

## Environment

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## Environmental Management

### The Declaration on Environment, Health and Safety, and Quality

[Click here for the “The Declaration on Environment, Health and Safety, and Quality”](#)

### Responsible Care in the Nippon Kayaku Group

Everyone belonging to the Nippon Kayaku Group shares a common understanding that the Group is striving to “prioritize safety above all else,” with all officers and employees promoting Responsible Care activities in accordance with the Declaration on Environment, Health and Safety, and Quality. Based on this common understanding, we are ensuring our compliance not only with the laws and regulations of Japan but also those in force at our overseas sites, preventing accidents that could affect the environment and our own safety, and working toward realizing the KAYAKU spirit.

The Nippon Kayaku Group Responsible Care Policy was created to set out the policies underpinning the Group’s ongoing efforts from FY2019 onward, the contents of which have been confirmed throughout the Group. The policies have been developed with a particular focus on the following: health and safety activities that place importance on identifying unsafe activities by implementing 30-second patrols and fixed-point observations; review of environment, health and safety diagnostics with an emphasis on assessing risks related to equipment safety; and decarbonization efforts with the aim of achieving the environmental targets of the new medium-term business plan that was newly developed with targets to be achieved by FY2030. The Nippon Kayaku Group will continue to promote Responsible Care activities based on these policies.

#### Nippon Kayaku Group Responsible Care Policy (Excerpt of policies related to the environment)

##### ◆ < Target >

Serious environmental accidents / disasters: zero

##### ◆ 1. Key issues in Responsible Care

- Improving Scope 1 and 2 greenhouse gas emission intensity per unit production by 1% per annum through energy saving

##### ◆ 4. Activities to achieve environmental targets

- Endorsing TCFD and making disclosures consistent with TCFD requirements
- Preparation to obtain SBT certification
- Appropriately operating a cloud-based environmental data aggregation system and establishing an emissions management system
- Establishing specific reduction targets based on CO<sub>2</sub> emissions reduction simulations
- Reviewing calculation methods for Scope 3 with a view to reductions
- Third-party verification of Scope 1+2+3 emission totals
- Response to the Plastic Resource Circulation Act
- Setting targets for reduction of plastic waste output

### System

[Implementing Responsible Care](#)

### Environmental Targets of the new Medium-term Business Plan

The Nippon Kayaku Group newly established the environmental targets of the new medium-term business plan in FY2021, and has commenced environmental protection activities under this new plan.

The Business Plan is already in effect, providing medium-term environmental targets to be achieved by FY2030, with the scope for the item on the “prevention of global warming” extended to include all companies within the Group (consolidated). In order to achieve the emissions target set for FY2030, we would need to reduce emissions at an annual rate of 3%. For FY2021, this translates to a goal of limiting emissions to 123,100 tons or less, which was achieved, with actual emissions kept down to 112,100 tons for that year. We are thus making steady strides toward the FY2030 target of reducing emissions to 88,300 tons or less. With regard to this issue, in March 2022, Nippon Kayaku announced its support for the recommendations issued by the Task Force on Climate-related Financial Disclosures (TCFD). In the future, Nippon Kayaku will not only disclose information on its progress with reducing greenhouse gas emissions in accordance with the TCFD recommendations, but will also actively disclose information on initiatives to develop a sustainable and recycling-oriented society, including those on the risks and opportunities related to climate change.

With regard to “reducing our chemical substance footprint,” the Business Plan does not define target figures for VOC and COD emissions, but requires that reports be made on the actual amounts of VOC and COD emitted. VOC emissions increased from the previous fiscal year, and COD emissions also went up slightly; however, these are believed to have been caused by the increase in production volume and other such factors.

As for the item concerning “reduction of waste,” the Business Plan calls for the amount of generated waste to be reported without setting a target, but does establish the goals of achieving a recycling rate (excluding container reuse) of 80% or more and a zero-emissions rate set at 1% or less. For FY2021, the amount of generated waste was affected by the increased volume of production, but recycling efforts were strengthened at each of the business sites. Furthermore, as a result of our continuous promotion of efforts to reduce our environmental impact, our recycling rate is improving and we are getting close to achieving our zero-emissions target.

## FY2021 Results for the Medium-term Environmental Targets

Category	Item	Target	FY2020 <sup>*1</sup>	FY2021
Prevention of global warming <sup>*2</sup> (consolidated)	Greenhouse gases & Scope 1 & 2 <sup>*3</sup> emissions	Target for FY2030: 88,300 tons or less (32.5% reduction or more compared to FY2019) (Reference: FY2021 results): 122,300 tons or less	118,400 tons (9.5% decrease)	112,100 tons (14.3% decrease)
Reduction of chemical substance footprint (non-consolidated)	VOC <sup>*4</sup> (volatile organic compound) emissions	(Report results)	33.3 tons	52.1 tons
	COD <sup>*5</sup> emissions	(Report results)	122.6 tons	124.2 tons
Reduction of waste (non-consolidated)	Total waste produced	(Report results)	25,153 tons	28,424 tons
	Recycling rate (excluding container reuse)	80% or more	81.6%	82.3%
	Zero-emissions rate <sup>*6</sup>	1% or less	1.6%	1.0%

\*1 Includes Joetsu Plant. Note that Joetsu Plant is outside the scope of the former medium-term environmental targets established for the period up to FY2020.

\*2 Medium-term environmental targets for the period up to FY2030: Reduced by 32.5% or more (88,300 tons or less) compared to FY2019 (130,800 tons)

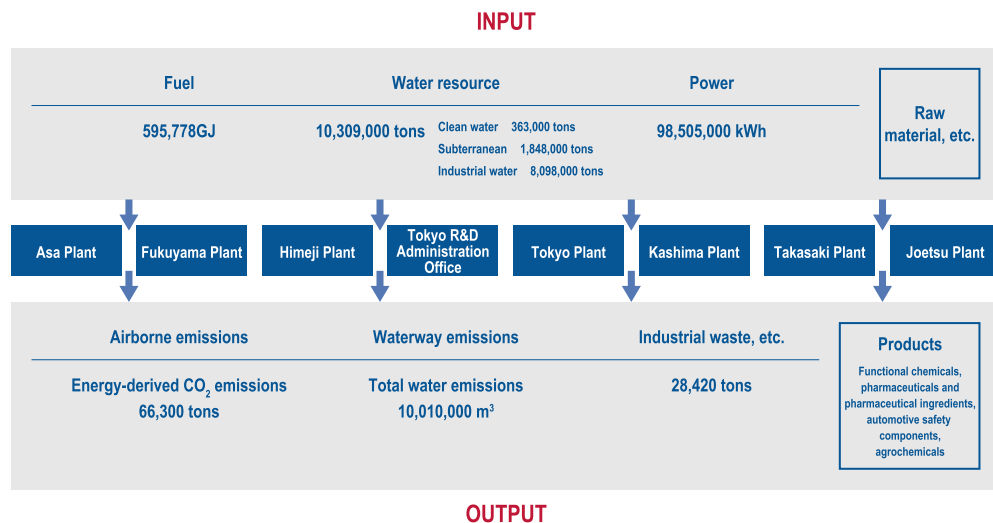
\*3 Scope 1: Direct emissions of greenhouse gas by the business itself (emissions from the burning of fuel, manufacturing processes, etc.)  
Scope 2: Indirect emissions from the use of power, heat and steam provided by other companies.

\*4 Tally for volatile organic compounds (VOCs) includes not only the chemical substances that are required to be reported by government ordinance (PRTR law), but also the chemical substances designated by the Japan Chemical Industry Association.

\*5 Chemical oxygen demand (COD): This refers to the amount of oxygen needed to oxidize a substance under water, and is one of the major indexes for measuring water quality.

\*6 Zero-emissions rate: Nippon Kayaku defines this as the amount of internal and external landfill waste produced as a percentage of the total waste generated.

## FY2021 Material Flow in Business Activities (Relevant organization: Nippon Kayaku non-consolidated)



## Acquisition of International Certification

### Acquisition of Environmental Management System Certification

The Nippon Kayaku Group develops, manufactures and provides its products and services while making efforts to protect the environment. It continues to be certified under ISO 14001, which is the global standard for environmental management. We began acquiring the ISO 14001 certification for our environmental management system in 1998, and are certified at all of our seven plants within Japan. Studies are also underway toward acquiring certification for our Group companies, including at our overseas locations.

#### ◆ List of Business Sites with Environmental Management System Certification

Business site	Certification date	Certification body	Certification number
Fukuyama Plant	April 1999	JCQA	JCQA-E-0062
Asa Plant	September 1998	JCQA	JCQA-E-0987
Tokyo Plant	December 1998	JCQA	JCQA-E-0036
Joetsu Plant (including logistics center)	August 2002	SGS	JP15/071413
Takasaki Plant	January 2001	JCQA	JCQA-E-0101
Himeji Plant	March 1999	JIA-QA	JE0054H
Kashima Plant	March 1999	JCQA	JCQA-E-0046
KAYAKU CHEMICAL (WUXI)	August 2006	UCC	02421E32060755R0M
WUXI ADVANCED KAYAKU CHEMICAL	July 2007	CQC	0012E33375R4M/3200
WUXI POLATECHNO OPTICS	April 2006	UCC	02420E31011518R2M
Kayaku Safety Systems Europe	December 2002	BVCZ	250302-2017-AE-CZS-RvA
Kayaku Safety Systems (Huzhou)	June 2016	SNQA	42144
<b>Coverage ratio*</b>			<b>63%</b>

\* Ratio of production facilities owned by our Company or by our consolidated subsidiaries that have acquired ISO 14001 certification.

\* The coverage rate of production facilities for Nippon Kayaku Co., Ltd. on a non-consolidated basis is 100%.

## Response to Environmental Regulations

The Nippon Kayaku Group complies with environmental legislation, and is responding to a variety of environmental regulations while educating our employees, providing information on dangers and hazards, and continuing to realize zero violations of law or community standards throughout the life cycle of our products, from research and development to final disposal after use. The Nippon Kayaku Group continued to remain free of any violations of environmental laws and regulations throughout FY2021.

### Response to Global Regulations on Chemical Products

The Functional Chemicals Group provides both domestic and overseas users with specialty industrial chemical products that take the environment, safety and quality into account. With laws related to chemical substances being developed and strengthened around the world, it has become increasingly important for our Group to operate its business in compliance with such regulations, and to provide accurate information to our supply chain regarding the chemical substances present in our products.

## ◆ Chemical Substance Management System

The Chemical Management Department, which is part of the Quality Assurance Division, oversees and assists the chemical substance management performed by the Functional Chemicals Group, which is under its jurisdiction. Main duties include the following: (1) dealing with chemical substance registration systems in and outside Japan; (2) keeping abreast of trends in chemical laws and regulations in the different countries, developing measures to respond to those trends, and providing related information and advice to relevant departments; and (3) managing the product safety data sheets (SDSs)\* and product labels, etc.

\* SDS: Safety data sheet. A document listing information about the hazards and toxicity of chemical substances that is issued when a company transfers (or provides) chemicals or a product that contains chemicals to another business.

## ◆ Education and Assistance

Employees involved in product sales and researchers working on product development need to possess accurate knowledge about the laws and regulations pertaining to chemicals in the countries and regions where our products are sold. In FY2020, we held study sessions on the revised industrial safety and health laws in South Korea, as well as on the laws and regulations on chemical products in Japan, which helped our staff improve their knowledge.

We have also been operating an in-house “chemical management portal site” since 2017 to address the increasing complexities involved in chemical management operations. The site includes the following contents: simplified explanations and the latest revisions of chemical laws and regulations in the different countries; methods for checking the chemical laws and regulations list; and examples of responses made to these laws and regulations. We will continue to enhance the site so that it reflects regulatory changes and contributes to our collective experience.

## ◆ Providing Hazard and Toxicity Information in Compliance with the GHS

As countries around the world adopt the GHS\*, we are now required to issue an SDS in the local language and attach it to our product labels in accordance with local laws and regulations. The Functional Chemicals Group operates an SDS authoring system (3E Generate) equipped with a wealth of translations, regulatory data for each country, and data on physical properties and toxicity, which enables it to issue the appropriate SDS in compliance with local laws and regulations for attachment to the product’s GHS label. Also, since the Japan Industrial Standards (JIS) were amended in 2019, we are in the process of changing the SDSs and product labels to comply with the new JIS within the transition period (within three years from the amendment).

\* GHS : Globally Harmonized System of Classification and Labeling of Chemicals

## Measures to Reduce Risk in the Manufacturing and Handling of Chemical Substances

The 2016 amendment of the Industrial Safety and Health Act made risk assessment mandatory for workplaces that manufacture and handle chemical substances. We are therefore performing risk assessments and implementing measures to reduce risk using Nippon Kayaku’s proprietary safety inspection system when conducting safety inspections for new or revised operations that involve substances mandated under this law or other hazardous or toxic substances.

The pictorial label of the GHS is attached at the site that handles the chemical substance, thereby making workers aware of the hazards and toxicity of any chemical substance that they could be exposed to.



Workers are made aware of the hazards and toxicity of the chemical substances that they could be exposed to.

## [Important Issues]

# Reducing Energy Consumption and Greenhouse Gas Emissions

## Policy and Basic Approach

In addition to the environmental targets of the new medium-term business plan for FY2030 that was established last year, the Nippon Kayaku Group set its sights further into the future and declared a final target of achieving carbon neutrality by FY2050. In recent years, we have been faced with a rising sense of crisis about climate change as we witness abnormal weather conditions and devastations of the natural environment in various parts of the world. This has resulted in an acceleration of the global trend toward decarbonization as seen at COP26 (26th UN Climate Change Conference), with the Japanese government declaring a growth strategy based on the Paris Agreement that seeks to achieve carbon neutrality by 2050.

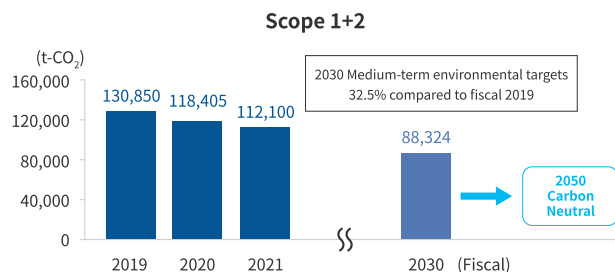
Against this background, in order to make a significant reduction to our greenhouse gas emissions, the Nippon Kayaku Group will confront the issues of climate change not only by implementing comprehensive energy-saving efforts but also by installing power sources such as solar power that have low CO<sub>2</sub> emissions and by switching to power derived from recycled energy that has a low emissions coefficient. We also aim to achieve decarbonization throughout our value chain by providing products that contribute toward realizing a decarbonized society and by promoting supplier engagement to that end.

## Reduction in the Amount of Greenhouse Gas Emissions

The Nippon Kayaku Group has been working on various measures to reduce its energy consumption, such as by improving the operation of our utility equipment, switching to high-efficiency equipment and using LED bulbs for lighting. Our Scope 1 and 2 emissions, which are used as metrics in our FY2030 medium-term environmental targets, have been diminishing every year as shown below.

Scope 1: Direct emissions of greenhouse gas generated from a source owned or managed by the business operator themselves (emissions from fuel usage, manufacturing processes, etc.)

Scope 2: Indirect emissions of greenhouse gas from the use of power, heat or steam supplied by another business (emissions from purchased power, etc.)



## Responses to Climate Change

The Paris Agreement, adopted at COP21\* held in 2015, binds each country at a national level to achieve its target for reducing CO<sub>2</sub> emissions, with the goal of preventing average global temperatures from rising by more than two degrees Celsius above pre-industrial levels, and urging efforts to limit the increase to 1.5 degrees Celsius. Previously, the Nippon Kayaku Group set a target range in its FY2020 medium-term environmental targets to reduce CO<sub>2</sub> emissions at the energy source for the parent company only. However, under the newly established medium-term environmental targets up to FY2030, the goal for reducing greenhouse gas emissions in our business activities has been expanded to include the entire Nippon Kayaku Group, with targets set for FY2030 to reduce emissions (Scope 1 and 2) resulting from our Group's business activities by 32.5% compared to FY2019. The consolidated results for Scope 1 and 2 emissions for FY2021 showed a decline of approximately 6% compared to the previous year.

\* COP21: 21st United Nations Climate Change Conference. The conference was held in the outskirts of Paris, France, and the Paris Agreement was adopted by all 196 participating parties as a new framework to follow on from the Kyoto Protocol, which expired in 2020.

## Disclosure of Data on CO<sub>2</sub> Emissions (Scope 3) Throughout the Supply Chain

In recent years, there has been an increasing tendency for companies to keep tabs on, manage and disclose information on indirectly emitted CO<sub>2</sub> throughout the supply chain. At the Nippon Kayaku Group, we are not only aggregating and managing Scope 1 and Scope 2 emissions as before, but are also calculating Scope 3 emissions within the supply chain.

Since FY2017, Nippon Kayaku has been calculating Scope 3 emissions on a non-consolidated basis, but from FY2019, this has been expanded to include both domestic and overseas Group companies. The Nippon Kayaku Group will continue to calculate and manage our data based on the General Guidelines on Supply Chain GHG Emission Accounting issued by the Ministry of the Environment, in order to systematically implement initiatives to reduce CO<sub>2</sub> emissions throughout the supply chain.

Scope 3: Indirect emissions other than Scope 2 (emissions from raw material procurement, employee commuting, business travel, waste processing consignment, product usage, disposal, etc.)

Category		Emissions (thousand ton-CO <sub>2</sub> /year)		
		FY2019	FY2020	FY2021
1	Purchased products and services	243.6	237.3	294.5
2	Capital goods	42.7	42.9	26.8
3	Fuel- and energy-related activities not included in Scope 1 or 2	22.4	21.2	22.3
4	Transportation and distribution (upstream)	19.0	17.6	22.3
5	Waste generated in operations	26.5	28.8	31.8
6	Business travel	0.8	0.8	0.8
7	Employee commuting	2.5	2.4	2.4
8	Leased assets (upstream)	Included in scope 1 or scope 2		
9	Transportation and distribution (downstream)	1.0	1.0	1.6
10/11	Processing/usage of sold products	-	-	-
12	End-of-life treatment of sold products	15.4	23.2	26.4
13	Leased assets (downstream)	0.4	0.4	0.4
14/15	Franchise/investments	-	-	-
<b>Total of Scope 3</b>		<b>374.3</b>	<b>375.6</b>	<b>429.3</b>
<b>Scope1</b>		<b>36.2</b>	<b>35.3</b>	<b>37.4</b>
<b>Scope2</b>		<b>94.7</b>	<b>83.1</b>	<b>74.7</b>
<b>Total of Scope 1+2+3</b>		<b>505.2</b>	<b>494.0</b>	<b>541.4</b>

Calculation method: As a rule, the amount of CO<sub>2</sub> emitted is calculated based on the General Guidelines on Supply Chain GHG Emission Accounting issued by the Ministry of the Environment and the Ministry of Economy, Trade and Industry, and the emission coefficient listed by the IDEA Research Laboratory at the National Institute of Advanced Industrial Science and Technology's Research Institute of Science for Safety and Sustainability.

## Supporting the Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)

The Nippon Kayaku Group upholds a basic policy of sustainable management as described in the new Medium-term Business Plan **KAYAKU Vision 2025**, which came into effect from FY2022, and is striving toward the realization of a sustainable society and the further enhancement of our corporate value by seeking to achieve environmental, social and economic value in implementing efforts to deal with climate change.

Climate has a major impact on our society and, accordingly, we consider this to be a highly important issue. In March 2022, we declared our support for the recommendations made by the Task Force on Climate-related Financial Disclosures (TCFD). Going forward, the Nippon Kayaku Group will accelerate our efforts toward reducing greenhouse gas emissions and developing a recycling-oriented society in line with the TCFD recommendations.



## Information Disclosure Based on the TCFD Recommendations

### Governance

The Sustainable Management Meeting, chaired by the president, deliberates, reviews and evaluates the business plan and other items related to the Nippon Kayaku Group's future responses to climate change. The results of such deliberations, reviews and evaluations are reported to the Board of Directors and, under this structure, are subject to being observed and supervised by the Board.

Furthermore, the Environment, Safety, Quality Management Committee (chaired by the head of the Technical Operations Group) has been created as one of the specialized committees under the Sustainable Management Meeting to oversee the implementation of climate change initiatives. This committee delves deeper into issues related to climate change from a standpoint that extends across the entire Group.



## Strategy

Nippon Kayaku has multiple businesses being deployed on a global scale, and is presented with various risks and opportunities depending on the business area. In order to identify the impact that climate change can have on each business, we evaluated the climate-related risks throughout the Group in accordance with the TCFD recommendations, and further considered the opportunities in each business area. In identifying the risks and opportunities related to climate change, the time period when the risks will emerge has been defined as follows.

	Period	Reason
Short-term	4 years up to FY2025	Period falling within the Medium-term Business Plan KAYAKU Vision 2025 (KV25) that started in FY2022
Medium-term	Up to FY2030	In line with goals for FY2030 that are set in the Nippon Kayaku Group Environmental Targets of the Medium-term Business Plan
Long-term	Up to FY2050	In line with the year set as the goal for Japan's NDC target

### Climate-related Risks

Business risks related to climate change are based on the IPCC's Representative Concentration Pathway (RCP 2.6, 8.5) scenarios, IEA's Sustainable Development Scenario (SDS) and the Stated Policies Scenario (STEPS) for both the 2°C and 4°C scenarios.

### Risks and Opportunities in Transitioning to a Decarbonized Economy for the 2°C Scenario

Category	Major risks	Period of risk emergence	Financial impact	Major countermeasures
Policies & regulations	Increased operation costs from tighter emissions regulations	Short to long term	Medium	<ul style="list-style-type: none"> <li>Implement dispersed power for each site, such as solar power and high-efficiency cogeneration power generators</li> <li>Reduce material loss by utilizing MFCA and implement comprehensive energy-saving activities</li> </ul>
	Rising price of electricity, LNG, etc.	Short to long term	Medium	
	Increased raw material costs from tighter emissions regulations	Short to long term	Medium	<ul style="list-style-type: none"> <li>Encourage suppliers to reduce emissions through engagement activities</li> </ul>
Market & reputation	Increased costs from disclosure of environmental information and LCA calculations, etc.	Medium to long term	Small	<ul style="list-style-type: none"> <li>Rationalize the emissions calculation method at each site and systemize the LCA calculations</li> </ul>

### Physical Risks from the 4°C scenario

Category	Major risks	Period of risk emergence	Financial impact	Major countermeasures
Acute & chronic physical risks	Increased costs from flood damage caused by typhoons, heavy rain events, high tides, etc.	Short to long term	Medium	<ul style="list-style-type: none"> <li>When building new plants, account for the possibility of flooding when considering the geographical situation and the configuration and placement of equipment</li> <li>Strengthen efforts to save water used during production, and consider reusing and recycling water</li> </ul>
	Impact on operations due to water shortage	Medium to long term	Small	
	Reduced labor productivity due to increased temperatures	Medium to long term	Small	<ul style="list-style-type: none"> <li>Enhance the work environment such as by improving air-conditioning, and promote the automation of high-temperature work processes</li> </ul>

### ◆ Opportunities in Each Business Area in Transitioning to a Decarbonized Economy for the 2°C Scenarios

Business area		Business environment		Opportunity	Period of opportunity creation	Financial impact*
Functional Chemicals	Functional Materials	Tightened regulations against greenhouse gas emissions in various countries & regions	<ul style="list-style-type: none"> <li>Advances in social changes, such as growth of smart cities</li> <li>Heightened demand for increased energy efficiency of electronics products</li> <li>Increased demand for storage batteries able to handle large output fluctuations in response to expanding use of recyclable energy</li> <li>Global expansion of demand for mobility/transport methods that have relatively low emissions</li> </ul>	<ul style="list-style-type: none"> <li>Increase in semiconductor materials from growth of smart cities and DX</li> <li>Expansion of functional materials that help reduce energy consumption of display devices</li> <li>Expansion of low-emission materials due to the increased shift in raw materials toward biomass feedstock</li> <li>Expansion of resin materials that help make mobility frames more lightweight</li> </ul>	Short to long term	Large
	Color Materials			<ul style="list-style-type: none"> <li>Expansion of ink for digital on-demand that enables low-carbon printing</li> <li>Expansion of dimming glass/film that controls incident sunlight</li> </ul>	Short to long term	Large
	Catalysts			<ul style="list-style-type: none"> <li>Growth of catalyst for producing green energy, such as hydrogen</li> <li>Growth of catalyst for promoting the use of biomass-derived raw materials</li> </ul>	Medium to long term	Large
	Polatechno			<ul style="list-style-type: none"> <li>Growth of safety display device components for sensors, HUD, etc. brought on by the development of EV and automated driving</li> <li>Growth of polarizing plates that help reduce energy consumption of display devices</li> </ul>	Short to long term	Medium
Pharmaceuticals			<ul style="list-style-type: none"> <li>Direct impact is limited</li> </ul>	<ul style="list-style-type: none"> <li>Studying items within the entire range of business activities that will become opportunities</li> </ul>	Short to medium term	Small
Safety Systems			<ul style="list-style-type: none"> <li>Global expansion of demand for mobility &amp; transport methods that have relatively low emissions</li> <li>Significant restrictions in sales of internal combustion engine vehicles, depending on the region</li> </ul>	<ul style="list-style-type: none"> <li>Rise of EV and automated driving brings increased diversification in smallness of size, lightness of weight, and shape to automobile safety parts</li> <li>Expansion of safety parts for unmanned aircraft such as drones</li> </ul>	Short to long term	Large
Agrochemicals			<ul style="list-style-type: none"> <li>Direct impact is limited</li> </ul>	<ul style="list-style-type: none"> <li>A certain level of temperature increase is expected even for the 2°C scenario, thus expanding the use of biostimulants that help maintain and improve agricultural productivity</li> <li>Expanded use of existing agrochemicals to deal with new problems with pests</li> </ul>	Medium to long term	Small

\* Financial impact: Large = 2 billion yen or more; Medium = 0.5 to 2 billion yen; Small = 0 to 0.5 billion yen

### Risk Management

The Nippon Kayaku Group identifies the reducing energy consumption and greenhouse gas emissions as a key sustainability issue related to climate change.

The M-CFT Mitigation of Climate Change Team was created to coincide with the start of the KV25 under a governance system comprised of the Board of Directors, the Sustainable Management Meeting and the Environment, Safety, Quality Management Committee. This response team serves a central role in identifying and evaluating climate change risks, while also executing other specific measures such as actively implementing energy-saving efforts and pushing forward with environmental investments.

### Metrics and Targets

As a metric against the risk of climate change, the Nippon Kayaku Group has established the target of reducing greenhouse gas emissions (Scope 1 and 2) for the entire Group by 32.5% in FY2030 compared to FY2019. In order to achieve this target, we are starting by aiming to reduce greenhouse gas emissions by 3% every year during the KV25 period. We are also conducting advanced studies on making a shift to green energy such as hydrogen and ammonia in order to achieve carbon neutrality for Scope 1 and 2 by FY2050.

Also, in order to enable us to include Scope 3 in establishing future targets on reducing emissions, we have been working on enhancing the accuracy of our Scope 3 calculation methods in anticipation of being able to individually determine the amount of emissions for each product (carbon footprint). Our calculation results for Scope 1, 2 and 3 are scheduled to be examined by a third party during FY2022. In order to reduce Scope 3 emissions, we will work together with our business partners in reinforcing efforts to reduce environmental impacts throughout the entire supply chain.

[> Environmental Data](#)

## Promoting the Adoption of Material Flow Cost Accounting (MFCA)

To date, the Nippon Kayaku Group has been striving to reduce its burden on the environment by making its production processes more energy-efficient and conserving resources. The Group is now working toward the adoption of material flow cost accounting (MFCA) by viewing its environmental burden-reducing initiatives as an opportunity for environmental management. Adopting MFCA helps us to identify energy losses and material losses in the production process, and by clarifying these losses it enables us to continuously reduce our impact on the environment such as by reducing CO<sub>2</sub> emissions in our production activities. Since the second half of FY2018, Nippon Kayaku has been working on adopting MFCA for certain products at its Fukuyama Plant, which is achieving some positive results. In FY2019, we adopted MFCA at our Tokyo and Asa Plants, and in FY2020 we also introduced MFCA at our Kashima Plant. We plan to expand MFCA to other plants in the future so that we can further promote energy and resource conservation.

### FY2021 Summary of Energy-saving Activities of the Nippon Kayaku Group

Since FY2011, Nippon Kayaku Group has been continuing to study and calculate energy-saving activities at each of our Group companies.

☀️: Solar panel installation /: Unrealized due to lease limitations -: Non-applicable  
 \* High-load machinery: Refrigerators/freezers, blowers, steam management, etc.

Business site / Company name	Management of appropriate thermostat settings	Power-saving, water-saving, awareness-building activities	Reduction of fluorescent lights, switch to LED lights	Controlled operation of high-load machinery*	Heat barrier film, heat barrier paint, water sprinkler
Nippon Kayaku (Head Office)	●	●	●	-	-
Fukuyama Plant	●	●	●	●	●
Asa Plant☀️	●	●	●	●	●
Tokyo Plant	●	●	●	●	●
Joetsu Plant	●	●	●	●	×
Takasaki Plant	●	●	●	●	●
Himeji Plant☀️	●	●	●	●	●
Kashima Plant	●	●	●	●	●
Tokyo R&D Administration Office	●	●	●	●	●
MOXTEC	●	●	●	-	●
WUXI POLATECHNO OPTICS	●	●	●	-	-
Dejima Optical Films	●	●	●	●	×
NIKKA FINE TECHNO	●	●	●	-	/
Nippon Kayaku Korea	●	●	/	-	/
NIPPON KAYAKU AMERICA	●	●	/	-	●
Euro Nippon Kayaku	-	●	●	-	/
KAYAKU CHEMICAL (WUXI)	●	●	●	●	●
KAYAKU Advanced Materials	●	●	●	●	-
WUXI ADVANCED KAYAKU CHEMICAL	●	●	●	●	●
Shanghai KAYAKU International Trading	●	●	-	-	-
NIPPON KAYAKU FOOD TECHNO	●	●	●	-	●

Business site / Company name	Management of appropriate thermostat settings	Power-saving, water-saving, awareness-building activities	Reduction of fluorescent lights, switch to LED lights	Controlled operation of high-load machinery	Heat barrier film, heat barrier paint, water sprinkler
Tumor Diagnosis Support	●	●	●	-	●
Taiwan Nippon Kayaku	●	●	-	-	-
Kayaku Safety Systems Europe☀️	●	●	●	●	●
Kayaku Safety Systems (Huzhou)	●	●	●	●	●
Kayaku Safety Systems de Mexico☀️	●	●	●	●	●
Kayaku Safety Systems Malaysia	●	●	●	-	●
Nishimato Driving School	●	●	●	-	●
Okiura Golf Center	●	●	●	-	●
Kayaku (Shanghai)	●	●	-	-	-
JAPAN HUMAN RESOURCES MEDICAL SCIENCE RESEARCH INSTITUTE	●	●	●	-	-
Wako Toshi Kaihatsu	●	●	●	-	-
Kowa Sangyo	●	●	●	-	●
Gunnan Sangyo	●	●	●	-	●
Kayaku Japan (Head Office)	●	●	●	-	/
Kayaku Japan (Asa Plant)	●	●	●	●	●



## Prevention of Air Pollution

The Nippon Kayaku Group is engaging in the careful management of substances that cause air pollution by categorizing them into those that fall under Japan's Air Pollution Control Act, those that are hazardous air pollutants, and all other air pollutants.

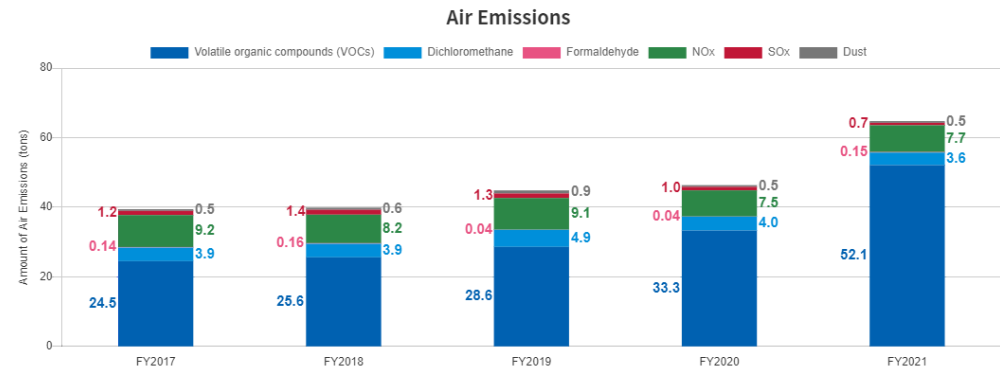
During FY2021, VOC emissions increased because we used aeration treatment to remove impurities from some solvents.

As for hazardous air pollutants, the Japan Chemical Industry Association has taken the initiative in defining 12 control substances<sup>\*1</sup> as those that should be voluntarily managed, with efforts being made to reduce emissions of them. Of these 12 control substances, five have been used by Nippon Kayaku since FY1995, but the use of benzene during the production process was terminated during 1995. Emissions of chloroform and ethylene oxide have been cut to zero since FY2007. Slight emissions of dichloromethane and formaldehyde continue to occur. Going forward, we will continue to make improvements to our production processes and other areas in order to reduce emissions, and will strive to reduce dichloromethane and formaldehyde emissions, largely by reducing the use of these substances.

As for other air pollutants, sulfur dioxide (SOx)<sup>\*2</sup>, nitrogen oxide (NOx)<sup>\*3</sup> and dust<sup>\*4</sup> are emitted during boiler operations. For the fuel used by its boilers, the Nippon Kayaku Group has been gradually transitioning from Bunker C heavy oil to Bunker A, which has a lower sulfur content, and is further shifting to the use of LPG and natural gas, which are sulfur-free. As a result, our SOx emissions have been in continuous decline since FY2008. We will continue in our efforts to reduce overall emissions of air pollutants into the atmosphere by performing regular inspections and keeping up the proper maintenance of our air pollution prevention equipment.

### Air Emissions

Indicator	Scope	Unit	FY2017	FY2018	FY2019	FY2020	FY2021
Volatile organic compounds (VOCs)	Non-consolidated	tons	24.5	25.6	28.6	33.3	52.1
Dichloromethane	Non-consolidated	tons	3.9	3.9	4.9	4.0	3.6
Formaldehyde	Non-consolidated	tons	0.14	0.16	0.04	0.04	0.15
NOx	Non-consolidated	tons	9.2	8.2	9.1	7.5	7.7
SOx	Non-consolidated	tons	1.2	1.4	1.3	1.0	0.7
Dust	Non-consolidated	tons	0.5	0.6	0.9	0.5	0.5



\*1 The 12 control substances subject to voluntary control are as follows: acrylonitrile, acetaldehyde, vinyl chloride monomer, chloroform, 1,2-dichloroethane, dichloromethane, tetrachloroethylene, trichloroethylene, 1,3-butadiene, benzene, formaldehyde and ethylene oxide.

\*2 SOx (sulfur oxide): SOx is emitted when fossil fuels that contain sulfur are burned. SOx reacts with moisture in the atmosphere to form sulfuric acid and sulfurous acid, which are causes of air pollution and acid rain.

\*3 NOx (nitrogen oxide): NOx is produced when burned chemical substances react to nitrogen in the air and when fuels and chemical substances that contain nitrogen compounds such as coal are burned. Not only is it a major cause of air pollution including photochemical smog and acid rain, but NOx also has a harmful effect on the human respiratory system.

\*4 Dust: Dust mainly refers to fine particles (soot) found in dust smoke produced when burning fossil fuels. In addition to being a major cause of air pollution, dust can cause humans to contract pneumoconiosis or other harmful health conditions when breathed in in high concentrations.

## [Important Issues] Reduction of Wastewater and Industrial Waste

### Policy and Basic Approach

The Nippon Kayaku Group has voluntarily adopted wastewater control standards that are tougher than the requirements laid out by national laws and local ordinances, and only discharges wastewater that meets our standards. The Group produces color material-related products including dyes and inkjet printer ink, and the plants that manufacture such color material-related products decolorize the colored wastewater before it is discharged.

With regard to waste, we must work toward achieving a recycling-oriented society with a low environmental impact by pushing forward with our efforts to make efficient use of and recycle different materials throughout the various life cycle stages, from production to consumption and up to final disposal. As such, the Nippon Kayaku Group elevated our goals for our recycling and zero-emissions rates in our **KAYAKU Vision 2025 (KV25)** to the status of key performance indicators (KPIs), and is striving to not only reduce waste but to also make effective use of it by considering the waste generated from our business activities as a future resource.

### System

[Implementing Responsible Care](#)

### Indicators

#### Control of Wastewater

Indicator	Scope	Unit	FY2017	FY2018	FY2019	FY2020	FY2021
COD	Non-consolidated	tons	132.1	133.7	145.2	122.6	124.2
Total phosphorus emissions	Non-consolidated	tons	1.4	1.6	4.1	3.2	2.0
Total nitrogen emissions	Non-consolidated	tons	75	93	72	83.2	70.4
SS*	Non-consolidated	tons	50.0	45.3	46.0	48.2	31.9

\* SS (Suspended solids): Suspended solids. SS refers to particulate-like substances of 2 mm or less in diameter found floating or suspended in water. These include metal particles, animal and plant plankton and their carcasses, and organic and metal sediments originating from sewage and factory effluents, among others. The increase in SS causes a decline in water transparency, and affects underwater photosynthesis by preventing light penetration.

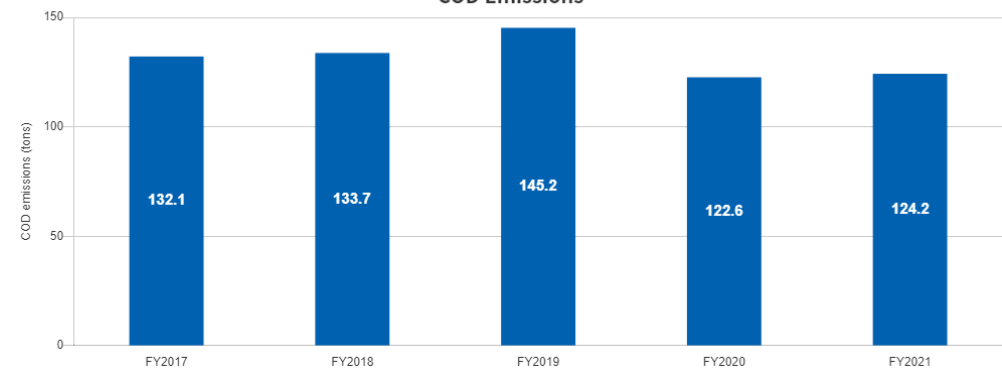
### PRTR Substances

Indicator	Scope	Unit	FY2017	FY2018	FY2019	FY2020	FY2021	
Emissions of PRTR <sup>*1</sup> substances	Atmosphere	Non-consolidated	tons	15.9	17.1	18.9	16.8	25.2
	Water bodies	Non-consolidated	tons	11.5	11.4	13.3	9.1	14.7
	Soil	Non-consolidated	tons	0	0	0	0	0
	Total <sup>*2</sup>	Non-consolidated	tons	27.4	28.5	32.2	25.8	39.8

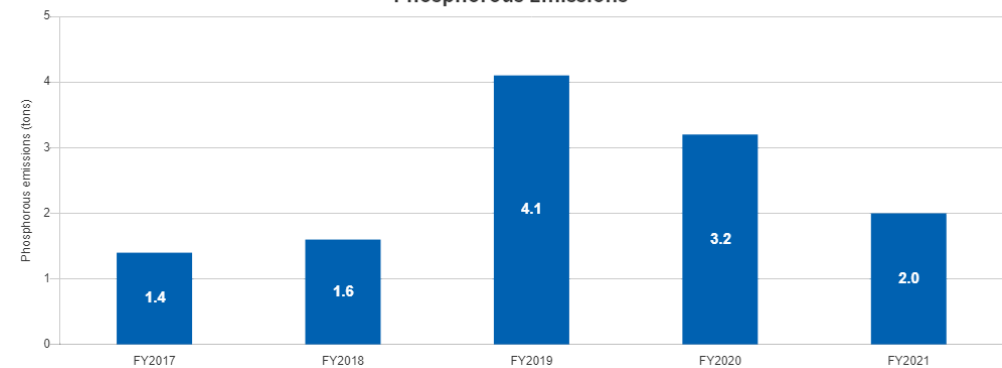
\*1 PRTR (Pollutant Release and Transfer Register): The PRTR regulation is designed to prevent environmental safety incidents by encouraging businesses to voluntarily improve their own chemical substance management.

\*2 The total sum may be incongruent due to rounding.

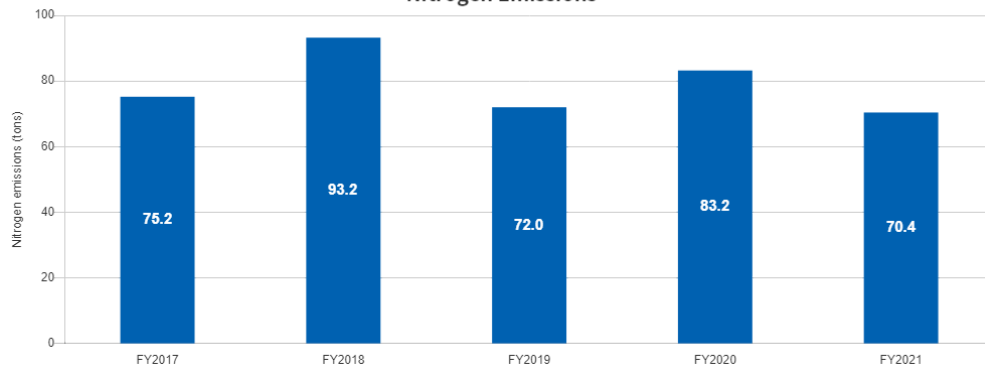
#### COD Emissions



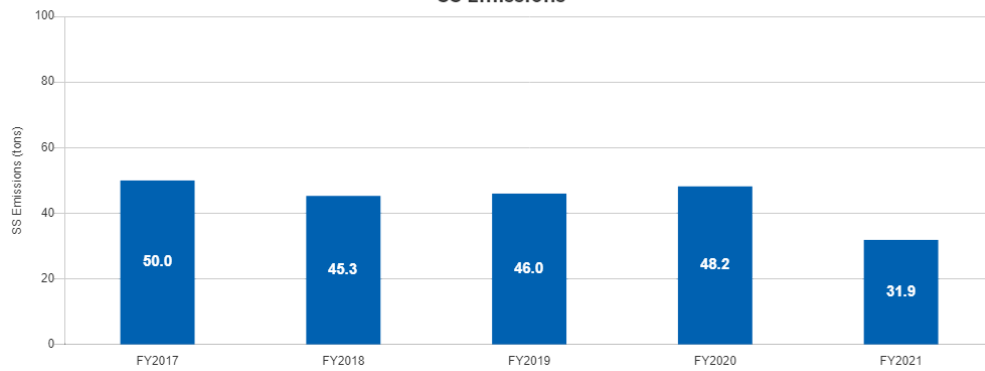
#### Phosphorous Emissions



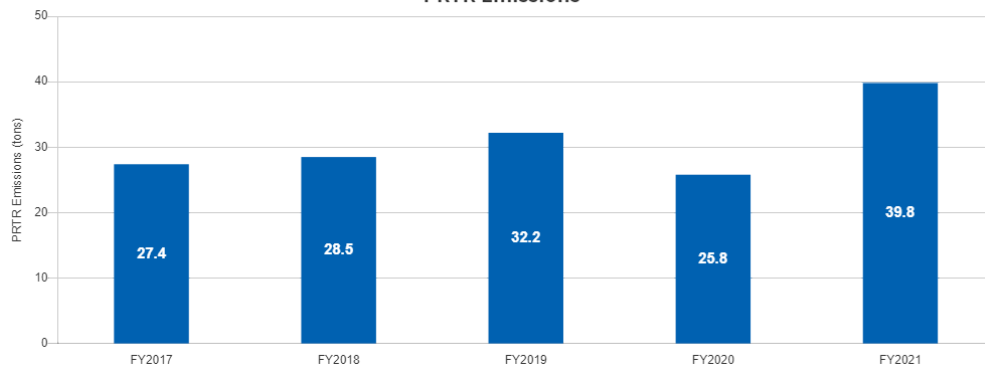
### Nitrogen Emissions



### SS Emissions



### PRTR Emissions



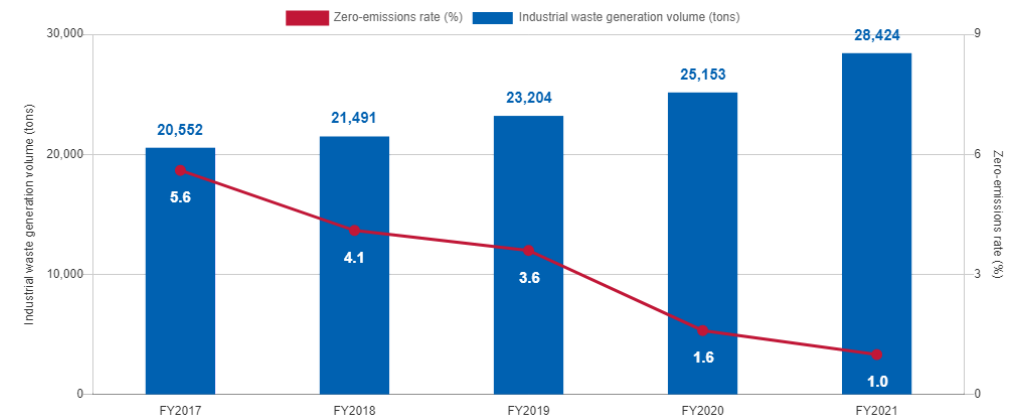
## Industrial Waste

In FY2021, Nippon Kayaku generated 28,424 tons of waste, which was an increase of approximately 13% from the previous year. Meanwhile, as a result of efforts made at each of the business sites to promote recycling and implement initiatives to reduce environmental impacts, landfill waste amounted to 298 tons, or approximately 74% of the amount of the previous year, and the zero-emissions rate was decreased by 0.4 points from the previous year to 1.0%.

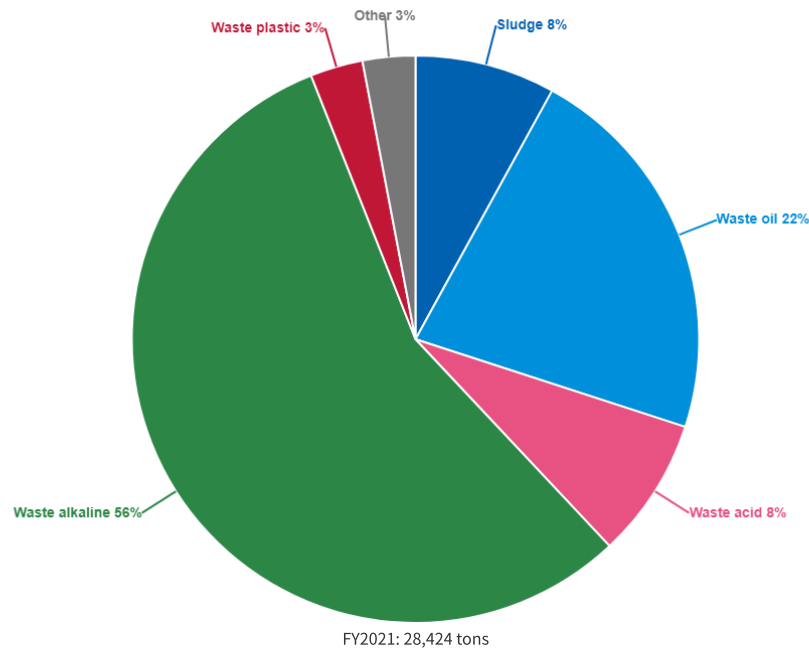
Going forward, we will keep a close watch over the production volume at each of our plants, and continue in our group-wide efforts to protect the Earth and our environment by working to reduce the amount of waste generated by our business activities and studying ways to make effective use of resources, in addition to promoting the recycling of landfill waste, which has a large impact on the environment.

Indicator	Scope	Unit	FY2017	FY2018	FY2019	FY2020	FY2021
Amount of industrial waste generated	Non-consolidated	tons	20,552	21,491	23,204	25,153	28,424
Amount of resources recovered	Non-consolidated	tons	16,380	17,493	19,584	20,449	23,290
Final disposal amount	Non-consolidated	tons	1,148	870	847	404	298
Recycling rate	Non-consolidated	%	79.7	81.4	84.4	81.3	82.3

### Trend in the Volume of Industrial Waste Generated and in the Zero-Emissions Rate



## Breakdown of Industrial Waste Generated



## Initiatives

### Fukuyama Plant Achieved Zero Emissions by Changing Sludge Treatment

Many types of waste are produced in the course of the Fukuyama Plant's production activities. Among them, sludge that is produced from the treatment of waste liquids accounts for a considerably large portion.

This sludge is difficult to dispose of because it contains moisture. In the past, it was disposed of in landfills after undergoing appropriate treatment. However, after examining whether this sludge could be recycled to reduce environmental impacts, we found that it could be utilized as fuel for adjusting the heat used in waste incineration plants (thus reducing the amount of fuel used). This also led to our waste disposal vendor now having a source of recycled fuel, thus enabling us to both make effective use of this waste.

As a result, the Fukuyama Plant was able to reach its zero-emissions rate target (less than 1%) for the portion of its waste disposed of in landfills. Not only this, but it was also able to increase the recycling rate of waste and cut disposal costs.

### Kayaku Safety Systems de Mexico

#### Industrial Waste Management

Kayaku Safety Systems de Mexico has been making untiring efforts to recycle solid waste, such as wood, cardboard, non-ferrous metals, aluminum and plastics, by separating them into appropriate categories and finding external suppliers that can re-use them. These different types of waste are stored for a period of two to three months at designated sites and are picked up by government-certified suppliers on a regular basis.

Of the waste that is collected, those types that can be recycled are transported to recycling companies. There, wood is made into wood pallets, cardboard is recycled into new cardboard, and plastics, aluminum and ferrous metals are used to produce new raw materials.

This program extends to non-production areas such as break areas, where organic and non-organic waste such as plastic bottles are separated to undergo proper treatment for recycling.



## [Important Issues] Improving Efficiency of Water Resource Use

### Policy and Basic Approach

Water risks can be largely divided into physical risks caused by drought, flooding and water contamination, and regulatory risks resulting from toughened water quality standards, changes in water and sewer prices, and switching to clean water due to the suspension of industrial water supply, among others. Water is a limited and important resource, and its conservation is considered an important theme throughout the world.

The Nippon Kayaku Group produces a variety of chemical products, and having access to water is essential for the continuation of our business activities. We are ever aware of the importance of our water resources, and are mindful of using water carefully without being wasteful.

### System

> [Implementing Responsible Care](#)

### Indicators

Total emissions for FY2021 amounted to 10,011,000 m<sup>3</sup>. This was an increase of only about 0.9% from the previous year's total emissions of 9,919,000 m<sup>3</sup>, despite the rise in our production volume. We will continue to take strict measures to manage and reduce wastewater in order to protect our valuable water resources.

### Usage of Water Resources

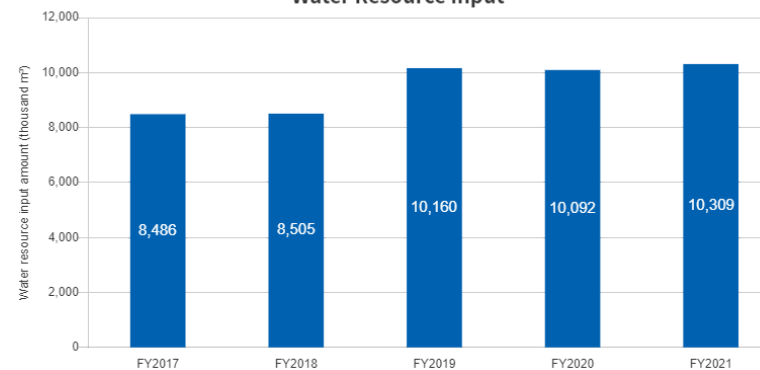
Indicator		Scope	Unit	FY2017	FY2018	FY2019	FY2020	FY2021
Water resource input	Municipal water (tap water)	Non-consolidated	1,000 m <sup>3</sup>	371	348	356	390	363
	Industrial water	Non-consolidated	1,000 m <sup>3</sup>	6,507	6,534	7,521	7,874	8,098
	Groundwater	Non-consolidated	1,000 m <sup>3</sup>	1,607	1,624	2,283	1,828	1,848
	<b>Total<sup>*1</sup></b>	<b>Non-consolidated</b>	<b>1,000 m<sup>3</sup></b>	<b>8,486</b>	<b>8,505</b>	<b>10,160</b>	<b>10,092</b>	<b>10,309</b>
	Water withdrawals in water stressed areas <sup>*2</sup>	Non-consolidated	1,000 m <sup>3</sup>	0	0	0	0	0
Amount of water discharge <sup>*3</sup>	Non-consolidated	1,000 m <sup>3</sup>	9,596	9,585	10,577	9,919	10,011	
Amount of water recycled for use	Non-consolidated	1,000 m <sup>3</sup>	0	0	0	0	0	
Rate of water recycled	Non-consolidated	%	0	0	0	0	0	

\*1 The total sum may be incongruent due to rounding.

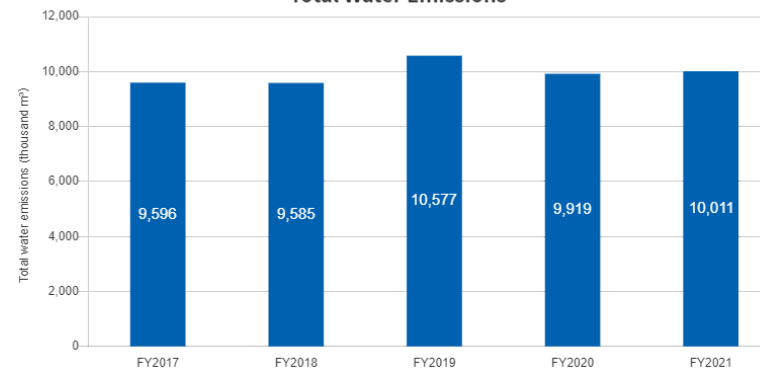
\*2 Areas where our plants are located (Fukuyama [Hiroshima], Asa [Yamaguchi], Tokyo, Joetsu [Niigata], Takasaki [Gunma], Himeji [Hyogo] and Kashima [Ibaraki]) are not considered to be water-stressed areas.

\*3 This refers to industrial water or groundwater, which is returned to the intake source with its quality equal to or better than its original quality.

Water Resource Input



Total Water Emissions



#### Fukuyama Plant Initiatives to Reduce Water Usage

The Fukuyama Plant treats wastewater resulting from the colorant manufacturing process within the plant, and then releases the treated water into the Seto Inland Sea. This plant has been manufacturing colorants for inkjet printers since 2000, and has been working on improving the method for treating wastewater resulting from the manufacturing process. As part of such efforts, numerous studies have been performed on implementing individualized treatment in accordance with the brand and revising the manufacturing process to reduce the environmental impact.

Through these efforts, the plant managed to reduce the contracted volume of industrial water from 24,000 m<sup>3</sup> per day to 23,000 m<sup>3</sup> per day in 2015, and further down to 22,000 m<sup>3</sup> per day in FY2018. At present, the plant is implementing even better wastewater treatment techniques, and is succeeding in continuing operations while maintaining the same contracted volume of industrial water, despite the increase in production volume. Moreover, in addition to industrial water, the plant is also working to reduce the use of public water, which is also used during the manufacturing and equipment cleaning processes.

**Kayaku Safety Systems Europe**

**Implementation of Equipment for the Effective Use of Rainwater**

Kayaku Safety Systems Europe (KSE) introduced a water storage tank system in 2017 to utilize rainwater more effectively as part of its capital investment activities to promote environmental protection. By FY2020, an equivalent of 750.5 m<sup>3</sup> of tanks had been installed. Rainwater, in addition to water discharged from air-conditioning that is used to control the humidity within the plant, is used for non-drinking purposes, which helps to not only increase the efficiency of water usage but also contributes toward reducing costs.



Due to the impact of climate change, the current drop in the amount of precipitation in the Czech Republic poses a significant concern, making the recycling of water extremely important. Since FY2020, the annual water storage at KSE amounts to more than the amount of drinking water used by all of KSE's employees and their families (approximately 4,000 people) for the year. KSE is continuing to promote this project in order to contribute toward the realization of a sustainable society.

	Unit	FY2019	FY2020	FY2021
Water storage capacity (scheduled)	m <sup>3</sup>	-	4,877	5,040
Water storage capacity (actual)	m <sup>3</sup>	4,433	6,177	7,234
Economic effects	Ten thousand yen	282	361	411

## Biodiversity

### Biodiversity

We at the Nippon Kayaku Group recognize that biodiversity is an essential foundation for achieving a sustainable society. Environmental pollution and deforestation are major factors in the loss of biodiversity. Thus, the Nippon Kayaku Group is working based on its Responsible Care Policy to prevent water pollution and is striving to promote plant operations in a manner that is in harmony with the natural environment.

### Preventing Water Pollution

➤ [For details, please see \[Important Issues\] Reduction of Wastewater and Industrial Waste](#)

### Initiatives

#### Takasaki Plant Plant Operations in Harmony with the Natural Environment

The Takasaki Plant was formerly an army gunpowder manufacturing plant for the Tokyo Second Army Arsenal in Iwahana. The plant was purchased in April 1946 and used to manufacture black-colored gunpowder. It later switched to manufacturing pharmaceuticals in August 1971. The plant has been aiming to be in “harmony with nature” from the time it began operations, and was certified under ISO 14001 in January 2001.

Surrounded by a rich natural environment that includes the Gunma-no-Mori forest and Karasu river, the plant operates under the slogan of “Takasaki Plant continues to protect life and the environment.” Under this banner, the plant’s environmental policy states that each and every person shall act with full awareness of the fact that they are working in an industry that is vital to human life, promote environmental protection activities and strive to operate the plant in a way that is in harmony with its rich natural environment.

The factory is located on an expansive site that extends over an area of 560,000 m<sup>2</sup>. Of this, 110,000 m<sup>2</sup> that is registered as a green zone under the Factory Location Act was formerly used for gunpowder storage. But as it has not been used since the factory switched to making pharmaceuticals, the area has been left in a virtually natural state. Believed to have reverted to its earlier ecosystem, it now serves as one of the Takasaki city district’s most valuable natural habitats. The site is surrounded by Class A rivers on three sides: to the east, south and north. They are the Karasu river (a Class A river that is part of the Tone river system), the Ino river (a Class A river that branches off from the Karasu river) and the Kasu river (a Class A river that branches off from the Hirose river, which is also part the Tone river system). The northern side of the site adjoins the Gunma-no-Mori prefectural city park. We will continue to protect this valuable naturally forested area that is home to various wildlife including raccoon dogs and kingfishers.

As an environmental facility, we have both the green zone and a “creek” within the plant site. This creek is a part of a facility that was used for hydraulic power generation during the time when the plant was used to manufacture gunpowder. Relics from the foreign-made hydraulic power generator that was used during the war are also being carefully preserved and managed.

The creek exists in a naturally forested area that is removed from the nearby residential districts. Close to the rivers and a safe place for animals, it serves as an oasis for migrating birds that stop by every year to gain nourishment from the surrounding forests and rivers. The annual arrival and northerly departure of these migrating birds is a seasonal event that is greatly looked forward to by our employees.

To protect the environment at the Takasaki Plant, in addition to our efforts toward achieving carbon neutrality we are also implementing measures to protect the surrounding area by managing emissions of our treated industrial wastewater. These emissions are being managed in the following manner.

The creek that flows through has a dam built on it that divides it into two sections. The first section temporarily pools industrial wastewater that has been detoxified by the activated sludge process. In the second section, the water quality is measured on a daily basis, and the dam is opened to release the water from the creek into the river after it has been confirmed by means of actual measurements that there are no abnormalities. In this way, we are taking every precaution to prevent environmental pollution.



### Transition to forest-certified Products

All of the paper used at the Head Office for photocopy machines is certified by the forest certification systems. We also use forest-certified paper for materials distributed throughout the Company, such as our in-house newsletters, company brochures, and pamphlets on sustainable management. We are also working on replacing our packaging materials with products that are forest-certified. We start our environmental efforts with those that our employees feel are pertinent to themselves, and take every possible step to reduce the impact that our business activities have on the environment.

# Environmental Accounting

## Environmental Accounting

Nippon Kayaku has been calculating the costs associated with its environmental protection initiatives and releasing the information to the public since FY2000. We have also been calculating the effects of our environmental protection initiatives since FY2003. Calculation of environmental costs and economic effects are made according to the Environmental Accounting Guidelines (2005 version) published by the Ministry of the Environment of Japan and the Environmental Accounting Guidelines for Chemical Companies published by the Japan Chemical Industry Association.

## Environmental Accounting

Category	Scope	Unit	FY2017		FY2018		FY2019		FY2020		FY2021			
			Investment	Expenses	Investment	Expenses	Investment	Expenses	Investment	Expenses	Investment	Expenses		
Inside business areas	Pollution prevention	Air pollution prevention	Non-consolidated	Million yen	98.4	116.2	85.9	98.3	40.2	83.9	20.9	97.0	37.1	124.2
		Water pollution prevention	Non-consolidated	Million yen	24.7	239.2	40.6	223.9	70.5	148.0	109.7	174.8	266.9	178.9
		Underground seepage prevention	Non-consolidated	Million yen	5.9	13.2	52.0	6.0	13.4	10.0	5.5	3.7	4.9	5.6
		Noise and vibration prevention	Non-consolidated	Million yen	0.0	0.2	4.3	6.1	2.4	1.8	17.2	6.2	6.0	0.0
		Other	Non-consolidated	Million yen	-	160.6	-	190.6	-	386.0	-	435.0	-	394.7
	Global environment protection	Non-consolidated	Million yen	152.9	41.1	102.9	8.1	40.3	20.1	172.6	100.4	244.6	92.3	
Resource recycling	Non-consolidated	Million yen	66.1	500.1	3.9	565.3	30.9	576.7	106.6	709.8	111.2	772.2		
Upstream & downstream	Container and packaging recycling outsourcing	Non-consolidated	Million yen	-	0.4	-	1.0	-	1.0	-	0.4	-	0.3	
	Sewage processing	Non-consolidated	Million yen	-	81.7	-	90.9	-	90.3	-	78.7	-	75.2	
Management activity	System development and operation	Non-consolidated	Million yen	-	93.4	-	100.4	-	87.4	-	105.3	-	174.9	
	Environmental impact monitoring	Non-consolidated	Million yen	-	51.7	-	41.8	-	38.5	-	42.5	-	38.3	
	Information disclosure	Non-consolidated	Million yen	-	9.5	-	8.7	-	5.6	-	6.3	-	6.3	
	Education, training, and other	Non-consolidated	Million yen	-	88.9	-	88.6	-	80.1	-	59.4	-	59.3	
	Greening	Non-consolidated	Million yen	-	163.0	-	97.5	1.0	58.0	-	70.0	0.5	43.9	
R&D	Non-consolidated	Million yen	-	316.3	-	178.1	-	81.7	-	57.2	-	39.2		
Social activity	Non-consolidated	Million yen	-	9.0	-	8.7	-	9.7	-	8.9	-	9.0		
Environmental damage	Non-consolidated	Million yen	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0		
<b>Total*</b>	Non-consolidated	Million yen	348.0	1,884.6	289.6	1,712.0	198.7	1,678.9	432.5	1,955.5	671.3	2,014.5		

\* The total sum may be incongruent due to rounding.

## Economic Effects from Environmental Protection Measures

Targets of evaluation of effects		Scope	Unit	FY2017	FY2018	FY2019	FY2020	FY2021	
Inside business areas effects	Pollution control effect	Air pollution prevention	Non-consolidated	Million yen	0.0	0.0	0.0	0.0	0.0
		Water pollution prevention	Non-consolidated	Million yen	0.0	0.0	0.0	0.0	3.5
		Reduction of the amount of imposition on pollution load	Non-consolidated	Million yen	0.4	0.1	0.4	0.4	0.6
		Noise and vibration prevention	Non-consolidated	Million yen	0.0	0.0	0.0	0.0	0.0
	Global environment protection effect	Global warming prevention and energy conservation	Non-consolidated	Million yen	45.6	53.5	55.9	112.8	80.4
		Waste and recycling	Waste reduction	Non-consolidated	Million yen	1.6	2.1	9.5	9.5
	Sales of recycled resources		Non-consolidated	Million yen	13.3	12.8	12.9	10.5	17.3
	Other		Non-consolidated	Million yen	8.6	6.3	0.0	0.0	7.0
Upstream / downstream effects	Containers recycling	Non-consolidated	Million yen	0.0	69.6	62.6	73.6	54.2	
Other		Non-consolidated	Million yen	0.0	0.0	0.0	0.0	0.0	
<b>Total*</b>		Non-consolidated	Million yen	69.4	144.4	141.3	206.8	167.1	

\* The total sum may be incongruent due to rounding.



## Investments Related to the Environment and to Health and Safety

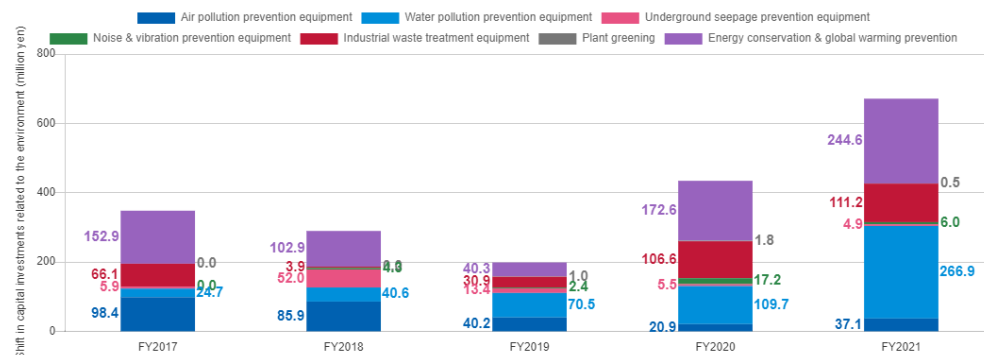
Nippon Kayaku makes well-planned and continual investments in projects related to the environment and safety and health. In FY2021, environment-related capital investment totaled 671.3 million yen, an increase of approximately 55% compared to the previous year. In particular, investments for equipment to prevent water pollution increased from 109.7 million yen to 266.9 million yen (or 2.4-fold), and investments for equipment related to energy saving and for global warming prevention increased from 172.6 million yen to 244.6 million yen (or 1.4-fold). Of the total equipment investment related to the environment, equipment for water pollution prevention amounted to approximately 40%, and that related to energy saving and global warming prevention amounted to approximately 36%. In addition, capital investment related to health and safety totaled 687.1 million yen for FY2021, an increase of about 30% from the previous year. Of that, investments to deal with aging equipment amounted to 490.9 million yen, which was an increase of 68% from the 292.9 million yen of the previous year, accounting for about 70% of the entire capital investment related to health and safety. Investments for dealing with natural disasters such as earthquakes, which increased significantly in the previous year, amounted to 4.4 million yen for this year, which was less than 10% of the capital investment of the previous year, thereby indicating that countermeasures against disasters have reached a certain level of completion.

### Environment-related Capital Investments

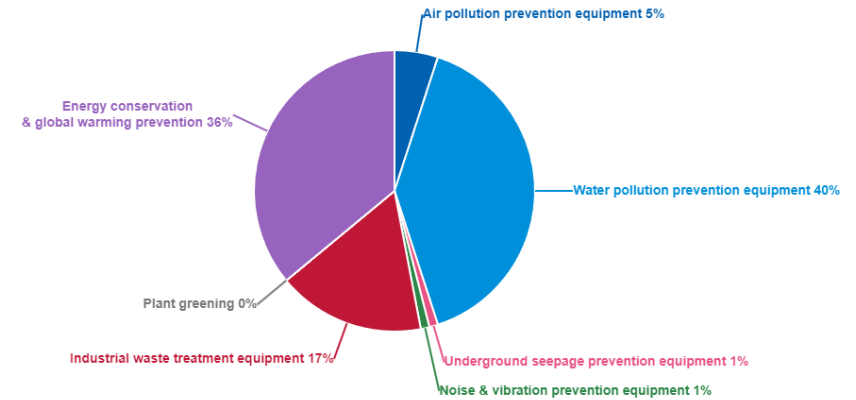
Category	Scope	Unit	FY2017	FY2018	FY2019	FY2020	FY2021
Air pollution prevention equipment	Non-consolidated	Million yen	98.4	85.9	40.2	20.9	37.1
Water pollution prevention equipment	Non-consolidated	Million yen	24.7	40.6	70.5	109.7	266.9
Underground seepage prevention equipment	Non-consolidated	Million yen	5.9	52.0	13.4	5.5	4.9
Noise and vibration prevention equipment	Non-consolidated	Million yen	0.0	4.3	2.4	17.2	6.0
Industrial waste processing equipment	Non-consolidated	Million yen	66.1	3.9	30.9	106.6	111.2
Plant greening	Non-consolidated	Million yen	0.0	0.0	1.0	1.8	0.5
Energy conservation and global warming prevention	Non-consolidated	Million yen	152.9	102.9	40.3	172.6	244.6
<b>Total*</b>	<b>Non-consolidated</b>	<b>Million yen</b>	<b>348.0</b>	<b>289.6</b>	<b>198.7</b>	<b>434.3</b>	<b>671.3</b>

\* The total sum may be incongruent due to rounding.

### ◆ Shift in Capital Investments Related to the Environment



### ◆ Breakdown of Capital Investments Related to the Environment (FY2021)

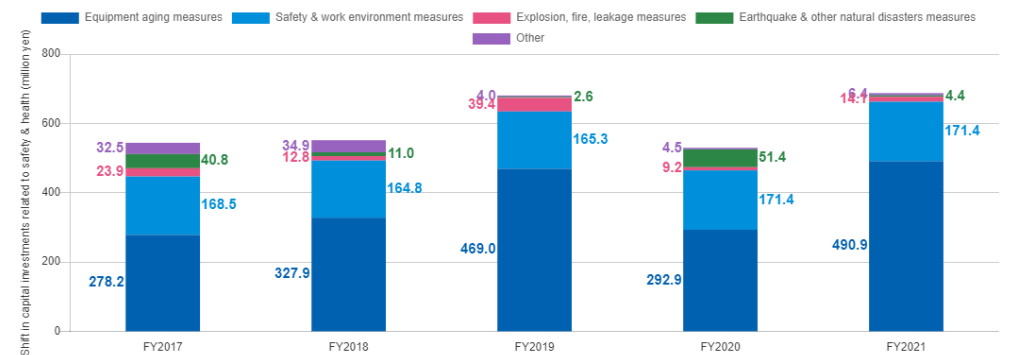


### Safety- & Health-related Capital Investments

Category	Scope	Unit	FY2017	FY2018	FY2019	FY2020	FY2021
Equipment aging measures	Non-consolidated	Million yen	278.2	327.9	469.0	292.9	490.9
Safety and work environment measures	Non-consolidated	Million yen	168.5	164.8	165.3	171.4	171.4
Explosion, fire and leakage measures	Non-consolidated	Million yen	23.9	12.8	39.4	9.2	14.1
Earthquake and other natural disasters measures	Non-consolidated	Million yen	40.8	11.0	2.6	51.4	4.4
Other	Non-consolidated	Million yen	32.5	34.9	4.0	4.5	6.4
<b>Total*</b>	<b>Non-consolidated</b>	<b>Million yen</b>	<b>543.9</b>	<b>551.4</b>	<b>680.3</b>	<b>529.4</b>	<b>687.1</b>

\* Value for each item is rounded off, which often results in an inconsistency between the total value indicated and the aggregate of all the relevant items.

### ◆ Shift in Capital Investments Related to Safety & Health



◆ Breakdown of Capital Investments Related to Safety & Health (FY2021)

