacity, and technological capabilities that can accommodate diverse facilities will be tremendous strengths. When transferring grades to other mills, it takes time and energy to gain customers’ understanding about the justification and to maintain functions, quality, and so forth. It is therefore important to ascertain factors such as the life cycles of products in business and demand.

■ Contributing to a Better Environment and  
the Trend of Shifting to Paper

Reducing GHG emissions is a Company-wide task. The Sales Planning Division believes initiatives on the raw materials and logistics fronts are critical. For instance, if we specify our products are transported via environmentally friendly methods that reduce GHG emissions, they will be recognized as products responding to decarbonization and we will be fulfilling our responsibilities as a leading manufacturer. Customers are starting to make such requests in the printing and business communication paper domain, and we are working to address them.

One product that meets needs to shift from plastic to paper in fields that are likely to grow moving forward is SHIELDPLUS®, an eco-friendly paper-based barrier material.

SHIELDPLUS® was revamped in October 2020, and appears to be gradually gaining traction as more companies with a strong interest in environmental issues are adopting it. Uptake is greatest in the food industry, but SHIELDPLUS® is also being used for non-food applications such as cosmetics packaging. While it is mainly being used as secondary packaging now, we look to collaborate with R&D divisions to enhance the product’s barrier properties and expand

its adoption as primary packaging in the future.

We are promoting products to replace plastic with paper through our Paperizing Campaign, and working to strengthen relationships with customers. Specifically, in addition to engaging with companies like food manufacturers, we are holding exhibitions, moving forward with approaching local companies via our offices and factories, and carrying out promotional activities targeting high school clubs and universities addressing environmental issues, among others.

The Sales Planning Division will back up sales departments while providing them with information and advice, and optimize the production structure from a medium- to long-term perspective to enhance the competitiveness of foundation businesses.



SHIELDPLUS® product example



[Each Business's Strengths and Future Strategies]  
Paperboard Business



Leveraging our advantages as a specialized containerboard manufacturer to tap into the trend toward eliminating plastic and using more paper

**Satoru Muto**  
President, Nippon Tokai Industrial Paper Supply Co., Ltd.

Link strengths to opportunities		Address challenges and threats	
<ul style="list-style-type: none"> <li>Development and production of high-added-value products utilizing kraft pulp*</li> <li>Framework unifying sales and development</li> </ul>	Strengths	Weaknesses	<ul style="list-style-type: none"> <li>Stabilizing operations</li> <li>Low direct transportation ratio</li> </ul>
<ul style="list-style-type: none"> <li>Stable demand for packaging applications for daily necessities</li> <li>E-commerce-related demand</li> <li>Robust demand in Southeast Asia</li> </ul>	Opportunities	Threats	<ul style="list-style-type: none"> <li>Falling demand due to economic deterioration and population decline in Japan</li> <li>Soaring prices for containerboard wastepaper and other raw materials and fuel</li> </ul>

\* Pulp produced by boiling wood chips, the raw material, in caustic soda (i.e., pulping) to release the fibers

### ■ Cutting Costs to Secure and Maintain Steady Profits

The Paperboard Business revised its containerboard prices in fall 2018, and has since worked to maintain prices. Thanks to this, its profitability is now stable. Heading towards 2030, we will strive to maintain and sustain this steady profitability.

Such an achievement will require work on both the production and sales fronts. Firstly, we will strive to reduce production costs as a manufacturer. We decided to invest in cost reductions at the Fuji and Otake Mills, and must ensure to deliver ongoing returns on those investments moving forward. Also, stabilizing operations is a major task. It is especially critical that we fully utilize the Akita Mill's paper machine, which is among the biggest kraft liner machines in Japan, by stabilizing pulp equipment, boilers, and other operations at the mill.

On the sales front, transportation has been

streamlined since Nippon Paper Industries and Tokushu Tokai Paper Co., Ltd. formed a business alliance and we now have realized production in suitable locations. However, further steps to address CO<sub>2</sub> emissions are called for because trucks are mainly used for transportation. We also need to think about efficient transportation while promoting the White Logistics Movement backed by Japanese government bodies, which aims to improve logistics, partly given the truck driver shortage. Direct transportation is the mainstay for containerboards, but costs for secondary transportation and operating warehouses in areas where the products are consumed could be reduced by further raising the ratio of direct transportation. Shortening the transport distance is also an effective means of reducing CO<sub>2</sub> emissions.

### ■ Concentrating on Sales and Export Strategies and New Product Development

On the sales side, we will secure sales volumes and maintain prices, taking into account the balance between the two. Specifically, we must work even more closely with our equity-method affiliate Nippon

Tokan Package Co., Ltd. We also want to build even better relationships with prominent containerbox manufacturers across Japan, and will advance strategies so that major beverage manufacturers and other

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More Profitable

More Reliable

Data Section

companies select us as their designated supplier for base paper. Since containerboards are mostly general-purpose products, we must work to maintain prices and concentrate on optimizing costs to generate profits.

Export strategies, focused on the Akita Mill, will also be important. Sales costs to the domestic market for products of the Akita Mill are higher than for other mills since it is far from the Tokyo metropolitan area, but on the other hand, it is an excellent export base since it is a coastal mill. The Akita Mill's export competitiveness is increasing further since demand for containerboards is strong overseas, and China has become a promising export destination, in addition to Malaysia and Vietnam. We will also actively promote business collaboration with Opal.

Regarding new product development, it is vital that sales teams accurately grasp market needs. We developed water-resistant linerboard, a multifunctional containerboard, as an alternative to styrofoam in line with the move to use less plastic. Marine product companies and others are considering adopting this



Akita Mill, a coastal mill leading export strategies

product. Moving forward, we are looking to accelerate this product's promotion via an array of applications. Furthermore, we are proactively developing heavy-duty linerboard, which is currently mainly imported.

### ■ Anticipating Demand Expansion with Extensive Containerboard Applications

We have focused on generating and maintaining stable profits as a pillar of our business strategy under Medium-Term Business Plan 2025. Since COVID-19 has affected a wide range of industries around the world, the demand forecast work is not easy. However, we think trends for containerboards will be stable, underpinned by solid demand for use as a packaging material for everyday necessities.

Looking 5 to 10 years ahead with that perspective, we believe the beverage and processed food-related fields, major sources of demand, will continue to drive the containerboard business as they are strong and unaffected by market conditions. Demand related to produce is affected by factors like the weather but should basically be stable. Additionally, we expect growth moving forward related to e-commerce since it entails the use of containerboards for transporting goods and has expanded during COVID-19. On the other hand, sales related to mechanical, electrical, automotive, and other components do fluctuate since economic and supply chain issues are involved.

In a society with an aging population and declining birth rate, dampening of domestic demand for food

on the whole is a concern. However, containerboard applications are extensive and the demand therein will not significantly decline. Containerboards excel as packaging material that can be steadily purchased and as recyclable, eco-friendly products from the standpoint of environmental considerations and the Sustainable Development Goals (SDGs). We therefore expect containerboard demand to stay strong. Moreover, we can reap benefits from the trend to replace plastics and styrofoam with paper. Going forward, I believe there will be a need for functions like water resistance in containerboards as well. We developed water-resistant linerboard, and look to greatly expand on products with additional functions in the future.

As a specialized containerboard manufacturer with kraft pulp facilities, we have an edge. Our ability to develop high-value-added products using kraft pulp manufactured in-house is also an advantage. While leveraging those strengths, we will step up R&D efforts incorporating user needs and continue to underpin profits as a foundation business of the Nippon Paper Group.



## [Each Business's Strengths and Future Strategies] Domestic Packaging Business



Aiming to leverage our strengths as an integrated system supplier to expand sales to the global market

**Yasuhito Obayashi**  
Managing Executive Officer  
General Manager, Paper-Pak Sales Division, Nippon Paper Industries Co., Ltd.

Link strengths to opportunities		Address challenges and threats	
<ul style="list-style-type: none"> <li>One of only a few integrated system suppliers in the world</li> <li>World-class technology for developing paper cartons and filling machines</li> </ul>	<b>S</b> Strengths	<b>W</b> Weaknesses	<ul style="list-style-type: none"> <li>Insufficient global market share</li> </ul>
<ul style="list-style-type: none"> <li>Expansion of the paper carton market for non-beverage applications</li> <li>Demand for filling machines to increase efficiency and save labor accompanying the decrease in the working population</li> <li>Demand for eco-friendly products</li> </ul>	<b>O</b> Opportunities	<b>T</b> Threats	<ul style="list-style-type: none"> <li>Declining younger population in Japan and beverage market diversification</li> <li>Escalating competition in the paper carton market</li> </ul>

### ■ 2030VISION: Aiming to Be a Global, First-Class Business

The Paper-Pak Business is central to the Nippon Paper Group's Daily-Life Products Business, and ideally positioned for further growth. Over the past five years, we have developed and launched differentiated, new products mainly in the domestic market. However, we will broaden our target to the global market moving ahead, setting our sights on heightened demand for paper cartons worldwide. We have established a vision that targets major sales growth and becoming a global, first-class business by 2030; in other words, ranking among the top four globally.

We regard the five years leading up to 2025 as especially important to achieving the 2030VISION, and will forge ahead with initiatives based on three key themes under Medium-Term Business Plan 2025.

The first key theme is thoroughly reinforcing the packaging business for the domestic beverage market, which is the third largest in the world. In FY2021/3, sales rose 15% from five years ago despite headwinds from COVID-19, thanks to growth in sales of differentiated, high-value-added products. Over the next five years, we will work to expand market share and acquire new customers as we harness the beauty and full-surface printing afforded by paper cartons to propose to customers designs that appeal to consumers, while emphasizing strengths in terms of environmental factors, targeting

plastic containers in particular. Turning to filling machines, we have developed models with functions and capacity that can compete with those for plastic containers. Examples include NSATOM®, which is the world's first multifunctional filling system for aseptic paper cartons with support for beverages with particles and long fibers; UPN-SEC14, which is a highly hygienic filling machine for paper cartons with attached closures for chilled products; and UP-MC240, which boasts the world's fastest filling capacity for school milk cartons at 24,000 per hour. Moving ahead, we will continue to bolster the filling machine business. Based on our success in the domestic market, we will set out to capture the global market in the future.

The second key theme is cultivating new business fields. Paper cartons are also seeing growing demand for industrial applications. For instance, we started selling SPOPS® replaceable containers for shampoo in 2019, and demand for switching to paper cartons for disinfecting and sanitizing products, such as alcohol and surfactants, has arisen amid the normalization of measures to address COVID-19. Most of those products require long-term storage at room temperature, and there were numerous technological and other challenges to practical application. However, we succeeded in developing SPOPS® Hygiene specially designed for disinfectant

applications, of which commercial sales will commence in 2H FY2022/3. We will also promote the use of paper cartons as sustainable packaging for refills from the standpoint of recycling. Additionally, we will commercialize maintenance services for our filling machines utilizing IoT, and develop sales of kraft paper wrapping machines.

The third key theme is global market development. In June 2021, Nippon Paper Industries acquired a portion of shares in Elopak ASA, a Norway-based liquid packaging carton company. Elopak has large markets, mainly in Europe and North America, and is

robustly pursuing development of environmentally friendly products in line with its declaration to contribute to a low-carbon, circular society on a global scale. The Company and Elopak have been deepening their relationship for over three decades since they first entered into a licensing agreement. With this acquisition of shares, we will build on our business alliance with Elopak, including by utilizing its overseas sales network to accelerate global sales of our new products.



SPOPS® Hygiene product

### ■ Steps to Enhance Technological Capabilities and Cost Competitiveness

To powerfully advance such initiatives, we must enhance our technological capabilities and cost competitiveness. The three points described below will be especially important.

The first point is capital investment. The biggest topic is fully utilizing the central impression (CI) flexo printing press, which will start operating in October 2021. It is a state-of-the-art printing press that features eight colors, roughly double the printing capacity of conventional printing presses, and is compatible with small-batch, high-mix production. It can therefore increase efficiency and significantly reduce costs compared with conventional printing presses.

The second point is new product development. With regard to filling machines, we are making steady progress developing new models with Shikoku Kakoki Co., Ltd. under the capital and business alliance we forged in 2019. We already rolled out the NSATOM® aseptic filling system for paper cartons based on the new concept of making storage at room temperature possible, and will speed up development and launches of new products so as to continue to receive exceptional ratings in Japan and overseas going forward. As for containers, we will

develop and expand sales of environmentally friendly products such as School POP® straw-less paper cartons.

The third point is effective utilization of liquid packaging board produced in-house. In the past, we relied on imports from other companies for liquid packaging board. But in 2016, we acquired Weyerhaeuser Company's liquid packaging board business, and established Nippon Dynawave Packaging Company, LLC in the United States. And at the Otake and Shiraoi Mills in Japan, we manufacture liquid packaging board for aseptic containers stored at room temperature. Currently, about 70% of liquid packaging board used by the Nippon Paper Group is produced in-house. This has enabled us to include liquid packaging board as a part of our new product development scope. Also, we have strengthened the production structure from a BCP perspective by making it possible to produce liquid packaging board at several bases, which allows us to respond flexibly to natural disasters, international risks, and so forth.



School POP®  
adopted by Himawari  
Milk Company

### ■ Paper Carton Business Headed for an Even More Exciting Future

The global trends towards a decarbonized society and the use of less plastic present tremendous business opportunities for paper cartons. Demand for paper cartons is steadily growing, and we believe paper carton business will become even more exciting from here on out.

We have built a robust business foundation as an integrated system supplier handling everything from liquid packaging board to converting, filling machines,

maintenance service, and recycling, and can compete on all fronts such as liquid packaging board, paper carton converting, and filling machines. That is a unique strength that globally famous paper carton competitors do not have. While leveraging that strength to proactively launch differentiated products at an early date and undertake M&A in the global market, we will work to realize the 2030VISION.

## [Each Business's Strengths and Future Strategies]

## Opal



Growing our profitability as an integrated fiber-based packaging company by strengthening the foundations of our business and responding to the opportunities created by social change

**Masanobu Iizuka**  
Chief Executive Officer, Opal

Link strengths to opportunities		Address challenges and threats	
<ul style="list-style-type: none"> <li>Integrated production system from raw material procurement to manufacturing base paper and converting</li> <li>Providing packaging solutions to meet customer needs</li> </ul>	<b>S</b> Strengths	<b>W</b> Weaknesses	<ul style="list-style-type: none"> <li>Structural separation between Business Units</li> <li>Duplication of functions in the post-acquisition value chain</li> </ul>
<ul style="list-style-type: none"> <li>Environmental awareness in Australia and New Zealand and the trend to replace plastic with paper</li> <li>Expanding demand for e-commerce</li> </ul>	<b>O</b> Opportunities	<b>T</b> Threats	<ul style="list-style-type: none"> <li>Decline in global demand for printing and writing paper</li> <li>Increased manufacturing costs due to higher energy prices</li> </ul>

## ■ Opal's Vision

Following its foundation in May 2020, Opal has been promoting its Vision: "Opal shapes the future through sustainable packaging." After an extensive engagement process involving close to 1,200 team members, the company confirmed the following five key Values (Codes of Conduct): Safe (We put safety at the centre of everything); Agile (We thrive through change); Extraordinary (We go above and beyond); Collaborative (We are better together); and Trustworthy (We do what we say). In order to realize its Vision as an integrated fiber-based packaging company, Opal aims to grow together with its customers in alignment with the Values created by our team members.

To achieve this, the company will leverage its strengths in an integrated production system from procurement of raw material including wood resources and waste cardboard, through to manufacturing base paper and converting, not only to deliver better products to customers, but also to provide the market with a full range of fiber-based packaging and converting solutions. In addition, the move to adopt sustainable packaging has been rapid in Australia and New Zealand, where environmental awareness is high. Opal will continue to expand its packaging business by focusing on the opportunities presented by the trend

to replace plastic with paper; supplying the market with new materials and products.

As the impact of COVID-19 continues, the company is committed to the health and safety of its team members and their families in accordance with its Values, and is taking all possible measures to manage our operations safely. The pandemic has made the business environment extremely uncertain, and the company will continue to make every effort to win trust by providing customers with the packaging solutions that they require.



The Opal Values (Codes of Conduct)

## ■ Towards Achieving Medium-Term Business Plan 2025

Under Medium-Term Business Plan 2025, Opal has established two basic policies: 1) Maximize profits from existing businesses and 2) Expand new business domains.

With regard to the first policy to maximize profits from existing businesses, as the company continues to align its businesses as "One Opal," it is centralizing the commercial functions that have been spread across each business. This is enabling the company to move its organization to a more efficient structure and ensure that integration synergies are realized. This will also allow it to identify and focus management resources on growth opportunities.

In addition, Opal is taking steps to optimize its supply chain to make the company even more cost competitive. This includes reducing costs through centralized procurement, consolidating duplicate warehouses created by the acquisition, and establishing a more efficient transportation management system. In operations, the company is working to establish common KPIs across all Business Units to establish integrated standards and ensure

maximum efficiency.

Under the second policy of expanding new business domains, the company is working to develop new materials and sustainable products. Opal will focus on providing products that promote the shift from plastic to paper by making use of its own facilities and through collaboration with the Nippon Paper Group, with the aim of expanding its business.



## ■ High Environmental Awareness Presents a Major Opportunity

The Oceania region is expected to experience both population and economic growth going forward, with an attendant increase in demand for corrugated packaging also anticipated. Capturing expanding demand from e-commerce in response to lifestyle changes also represents a chance for the company to expand its business.

The Australian federal and state governments support the target of making all packaging materials reusable, recyclable, or compostable by 2025, and are working to further develop the domestic recycling industry and expand demand for recycled products. In line with this, many major food and FMCG companies, the Quick Service Restaurant sector, and retailers are developing sustainable packaging strategies and are moving towards eliminating or reducing their consumption of single-use plastic materials. This trend represents an extremely important business opportunity for Opal, which is well positioned as a fiber-based packaging business.

On the other hand, threats include the decline in global demand for printing and writing paper. This market decline has accelerated with the impact of COVID-19. In addition, high energy prices have been increasing the cost of manufacturing. As a counter

measure, Opal is currently exploring Energy from Waste projects at its two paper mills in collaboration with a range of partners.

Going forward, Opal will strengthen its ties with the Nippon Paper Group to take advantage of economies of scale to reduce procurement costs and switch from externally sourced base paper to Group products. Nippon Paper Industries and Opal will combine and develop their respective strengths in manufacturing technology and efficiency improvements for base paper production to benefit the Group. The company will make use of new materials from the Nippon Paper Group to produce products that respond flexibly to a range of needs in the Australian and New Zealand markets, as they pursue a shift from plastic towards paper.

Opal aims to steadily complete the structural integration process and achieve its business plan. In addition, as the company improves its structure as an integrated fiber-based packaging company, it will seize the opportunity presented by rapidly growing demand for sustainable packaging and seek to expand the packaging business quickly through the provision of new products and innovation.



## [Each Business's Strengths and Future Strategies] Household Paper and Healthcare Business



Contributing to healthy, hygienic living through product development that will drive lifestyle changes

**Kazumori Fukushima**  
President and Representative Director, Nippon Paper Crecia Co., Ltd.

Link strengths to opportunities		Address challenges and threats	
<ul style="list-style-type: none"><li>Raw material is sustainable woody resource</li><li>Strong brands, technological capabilities, marketing capabilities</li><li>Production sites near major consumption areas</li></ul>	<b>S</b> Strengths	<b>W</b> Weaknesses	<ul style="list-style-type: none"><li>Large number of competitors</li><li>Inefficient aspects of operations and logistics</li></ul>
<ul style="list-style-type: none"><li>Demand for products that are environmentally friendly</li><li>Increase in needs for health and hygiene</li></ul>	<b>O</b> Opportunities	<b>T</b> Threats	<ul style="list-style-type: none"><li>Capacity expansion by competitors</li><li>Fluctuation in raw material and fuel prices</li></ul>

### ■ Hygiene, Health, and the Global Environment Are Key Themes for Product Development

Nippon Paper Crecia Co., Ltd. has adopted a corporate philosophy of providing valuable products and brands that can contribute to health and hygiene, from the customer's perspective. Guided by this philosophy, the company focuses on product development that is responsive to lifestyle changes, aiming to contribute to healthy, clean lifestyles.

The key themes underpinning the company's product creation are hygiene, health, and the global environment. By reflecting customer feedback in product development and conducting proper marketing, the company will strive to respond to changes in lifestyles and living environments in its product development. In addition, the raw material used by the company is based on sustainable woody resources. It is one of the company's strengths that its business is directly linked to an environmentally friendly image.

In April 2021, the company stopped producing its usual 12-roll packs of toilet paper and changed to long-lasting rolls. This has contributed to improved customer convenience and logistics efficiency, and reduced the use of resources like cardboard cores, thereby helping to reduce greenhouse

gas emissions. Looking ahead, the company plans to develop similar benefits for other products. In other efforts, the company has started sales of toilet rolls wrapped in paper-packaging, rather than plastic film, mainly sold through the e-commerce channel, and there are plans to increase the paper wrapped product lineup and to expand sales channels going forward. Likewise, the company needs to make further progress on responding to the global environment and customer needs by increasing its technological capabilities.



Paper-packaged tissue paper SCOTTIE® CASHMERE® NATURAL

### ■ Telling an Appealing Story to Gain Better Understanding of Product Value

Medium-Term Business Plan 2025 covers a five-year period during which the company will create a foundation for developing valuable products that will drive lifestyle change and products that will contribute to the global environment in order to realize the company's vision for 10 years in the future. With this foundation, the company will be able to expand its business even further in the following five years.

In the second five-year period, the emphasis will shift to product development based on the technological capabilities developed by that point and marketing capabilities to accurately communicate the benefit of the products developed. Recently, the purchasing methods of end users have been diversifying. The company will examine the most suitable marketing activities for each product, based on big data analysis using digital technology and so forth. In the field of e-commerce in particular, the company will leverage these data to further sales promotions.

On the other hand, it is necessary to make sales strategies for household products that encourage customers to actually grab products in stores. This requires creating and communicating a story to promote product value. That is to say, rather than simply selling a thing, the process must start with

communicating the value of that thing.

For the long-lasting rolls for household use, such a story effectively conveys product differentiation. For tissue paper, value addition and differentiation has yet to be accomplished. The development and marketing divisions are working on how to achieve this.

In healthcare products, the company aims to help customers to understand the odor-eliminating effects of cellulose nanofiber (CNF), and use this as a competitive advantage over other companies to expand market share. The company's focus will be on increasing exposure of these products through advertising such as TV commercials, as well as product improvements and new development aligned to customers' needs. Since it is difficult to convey the high performance of these products without actually using them, finding the most effective way to communicate is a challenge. Looking forward, the company will also focus on developing eco-friendly products. The healthcare product market is becoming much more competitive as society ages. In this situation, it is extremely important to ensure that consumers understand the true value of the company's products if they are to be the product of choice.

### ■ Envisaging Our Growth Using the Combined Capabilities of the Group

Under Medium-Term Business Plan 2025 measures for increasing the top line include taking on the role of an industry pioneer to drive a shift towards long-lasting rolls. Furthermore, in hand towels, the company integrated the sales functions of Try-Fu Co., Ltd. in October 2020, and expects to increase its top line by mutually sharing distribution channels. In particular, expanding sales through Try-Fu Co., Ltd.'s proprietary commercial product distribution channels are expected to deliver synergy effects. On the other hand, Try-Fu Co., Ltd.'s home-use products are also starting to be sold through the company's distribution channels, and the two companies are both seeking to realize a win-win situation.

Looking ahead, concerns for the company include increased competition as well as fluctuations in pulp price for raw material. As measures to alleviate these concerns, the company aims to increase the use of pulp manufactured within the Nippon Paper Group to

ensure stable earnings without supply instability.

In terms of logistics, the company's challenges are to further simplify and streamline its processes. While promoting pallet transportation, the company also needs to introduce digital technologies such as IoT and AI and take steps to help frontline employees use their time as efficiently as possible. Regarding the actual manufacturing operation, some previously manual processes at the Tokyo Mill are now being performed by robots.

To achieve the 2030VISION, under Medium-Term Business Plan 2025 the company will pursue product development that can meet customers' needs in order to stay ahead of changing lifestyles. The next step is to further expand the company's business domains and harness the combined capabilities of the Nippon Paper Group to drive the company's growth.



Meticulous about the B2B business style and proactively propose useful products to customers

**Kazunori Itaya**  
Executive Officer  
General Manager, Chemical Sales Division, Nippon Paper Industries Co., Ltd.

Link strengths to opportunities		Address challenges and threats	
<ul style="list-style-type: none"><li>Diverse product groups including wood-based and natural materials and technical resources</li><li>A business style of presenting, developing and providing products that are useful to customers</li></ul>	Strengths	Weaknesses	<ul style="list-style-type: none"><li>Investment cost to upgrade production equipment</li><li>Production is low-scale and high-cost</li></ul>
	Opportunities	Threats	<ul style="list-style-type: none"><li>Optimizing a wide diversity of businesses</li><li>Rapid societal changes greater than expected</li></ul>

### Aim to Create Win-Win Partnerships

Our division is based on a B2B business style centered on a wide range of products used in various fields and seeks to expand sales while earning the trust of customers. To put it another way, rather than developing products that customers want, our basic stance is to provide customers with useful products. Based on a philosophy of product-oriented evolution conscious of marketing, we have always strived to brainstorm with customers, proactively propose useful products to them and develop new products, and this style will continue going forward.

Our division has developed with a focus on comprehensive use of wood, including dissolving pulp,

lignin, fermentation and cellulose. At the same time, to ensure a good balance of earnings, we have also proactively engaged in businesses using chlorination, synthetic concrete admixture and film coating technologies. From that standpoint, over the next 10 years, including Medium-Term Business Plan 2025, the Chemical Business will aim to further expand under a policy of accurately grasping the needs of changing times and providing products that satisfy market demand in a timely fashion.

In so doing, it will be important to create more beneficial corporate partners to generate win-win relationships on a B2B basis.

### Looking Ahead 10 Years and Using 4 Key Phrases as Opportunities

Looking ahead 10 years, we are adopting 4 key phrases: environmental issues, food issues, the aging society and DX (digital transformation). We want to be involved in multiple aspects of each of these key

phrases with a wide variety of products, and already have the resources to move forward.

Firstly, regarding environmental issues, we sell renewable woody resource cellulose in a variety of

fields, and its application is expected to expand further going forward. The division is also already selling raw materials for lithium-ion and lead acid batteries. Growth is expected in the future with demand increasing as electric vehicles require both types of batteries.

Then, regarding food issues and the aging society, realizing food safety, security and stability is an important issue. We are focusing on the livestock and aquaculture industries to sell and develop supplements that do not contain antibiotics or synthetic compounds. Various evidence is currently being gathered and preparations made to expand sales in the future. The division is selling raw materials for new functional ingredients and plant-based sweeteners that will support health maintenance and can also support provision of drinks that are easily consumed by the elderly.

Finally, regarding DX, the progress of IT means more work will be done on screens such as smart-phones and computers in the future. The division has already achieved many results with highly functional films related to displays, and will continue to do so. Moves responding to the 4 key phrases are underway. Work to increase production capacity is also moving forward to prepare for further market expansion. The aim is to expand business by accelerating

those initiatives while having close communication with customers.

These key phrases do not only present opportunities, but also threats. We have developed many products and brands, and must estimate whether demand for each product will increase, decrease, rebound or worsen over the next 10 years, and such decisions carry risk. Naturally, resources are also limited, so their reallocation is also a challenge. Put another way, it is important to resolutely decide where to apply offense or defense, go with the flow of the times and connect this to generating profits and solving social issues.

Examples of cellulose in use



### Strengthening Profitability through Development-Led Sales Proposals and Human Resource Training

We believe the rapid changes currently taking place in the world are inevitable. The division has been preparing to respond to these changes. However, due to the COVID-19 pandemic, changes occurred faster than envisaged and we have to shift up a gear.

Moreover, the division is involved in the development of many products that are raising expectations even within Nippon Paper Industries, and we must collaborate with associated divisions to link new products to profits as soon as possible.

A three-in-one system of sales, R&D and production are indispensable for timely provision of products needed by markets. Sales and R&D teams work together to anticipate what customers will need going forward, the R&D teams give that shape and make proposals, and the production team

provides stable supply. Maintaining this development-led proposal sales function is an important theme for our division.

To achieve this theme and bolster profitability, it is important to secure outstanding human resources. We need to nurture human resources that are able to grasp global trends and draw their own conclusions. Overseas strategies are also important, so we need to have human resources that can stand strong.

We believe that our division's resources and distribution channels will definitely be useful for the new products that will support the Nippon Paper Group's growth. We will be involved in more new products launched by the Company, and will produce solid results at this major turning point for the Group.



## [Each Business's Strengths and Future Strategies] Energy Business



### Promoting decarbonization and carbon neutrality by reviewing the energy mix and adopting new fuels

**Yoshinori Matsubara**  
General Manager, Energy Business Division  
Nippon Paper Industries Co., Ltd.

Link strengths to opportunities		Address challenges and threats	
<ul style="list-style-type: none"> <li>Accumulation of technology, facilities and expertise cultivated over many years of paper production</li> <li>Use of wood-based fuel leveraging a wood materials procurement network</li> </ul>	<b>S</b> Strengths	<b>W</b> Weaknesses	<ul style="list-style-type: none"> <li>High ratio of fossil fuels in the energy mix</li> <li>Issues of cost and damage to social reputation due to significant use of coal</li> </ul>
<ul style="list-style-type: none"> <li>Needs for biomass fuel to achieve carbon neutrality in 2050</li> <li>Future potential of hydrogen-using technology</li> </ul>	<b>O</b> Opportunities	<b>T</b> Threats	<ul style="list-style-type: none"> <li>Increasing environmental awareness among the public</li> <li>Move to introduce carbon pricing</li> </ul>

## ■ Initiatives to Achieve the Ambitious 2030 GHG Reduction Target

The Company has responded to the Japanese government's 2050 carbon-neutral declaration by setting an ambitious target to reduce the volume of its greenhouse gas (GHG) emissions by 45% from FY2014/3 levels by FY2031/3. As the Company strives for this goal in 2030, it will begin by switching from fossil fuel to non-fossil fuel for its in-house electric power generation in as many areas as possible, aiming to increase the ratio of non-fossil fuels used. At dedicated electricity selling facilities, the Company will also follow a basic policy of decreasing the ratio of fossil fuels and increasing that of non-fossil fuels, thereby reducing GHG emissions. By making a concerted effort in these initiatives, the Company's vision is to arrange a business situation that will make its stakeholders proud by 2030.

Under Medium-Term Business Plan 2025, the Company will work step by step to achieve the

challenging numerical target for in-house power generation in 2030. Up to now, coal has accounted for over half of the Company's total fuel use, at around 2 million tonnes per year. By 2030, the Company must reduce this to 1 million tonnes. This target has been set in consideration of what kind of fuel is currently optimal for society, as well as the Company's energy conversion measures.

Under the 2030VISION, the Company will proceed to review the energy mix, reduce fossil fuel usage by reorganizing its production structure, and promote development and social implementation of biomass fuels. From 2030 to 2050, the Company will convert its energy use base, aiming to realize carbon neutrality. To this end, the Company plans to improve its energy mix by making capital investments in the order of approximately ¥52.0 billion for environmental responses by FY2031/3.

## ■ Promoting Increased Use of Non-Fossil Fuels Using Existing Infrastructure and Technology

The specific direction towards achieving carbon neutrality in 2050 has yet to be determined worldwide, and there is not a clear projection of the future

condition of the social framework, technologies, and fuel markets. The Company will respond flexibly using its existing infrastructure to the fullest extent, until it

achieves the conversion of its energy use base.

To make paper, the Company has generated electricity by turning turbines with steam from boilers, making further use of the same steam as the source of heat for the production process. For this reason, the Company's infrastructure and electricity generation technology developed over many years is one of its strengths, and we have electricity generation capacity of around 2 million kW, which is rare in private sector companies aside from power companies. The Company's basic strategy in the 2030VISION and Medium-Term Business Plan 2025 is to use these strengths to realize the GHG reduction target of FY2031/3.

As a specific measure, the Company is maximizing the biomass combustion ratio in its existing coal-fired boilers for both in-house electric power generation and dedicated electricity selling facilities,

to clear electricity generation efficiency regulations for coal-fired thermal power generation. At the Ishinomaki Hibarino Power Plant (Nippon Paper Ishinomaki Energy Center Ltd.), the current maximum biomass combustion ratio is 30%. By expanding the combustion ratio, the plant can be converted to a power source with even higher environmental added value, contributing to the further increase of non-fossil fuel use in society.

However, external procurement will not satisfy the required volume of biomass fuel, and the Company is therefore taking steps to develop its own carbon-neutral biomass solid fuel and practically implement it in society. In addition, the Company aims to further reduce the amount of coal used by combining use of low-carbon fuels such as waste-oriented fuels and wood pellets.

## ■ Expected Start of Operation of 100% Biomass Power Generation Facility

Looking ahead, as public environmental awareness continues to increase, the Company is receiving requirements from its corporate customers to present high figures regarding GHG emission reductions per product. A major challenge is whether or not the Company can produce energy with zero fossil fuels in response to these requirements. The Company also purchases electricity, and not all of it is green electricity. Given this situation, one of the Company's major challenges is how to adhere to the demanding targets from society.

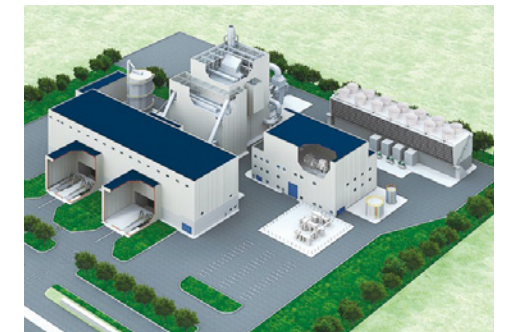
Carbon pricing is another movement that the Company cannot ignore. If it is to be actually incorporated into a system, then the cost of electricity generated using coal would effectively increase several-fold. This would increase production cost, as well as a perceivable risk that the Company's products would cease to be preferred in Japan and overseas if the Company were to continue using coal. As a countermeasure against this, the Company has made various internal investments in energy saving and has also introduced internal carbon pricing since July 2021. Furthermore, in April 2021, the Company agreed with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and will be promoting public disclosure of its climate-change initiatives.

In converting its energy use base from 2030 to 2050, the Company will promote initiatives towards decarbonization and carbon neutrality and internally develop biomass fuel as a new fuel. The Company's energy use base conversion going forward is, in effect, the utilization of new energy sources, primarily hydrogen, which is a green energy source that does

not emit CO<sub>2</sub>. The Company has expectations for hydrogen-based ammonia and carbon-neutral methane synthesized from hydrogen and CO<sub>2</sub>. In addition to these clean fuels, the Company will also strategically promote the use of green electricity generated from hydrogen.

With regard to the electricity sales business, the Yufutsu Biomass Power Plant (Yufutsu Energy Center, LLC), which features one of the largest biomass power generation facilities in Japan, is to begin operation in January 2023. The power plant will be fueled with wood chips and unused domestic wood. The use of these wood chips cannot be imitated by other companies as it relies upon the Nippon Paper Group's network developed for procurement of raw materials for paper. The Company also has high expectations for a power generation business at the Yufutsu Biomass Power Plant.

The Company is also promoting an ambitious project, unprecedented in Japan, of converting its coal-fired Suzukawa Thermal Power Plant (Suzukawa Energy Center Ltd.) into a biomass mono-firing power plant. Looking ahead, the Company will continue driving initiatives aimed at achieving the challenging targets of reducing GHG emission by 45% in FY2031/3 and becoming carbon-neutral in 2050.



CG rendering of the completed Yufutsu Biomass Power Plant

## [Each Business's Strengths and Future Strategies] Wood/Building Material Business



Utilizing the wood material procurement network to  
facilitate rapid growth in the domestic lumber business

**Kunihiko Hayama**  
President and Representative Director,  
Nippon Paper Lumber Co., Ltd.

Link strengths to opportunities		Address challenges and threats	
<ul style="list-style-type: none"><li>Nationwide procurement network for wood chips used in paper manufacturing</li><li>Procurement and supply system for wood chips used as fuel</li><li>High flexibility to change</li></ul>	<b>S</b> Strengths	<b>W</b> Weaknesses	<ul style="list-style-type: none"><li>Business related to housing, which is in decline</li><li>Decreased demand for paper</li></ul>
<ul style="list-style-type: none"><li>Expansion of the domestic lumber supply ratio</li><li>Replacement of imported lumber with domestic lumber</li><li>Increase in biomass power generation facilities</li></ul>	<b>O</b> Opportunities	<b>T</b> Threats	<ul style="list-style-type: none"><li>Downturn in demand for wood products following a decline in the number of new housing starts</li><li>Lack of forestry workers</li><li>Low productivity of forestry industry</li></ul>

### ■ Aiming to Significantly Increase the Handling Volume of Domestic Lumber

A theme important to Nippon Paper Lumber Co., Ltd. in the 2030VISION is to expand the domestic lumber business, which is one of the company's strengths, and to focus on expanding the fuel supply business for the energy sector in order to build a business foundation that will offset the declining trend in the housing and paper-related businesses.

In regard to the domestic lumber business, the company seeks to establish a firm position as the leading company by 2030. The company has developed a nationwide procurement operation for wood chips for paper, which it supplies to Nippon Paper Industries. One of the company's strengths is its ability to use this procurement network for procuring domestic lumber. When the company was originally

established, around 80–90% of the lumber handled by the company was imported. In the future, the company plans to gradually reduce its procurement of imported lumber and actively switch all of its supply to domestic lumber. Harnessing the strength of its domestic lumber procurement network, the company will increase its share of the domestic lumber market, aiming to supply over 1 million m<sup>3</sup> per year by 2025, and 1.5 million m<sup>3</sup> by 2030.

With regard to the fuel business for the energy sector, the company will leverage the strength of its fuel wood chip procurement and supply network to steadily capture growing needs for biomass power generation and aim to expand the business.

### ■ Initiatives to Support the Increase of Forestry Workers

The perceived threat to the achievement of these objectives is the declining and aging population of Japan, accompanying a decrease in the birthrate. By 2030, the number of new housing starts is projected to decrease by around 30% from 2019 levels, to around 630,000. Naturally, new housing starts are a

key driver of wood product demand, and if no action is taken, the industry itself may collapse due to the decrease in volume, causing the company to have a sense of crisis.

In response, the company has prioritized its initiatives to expand the domestic lumber business.

Japan's wood product self-sufficiency rate is somewhat low at 38%. The government aims to increase the rate to 50% or higher by 2025, and the supply of domestic lumber is steadily growing. However, the growth has now plateaued, mainly due to a lack of forestry workers. Japan is presently dependent on imported lumber for homebuilding, and there have been cases of unreliable import flows and high prices caused by rampant lumber demand in the U.S. and China and a global container shortage. The number of new housing starts is expected to continue to decline going forward, and by switching from imported to domestic lumber and increasing the ratio of the latter, the company aims to maintain its sales even as the market contracts. This is a key point of the domestic lumber business expansion strategy.

The company's strengths in terms of its nationwide wood products procurement and supply networks will be demonstrated in this strategy, while on the other hand the company also recognizes risks

such as the unmaintained state of mountain forests, low productivity of the forestry industry, and the serious shortage of forestry workers. For that reason, the company will concentrate its efforts on policies to increase forestry workers. In Hokkaido, the company is already conducting initiatives to train personnel from other industries to be forestry workers and provide them work, an effort that is resulting in an increase in workers. As the initiative has been successful, the company will implement it in other areas going forward.

To expand the domestic lumber business, the company will strengthen collaboration within the Group. Group company N&E Co., Ltd. produces medium-density fiberboard (MDF), using almost 100% domestic lumber as raw material. In addition to using domestic lumber, the company also has expertise in engineered wood,\* which it will leverage to help expand the domestic lumber business.

\* Secondary processed wood products with calculated, evaluated, and guaranteed strength characteristics

### ■ Strengths in Expansion of Fuel Business As Well

Another strategic pillar is expansion of the fuel supply business in the energy field. The company participates in the business of supplying biomass power plants from the planning stage of the power generation equipment. If all of the installations currently in progress become operational, it will generate new sales of around ¥30.0 billion through expansion of fuel wood chip supply.

The key to expanding this business is also the domestic lumber procurement network. The purpose of this network is to procure wood chips for making paper, but it can also be used to procure fuel wood chips and as a system for supplying fuel wood chips to boilers throughout Japan. This logistics infrastructure also includes a Group company that operates a maritime shipping business, enabling fuel wood chips to be transported over a wide area.

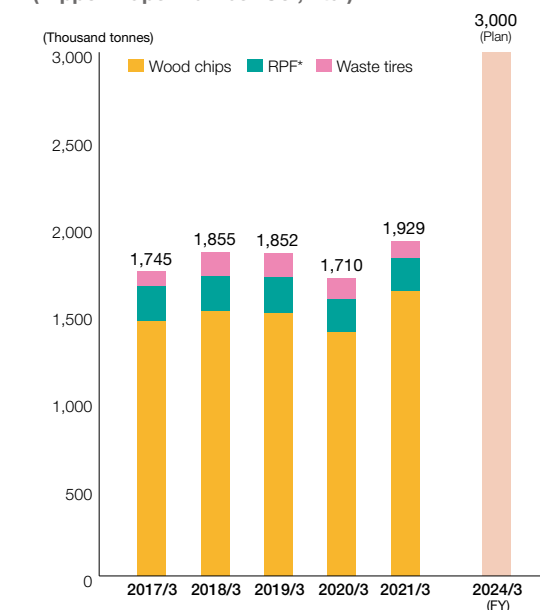
The volume of fuel handled in FY2021/3 was around 1.9 million tonnes, but the company plans to increase this to around 3.0 million tonnes by FY2024/3. These figures include not only domestic lumber, but also imported wood chips and imported pellets. The company will use domestic lumber procured through its network, along with a portion of imported fuel chips for large-scale boilers that consume large quantities of fuel.

Currently, around 200 people are working as a small but powerful team in the company. Although the scale may be small, this makes it easier to get everyone focusing their aims in the same direction. Employees responsible for wood chips for paper

manufacturing may be reallocated to focus on fuel wood chips depending on developments going forward. Employees are being trained so that they will be able to respond flexibly regardless of the situation.

The company is highly flexible to change. In an era where the pace of change is proceeding even faster, the entire company will work as one as it continues to evolve.

History and Plan Regarding Handling Volume of Fuel (Nippon Paper Lumber Co., Ltd.)



\* RPF stands for refuse derived paper and plastics densified fuel that is pellet fuel made from paper and plastics industrial wastes which are difficult for recycling.



## Accelerate Business Transformation

## Launch of the Biomass Material Business Division



## Building a New Material Business and Promoting Early Commercialization

**Mitsuhiro Sugino**  
Executive Officer  
General Manager, Biomass Material Business Division  
Nippon Paper Industries Co., Ltd.

### ■ Undertaking the Group's Business Transformation and Strengthening of External Collaboration

The Biomass Material Business Division was established as an organization for powerfully promoting business transformation, which is a pillar of the 2030VISION and Medium-Term Business Plan 2025. It plays two important roles to achieve the numerical targets of the 2030VISION and Medium-Term Business Plan 2025. The first is to provide cross-divisional penetration throughout the Group, creating a structure that will drive Group-wide business transformation. The second is to play a central part in strengthening collaborative external relationships with other industries, university research institutions, etc.

Previously, the former Innovative Material Sales Division responsible for CNF and MinerPa® mainly worked on sales expansion with the support of other business divisions and affiliated companies. However, such structures were subject to resource limitations. A key strategy of Medium-Term Business Plan 2025 is for the division to fully utilize the diverse channels, knowledge, experience, and network of the entire Group to sell innovative materials. For this reason, the division is positioned not as a sales division, but as a business promotion division, a function that involves building the business. The Group's sales targets for innovative materials overall are for ¥15.0 billion in FY2026/3 and ¥65.0 billion in FY2031/3. The Biomass Material Business Division is deeply

committed to drive them.

As a specific measure for achieving this, the division has set up a cross-divisional project structure for each new material and will promote multiple projects in parallel. In addition, the division will share information and liaise between projects, promoting highly efficient operation. Project members are not fully fixed, allowing resources to be provided as needed. Each project conducts careful progress management and makes regular reports to the Group Management Strategy Committee. The committee's opinion will form a reference point for conducting a PDCA cycle.

Another initiative is to strengthen collaboration with external partners, as mentioned above. In promoting the commercialization of innovative materials, there is always some technology that cannot be supplied from inside the Group, necessitating external collaboration. To produce ideas such as new application development and so forth, it is important to have collaboration not only with companies, but also universities. The company currently has joint research ventures in place with multiple universities for different materials. Going forward, we will further increase communication with outside organizations to enable even deeper exploration of technologies and ideas.

### ■ Aiming to Achieve Targets by Promoting the Value of Woody Resources

The division has three organizations: the Business Transformation Promotion Office, the Biomass Material Sales Promotion Department, and the Biomass Material Communication Center. The Business Transformation Promotion Office is positioned to take over and continue the outline policy

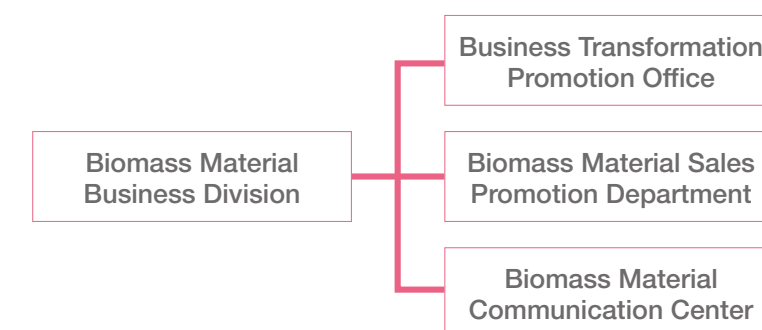
project that was promoted during the formulation of the 2030VISION and Medium-Term Business Plan 2025. Its role is to promote the implementation of projects and tasks through internal cooperation within the Group. The Biomass Material Sales Promotion Department focuses on innovative materials such as

CNF, MinerPa®, and Biocomposite™, conducting market surveys, proposing sales expansion strategies, and carrying out sample work. This organization is strongly expected to implement cross-divisional functions within the Group at a higher level than before and aims to achieve sales targets by forming projects with other sales divisions and affiliated companies. Meanwhile, the Biomass Material Communication Center performs the role of creating opportunities for customer contact and feedback.

The key to commercializing innovative materials is to thoroughly pursue the characteristics of woody resources based on the so-called Three Circulations, namely: (1) Circulation of sustainable forest resources; (2) Circulation of woody resources used for various purposes with technological capabilities; and (3) Active product recycling. Rather than simply replacing existing materials, the division must appeal to the unique strengths and value of woody materials. To achieve this, the challenge for the division is to increase opportunities for the customers to actually take a look at those materials and to receive feedback from them. By fully utilizing the functions of the Biomass Material Communication Center, which has a team of highly specialized staff, and pursuing eco-friendly products, the division will build the business and promote stronger collaboration with the R&D Division.

For the present, the division will focus on nine projects, including seven currently in progress at the Business Transformation Promotion Office, plus CNF and MinerPa®. The division considers these to be a priority for Medium-Term Business Plan 2025. From there, among the topics raised by the New Product

#### Biomass Material Business Division Organization Chart



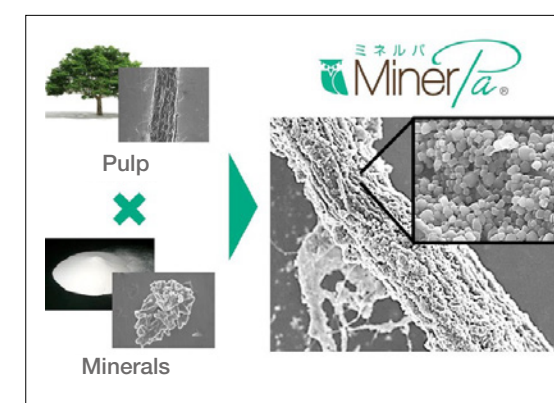
Development Committee, the division will handle those that have neared the trial stage. To reiterate, the role of the Biomass Material Business Division is not that of a sales division, but rather to develop innovative materials into businesses through measures such as strengthening collaboration. In other words, the R&D Division carries out development or refinement of technologies, while the Biomass Material Business Division takes charge of the business promotion stage. After that, the baton is passed to the Sales Division.

To achieve early commercialization of innovative materials, the main point is to strengthen cross-divisional functions within the Group and find ways to leverage the combined capabilities of the Group. To achieve the sales targets of ¥15.0 billion for FY2026/3 and ¥65.0 billion for FY2031/3, the Group must approach the challenge as though its very survival were at stake. To this end, the division is determined to effectively utilize all resources both internal and external, deepening and accelerating its initiatives with the cooperation of other divisions and Group companies.

### Innovative Materials Aiming for Early Commercialization



CNF: An innovative material made from wood-derived fiber micro-refined to the nano level



MinerPa®: A compound material of pulp and minerals



Biocomposite™: A composite material of woody resources and resin

# Research and Development for Further Growth



**Takashi Ochi**  
Executive Officer  
General Manager,  
Research and Development Division  
Nippon Paper Industries Co., Ltd.

## Strengthening Internal and External Collaboration Aiming to Achieve Early Commercialization of Innovative Materials from Sustainable Woody Resources

The Nippon Paper Group is promoting research centered on afforestation and the use of paper, pulp, and biomass as a comprehensive biomass company. The Company's strengths lie in the technologies and expertise that it has cultivated through research and development. It has widened the scope of research, focusing mainly on technologies for extracting cellulose from wood, which is the raw material for paper, as well as papermaking and coating technologies.

As the basic policy of the 2030VISION has stated that the Group will "ensure new businesses and new materials make an early positive contribution," the Company is aiming to achieve product development and early commercialization of innovative materials such as cellulose nanofiber (CNF)

and MinerPa®. With declining demand for graphic paper, the Company's greatest challenge is to develop new applications for cellulose and pulp in unconventional forms. In addition, in new products and fields, the Company needs to consider everything starting from the manufacturing process and sometimes faces hurdles that it has not experienced before. In conventional paper development, much of the process can be handled internally; however, in new products, it can take significant time to evaluate one prototype. To solve this issue quickly, the Company will further deepen its collaboration with the research institutions of other companies and universities.

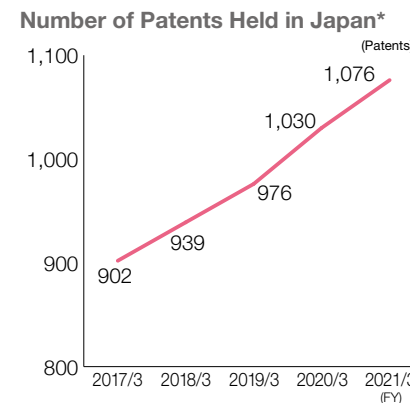
In a CNF-based dry electricity storage body currently under joint development with Tohoku University, the university was the first in the world to discover that CNF produced by the Company can effectively store electricity in nano-sized surface irregularities. The Company was not able to discover this by itself. Through open innovation, the Company has recognized the importance of increasing the number of joint research partners among institutions from different industries and widening the scope of development. Now the Company has started development of a dry, light-weight supercapacitor that makes use of this effect.

The Company is strengthening coordination, not only with outside partners, but also internally. In the Research and Development Division, efforts to foster exchanges between researchers and to share research challenges had made progress, and recently this led to the development of printing paper with antiviral properties.

Amid demands to reduce environmental impacts such as reducing GHG emission and shifting away from plastic, woody resources are experiencing a boost due to their renewable and biodegradable nature. The Company aims to seize this opportunity and promote R&D with a sense of urgency to realize a sustainable society.

## Intellectual Property Strategy

The Group is strengthening its intellectual property capabilities because intellectual property is an important management resource for building a competitive advantage. Recently, the Group has focused on applying for patents in growth fields and new business fields. With the global development of its business, the number of overseas patent applications is also increasing. In addition, the number of domestic patents registered has been stably increasing, while the number of patents held in Japan is also climbing steadily.



\* The target organizations are Nippon Paper Industries Co., Ltd., Nippon Paper Papyrus Co., Ltd., Nippon Paper Crecia Co., Ltd., Flowric Co., Ltd., Nippon Paper Lumber Co., Ltd., Sakurai Co., Ltd., and Akita Jujo Chemicals Co., Ltd.

### Specific Initiatives of the Intellectual Property Strategy

Formulation and execution of intellectual property strategy in line with each type of research and business

Examination and utilization of information technologies such as AI for increasing intellectual property operation efficiency

Communication of beneficial information for business decisions combining intellectual property and financial information

Strategic use of intellectual property agreements that contribute to research and development and business development

## Laboratory Introduction

### Research Laboratory

The Research Laboratory conducts R&D on paper manufacturing, which is the Company's foundation business, breeding and proliferation technologies in the field of afforestation, and applications for woody resources other than paper. Research into breeding and proliferation is mainly focused on technology development for increasing the productivity of trees mainly in overseas afforested areas. Using afforestation techniques cultivated overseas, the laboratory is also promoting R&D for proliferation of specific cedar mother trees that have low pollen volume, excellent growing characteristics and high CO<sub>2</sub> absorption capability, and to provide a stable supply in the form of

seedlings. In research on applications for woody resources other than paper, the laboratory is developing applications for chemical products based on wood compounds such as cellulose and lignin (CMC, cellulose powder, various lignin products, etc.), as well as MinerPa®, a functional material combining wood fiber and minerals. With regard to paper, the laboratory is promoting R&D on high-performance paper materials for promoting the shift away from plastic, such as waterproof cardboard cases, by organizing an integrated research structure covering all processes from pulping, paper, coating, printing, and analysis.

### CNF Research Laboratory

The Company is focusing on developing applications and new functions for TEMPO-oxidized CNF, carboxymethylated CNF, and CNF-reinforced resin. The Company's aim for TEMPO-oxidized CNF is to see it adopted as an industrial material for various kinds of rubber and coatings, such as general-purpose tires, by optimizing different physical properties and manufacturing conditions. Carboxymethylated CNF has been adopted in many applications for food and cosmetics, and the Company is promoting development of new functions through combination with other materials and so forth. For CNF-reinforced resin, the Company is introducing new kneading machines and carrying out sample work with CNF-reinforced nylon and CNF-reinforced polypropylene, while working to establish manufacturing methods and optimize manufacturing processes.

### Packaging Research Laboratory

SHIELDPLUS®, the paper barrier packaging material, has been renewed. Now, its barrier bending resistance has been improved and its range includes a new grade with improved gravure printing suitability. The laboratory has organized a production system and started sales of Lamina® heat-sealable paper. Meanwhile, in liquid packaging cartons, the Company commercialized School POP®, a paper carton for school lunches that lets one drink beverages directly without using a straw. Furthermore, for the replaceable paper carton, SPOPS®, the laboratory developed a special specification with superior penetration resistance, SPOPS® Hygiene, to respond to increasing demand for disinfectant associated with the spread of COVID-19. Going forward, the laboratory will continue to develop products that are easy to use while reducing environmental impact.

### Functional Materials Development Laboratory

The Functional Materials Development Laboratory develops optical films with functions that respond to customers' needs, mainly for display applications. Typical functions include transparency, anti-glare, hardness, dirt-resistance, and recoating properties. The laboratory will continue to actively pursue development that contributes to film products with diverse functions that provide high satisfaction and to new businesses. To this end, it will make full use of the Company's core technologies: 1) coating design that satisfies customer requirements, 2) clean and precise coating technologies, and 3) quality control that lets customers use the Company's products with confidence.

### Chemical Products Research Laboratory

The Chemical Products Research Laboratory develops functional coating resins, adhesion promoters for paint and ink used for plastics such as polypropylene. The laboratory is developing eco-friendly products and new products that contribute to electrification and weight reduction of automobiles. It is also developing lignin products and synthetic resins used in concrete and dye dispersants, as well as new products that involve lignin as special modification. Likewise, the laboratory is expanding applications using its strengths as Japan's only comprehensive lignin manufacturer.



## Case Study

### TOPIC 1

#### Research Laboratory × CNF Research Laboratory

#### Launch of Printing Paper with Antiviral Properties

The recent spread of COVID-19 resulted in a surge in demand for products with antiviral properties. The Company utilized modified cellulose, a new proprietary material with antiviral properties, to develop and launch a printing paper called npf Antiviral Paper. The surface of chemically modified cellulose can be used as a carrier for metal ions, so that the high performance of metal ions (antiviral, antibacterial, and deodorizing) can be imparted to the paper. The developed product is a hybrid combining the respective strengths of the Research Laboratory, which has papermaking technology and expertise cultivated over many years, and the CNF Research Laboratory, which has recently been focused on new material development. By supplying the new paper for applications such as mask cases, envelopes, and notebooks, it will provide people with peace of mind in their daily lives.



Metal ion carrying modified cellulose



Application example (Mask case)

### TOPIC 2

#### Nippon Paper Industries × The Japan Steel Works, Ltd.

#### Development of Torrefide Biocomposite™, a New Resin Composite Material with High Woody Material Content

Using the new biomass solid fuel torrefaction (semi-carbonization) technology developed by the Company, woody material is imparted with heat resistance, crushing resistance, and hydrophobic properties. This material is then blended into resin using a TEX series twin-screw extruder made by The Japan Steel Works, Ltd. to develop Torrefide Biocomposite™. The material has excellent heat resistance and moldability, reducing the amount of plastic used by over 50% while also helping to reduce greenhouse gas emissions. Furthermore, the two companies have also developed Cellulose Biocomposite™, combining cellulose powder with resin. Looking ahead, the two companies aim to commercialize these materials in various fields, including building materials, food containers, home appliances, and gardening.



Torrefide Biocomposite™



Cellulose Biocomposite™