



Initiatives for Environmental Protection

Nippon Kayaku is committed to achieving a balance between the efficiency of production and reducing its impacts on the environment. For this reason, we consider environmentally friendly management to be an important task. We are now striving to achieve the various environmental targets we have set.

We are working to improve facilities and treatment processes in order to use energy and exhaust gas including green house gas emissions more efficiently and to lower the amount of substances released from effluent and waste that impact the environment. We have added some disclosure items according to GRI (Global Reporting Initiative) this year.

Promotion of Environmental Protection Activities

Nippon Kayaku has established specific numerical targets as part of its mid-term environmental targets ended in fiscal 2020. We have now further formulated mid-term environmental targets up to fiscal 2030 with a focus on combating climate change. To achieve these targets, we will continue to carry out activities such as reinforcing our responses to natural disasters, developing and improving wastewater treatment technologies, and countermeasures for global warming and energy conservation.

Results of the Fiscal 2020 Mid-Term Environmental Targets

Nippon Kayaku established mid-term environmental targets for fiscal 2011 to fiscal 2020 that consisted of six items covering three areas.

Fiscal 2020 was the final year of our mid-term environmental targets. The mid-term environmental targets were reported only for Nippon Kayaku and not the Joetsu Plant.

As a result of efforts at each business site to achieve the mid-term environmental targets, we achieved targets in all six items in the three areas of the mid-term environmental targets by fiscal 2020.

Final Results for Mid-Term Environmental Targets up to FY2020

	Prevention of Global warming	Prevention of Global warming	Prevention of Global warming	Reduction of waste		
	Energy Derived CO ₂ Emission* ¹ (Production Divisions+ Operation Divisions)	VOC* ² Emissions	COD* ³ Emissions	Total waste produced	Recycling Rate	Zero Emission Rate* ⁴
Fiscal 2020 results	61.3 thousand tons	33.3 tons	122.6 tons	22,732 tons	83.7% <small>Displacement outside of the factory 20,080 tons of which final disposal volume 870 tons</small>	1.4%
Target	Under 79.5	Under 42 tons	Under 150 tons	Under 23,500 tons	More than 80%	Under 3.0%
Target comparison	18.2 thousand ton decrease (25.9% decrease)	8.7 ton decrease (20.7% decrease)	27.4 ton decrease (18.3% decrease)	768 ton decrease (3.3% decrease)	3.7% rise	Further 1.6% improvement
Evaluation	○	○	○	○	○	○

* 1 Energy-derived CO₂ emissions: Japanese Government policy is to reduce these emissions by 3.8% versus 2005 (82.6 thousand tons).

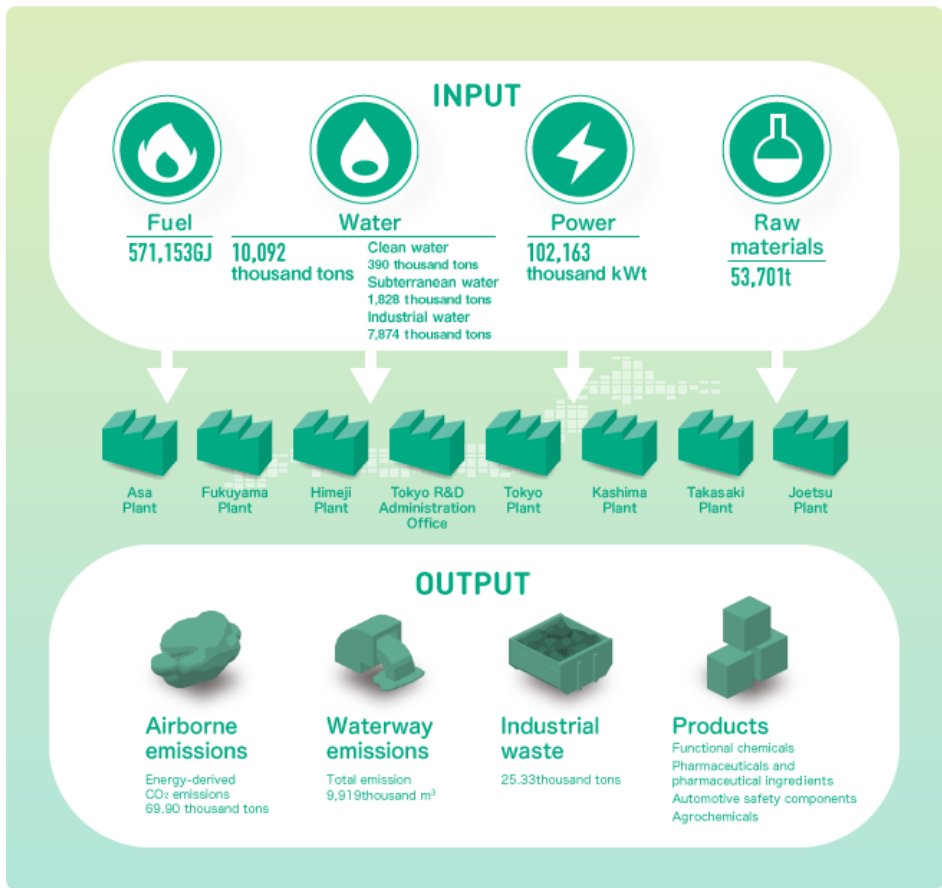
*2 VOC: Volatile Organic Compounds (VOCs). This tally includes all chemical substances of reporting regulation, emitted into the atmosphere.

*3 COD: Chemical Oxygen Demand. An indication of the amount of oxygen needed to oxidize a subject compound under a predetermined condition using oxidizing agents.

*4 Zero emission rate: The amount of internal and external landfill waste produced as a percentage of total waste produced.

Energy and Material Balance

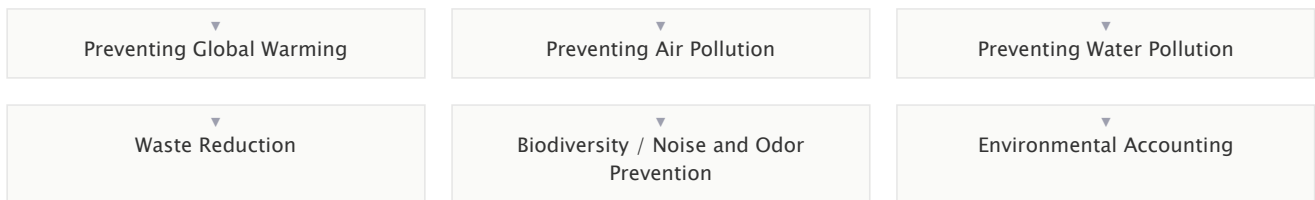
● Overview of business activities and environmental impacts



Scope: Nippon Kayaku (Including Joetsu Plant)

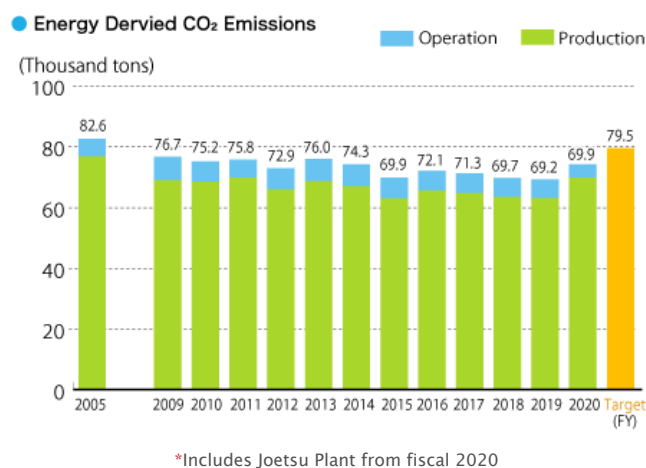
Results of Our Efforts to Reduce Environmental Impacts

As part of its effort to reduce environmental impacts, Nippon Kayaku focuses on preventing air, water and noise and odor pollution as well as stopping global warming and reducing waste.



Preventing Global Warming

At each business site, we have been working on energy conservation measures such as improving the operation of utility equipment, replacing it with high efficiency equipment, and changing to LED lighting. Energy-derived CO₂ emissions have been changing as shown below, and are declining year by year.



■ The Nippon Kayaku Group has been investigating and tabulating the energy saving activities of each group company since fiscal 2011.

➤ [FY2020 Energy saving activity summary sheet of Nippon Kayaku Group](#)

About climate change

The “Paris Accords” adopted at COP21* held in 2015 aims to maintain the average temperature rise of the world before the Industrial Revolution to “below 2°C” and to tackle “below 1.5°C”. In addition, based on this agreement, each country promises national CO₂ emission reduction targets. The Nippon Kayaku Group set the target range for reducing CO₂ emissions from energy sources at Nippon Kayaku on a non-consolidated basis in the fiscal 2020 Mid-Term Environmental Targets. However, under its newly established 2030 Mid-Term Environmental Targets, the Nippon Kayaku Group will continue to take measures against climate change expanding the reduction of greenhouse gases emitted by business activities across the entire Nippon Kayaku Group with the aim to reduce greenhouse gas emissions (Scope 1 and 2) in 2030, by 32.5% compared to 2019.

* COP21: 21st Conference of the Parties to the United Nations Framework Convention on Climate Change. As a new framework after the Kyoto Protocol, which expires in 2020, all 196 countries have adopted the Paris Agreement held in the suburbs of France.

Disclosure of CO₂ emission data (Scope 3) throughout the supply chain

In recent years, there has been an increasing trend for companies to grasp and manage CO₂ emissions in the entire supply chain, which are indirectly emitted, and disclose them externally. Nippon Kayaku is calculating not only Scope 1 and Scope 2 that have been aggregated and managed until now, but also calculation of CO₂ emissions “Scope 3” in the supply chain. Since fiscal 2017, we have been calculating Scope 3 emissions for Nippon Kayaku on a non-consolidated basis, but from fiscal 2019 we began calculating Scope 3 emissions after expanding the scope to include domestic and overseas Group companies. The Nippon Kayaku Group plans to systematically promote efforts to reduce CO₂ emissions throughout the supply chain by collecting and managing data based on the “Basic Guidelines for Accounting Greenhouse Gas Emissions Throughout the Supply Chain” issued by the Ministry of the Environment.

[Scope 1] GHG emissions generated from emission sources owned or controlled by the business operator (fuel use, emissions from manufacturing processes, etc.)

[Scope 2] Indirect GHG emissions from the use of electricity, heat and steam supplied from other companies (use of purchased electricity, etc.)

[Scope 3] Indirect emissions other than Scope 2 (procurement of raw materials, employee commuting, business trips, waste processing consignment, product use, disposal, etc.)

Categories		Emissions (Thousand tons-CO ₂ e)	
		2019	2020
1	Purchased goods and services	84.9	79.5
2	Capital goods	42.7	44.6
3	Fuel- and energy-related activities (not included in scope 1 or scope 2)	22.6	21.1

Categories		Emissions (Thousand tons-CO ₂ e)	
		2019	2020
4	Upstream transportation and distribution	19.2	17.7
5	Waste generated in operations	26.5	28.8
6	Business travel	0.8	0.8
7	Employee commuting	2.5	2.4
8	Upstream leased assets	Not calculated as included in Scope 1 and 2	
9	Downstream transportation and distribution	1.0	1.0
10/11	Processing / use of sold products	-	-
12	End-of-life treatment of sold products	15.4	23.2
13	Downstream leased assets	0.4	0.4
14/15	Franchise / investment	-	-
Scope 3 total		218.0	219.6
Scope 1		38.0	35.2
Scope 2		93.5	84.4
Scope 1+2+3 total		349.5	339.2

Calculation method: As a general rule, CO₂ emissions are described in the basic guidelines of the Ministry of the Environment and the Ministry of Economy, Trade and Industry and the IDEA Lab, National Institute of Advanced Industrial Science and Technology, Safety Science Research Division. Calculated using coefficients.

Promoting the Adoption of Material Flow Cost Accounting (MFCA)

To date, Nippon Kayaku has been trying to reduce its burden on the environment by making its production processes more energy-efficient and conserving resources, and now it is working toward the adoption of material flow cost accounting (MFCA) by taking its environmental burden-reducing initiatives as an opportunity for "environmental management." Adopting MFCA helps us to identify and clarify energy losses and material losses in the production process, making it possible for us to continuously reduce our impact on the environment such as by reducing CO₂ emissions in our production activities.

Since the second half of fiscal 2018, Nippon Kayaku has been working on adopting MFCA for certain products at its Fukuyama Plant, and some results have been achieved. In fiscal 2019, we adopted MFCA at our Tokyo and Asa Plants, and in fiscal 2020 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.

The Formulation of New Mid-Term Environmental Targets

Nippon Kayaku has been engaged in environmental conservation activities after setting specific numerical targets as its mid-term environmental targets which came to an end in fiscal 2020. We therefore newly formulated new mid-term environmental targets for 2030 with the aim of expanding and promoting the reduction of greenhouse gases emitted by our business activities from the entire Nippon Kayaku Group.

Nippon Kayaku has set "energy use and greenhouse gases" as one of its key CSR issues (materiality). The mid-term CSR Action Plan for achieving this key issue is to "Pursue activities to save energy and combat global warming. Achieve the environmental targets for FY2020 and formulate targets for FY2030." Going forward, we will aim to contribute to the goals of the internationally agreed Paris Agreement and strengthen business continuity by identifying our climate change risks and taking countermeasures. And as an environmental target for fiscal 2030, we have decided to reduce greenhouse gas emissions emitted by the Group's business activities (Scope 1 and 2) in fiscal 2030 by 32.5% compared to fiscal 2019.

In addition, the COD emissions, waste generated, recycling rate and zero emission rate, which have been set as targets thus far, continue to be maintained as the targets of the 2020 mid-term environmental targets for Nippon Kayaku alone. We decided not to

set a new target for VOC emissions as we judged that we could manage it sufficiently without setting and working on a mid-term environmental target.

Area	Item	Scope	Target	Achieved by
Combat global warming	Greenhouse gas emissions (Scope 1 and 2)	Group	88,790 tons or less (32.5% or more reduction compared to 2019)	Fiscal 2030
Reduce chemical substance emissions	COD emissions	Non-consolidated	150 tons or less (maintaining 2020 target)	–
Reduce waste	Amount of waste generated	Non-consolidated	23,500 tons or less (maintaining 2020 target)	–
	Recycling rate	Non-consolidated	80% or more (maintaining 2020 target)	–
	Zero emission rate	Non-consolidated	3% or less (maintaining the 2020 target)	–

Click to show the other activities

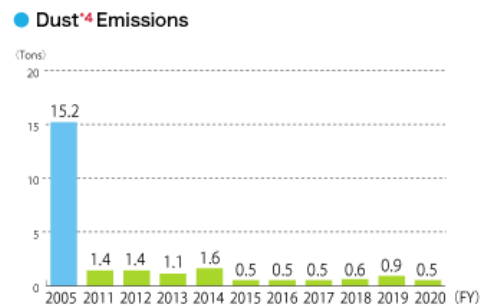
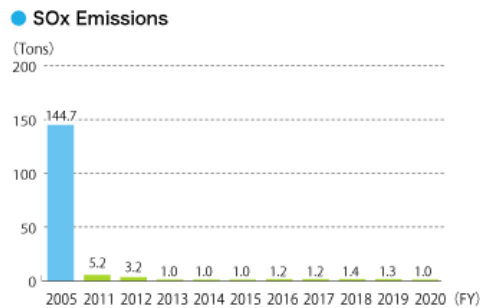
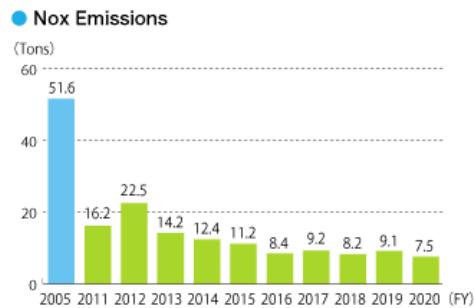
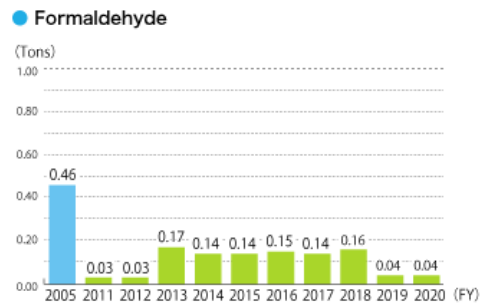
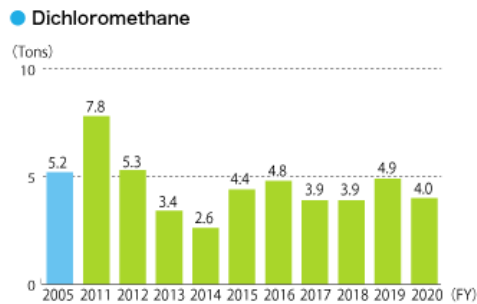
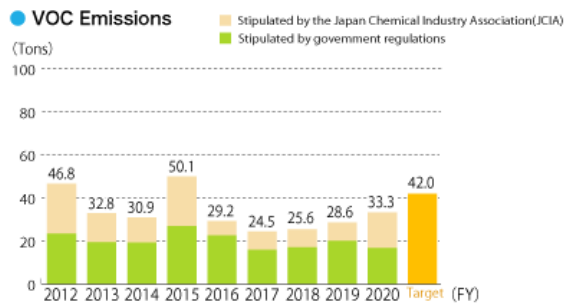
Himeji Plant Introduction of a Photovoltaic System	read more ▼
Activities by Kayaku Safety Systems de Mexico, S.A. de C.V. (KSM) to Reduce its Environmental Impacts	read more ▼
Wuxi Advanced Kayaku Chemical Co., Ltd. (WAC) Switching to LED lighting	read more ▼
Rolling Out Eco-friendly Sales Vehicles	read more ▼

Preventing Air Pollution

To help prevent air pollution, we carefully manage substances subject to Japan's Air Pollution Control Act, hazardous substances released into the air and other air pollutants.

(Under the initiative of the Japan Chemical Industry Association, the industry is taking action to voluntarily manage and reduce emissions of 12 control substances*¹ that are deemed to be harmful air pollutants. Of these 12 control substances, we used five substances after 1995, but stopped the use of benzene in 1995. Emissions of chloroform and ethylene oxide have been cut to zero since fiscal 2007. About dichloromethane emissions there were few times of zero since fiscal 2007, but have risen slightly since fiscal 2010 because of their minor use in products. Formaldehyde emissions continue to occur, albeit in small amounts, because of its use in products and in sterilization and fumigation. Going forward we will focus particularly on reducing the use and emissions of dichloromethane and formaldehyde through production process improvements and other means.

Air pollutants sulfur oxide (SOx)*² and nitrogen oxide (NOx)*³ are emitted during boiler operations. To date, the Nippon Kayaku Group has gradually shifted the fuel for its boilers from Bunker C heavy oil with high sulfur content to other lower sulfur content fuels such as Bunker A, in addition to LPG and natural gas, which are sulfur free. As a result, since fiscal 2008, we maintain to reduce SOx emissions about, we made further reductions. The Nippon Kayaku Group will continue to make efforts. to properly maintain air pollution prevention equipment, carry out regular inspections and upkeep, and reduce overall emission of air pollutants into the atmosphere.



- * 1 12 control substances subject to voluntary controls: 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 water 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. In addition, NOx is also known to include the greenhouse gas dinitrogen monoxide.
- * 4 Dust: Dust mainly refers to fine particulate soot found in dust smoke produced when burning fossil fuels. In addition to a major cause of air pollution, humans can contract pneumoconiosis or other harmful health conditions when breathing dust in high concentrations.

Fukuyama Plant VOC Reduction Initiative

Some of the products manufactured at the Fukuyama Plant are made utilizing organic solvents which are target compounds of VOC emission control.

While removal of such compounds is a required process at the final stage of manufacturing, a small amount of these organic solvents are released into the atmosphere during this process. Upon reviewing the potential of recovering and reusing these organic solvents, we achieved a reduction of VOCs released into the air by more than 30% as well as reduced the amount of organic solvents used through equipment modifications and process improvement.

● VOC Emissions

年度	ton
2013	12.0
2014	10.0
2015	11.5
2016	5.6
2017	5.2
2018	6.0
2019	5.3
2020	5.7

Response to Water Risks

The Sustainable Development Goals (SDGs) were adopted at the UN Summit in September 2015. The SDGs consist of 17 goals and 169 targets to achieve by 2030. Within the 17 goals, Goal 6 (water and sanitation), Goal 12 (sustainable production and consumption), Goal 13 (climate change), Goal 14 (ocean conservation), and Goal 15 (ecosystems and forests) are items related to water risks*. The Nippon Kayaku Group is working not only to resolving waste water issues as discussed in the Special Feature article of fiscal 2018 CSR report, but also the reduction of water usage.

* Water risks refer to the following three main categories.

1. Physical risk: impact on business operations due to drought, flood, and water pollution
2. Regulation risk: tightening water quality standards and revisions to waterworks and sewerage charges
3. Reputation risk: declined corporate image based on response to water access rights

■ Preventing Water Pollution

The Nippon Kayaku Group has set voluntary wastewater discharge control standards that are tougher than requirements laid out in national laws and local ordinances. And The Nippon Kayaku Group produces color material-related products including dyes and ink jet printer ink, among others. Our Tokyo and Fukuyama plants, where color material-related products are manufactured, fully decolorize colored wastewater before it is discharged.

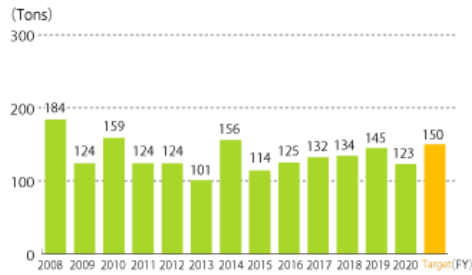
As a result of efforts to reduce COD emissions by installing activated sludge treatment equipment at plants with high levels of COD emissions, Company-wide emissions reached 122.6 tons, achieving our 2020 mid-term environmental target. The Nippon Kayaku Group will continue to thoroughly manage wastewater and make efforts to protect the environment.

■ PRTR*1 Initiatives

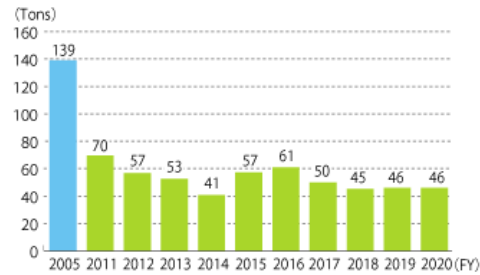
Since 1995, the Nippon Kayaku Group has participated in the Japan Chemical Industry Association led initiative to reduce compounds identified in the PRTR regulation, working to reduce its emissions of PRTR controlled compounds into the environment. In fiscal 2019, our emissions of PRTR controlled substances totaled 32.2 tons which marked about 13% decrease from 28.5 tons in fiscal 2018. In addition, we continue to handle a large amount of toluene which produces large emissions, but this amount decreased from 15.5 tons in 2015 to 5.3 tons in 2019, and further decreased to 3.5 tons in 2020.

The result of the VOC emission reduction effect surely appeared.

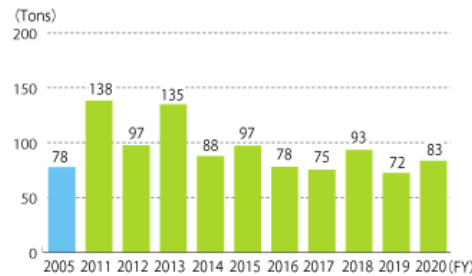
● COD Emissions



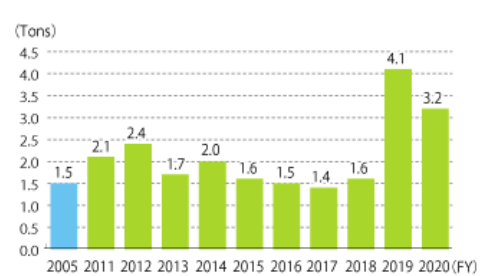
● SS*2 Emissions



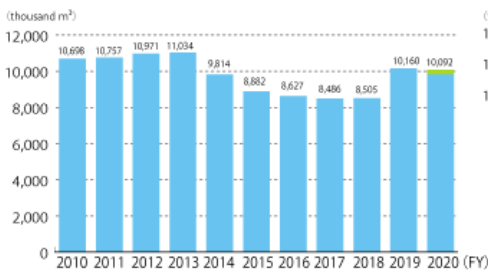
● Nitrogen Emissions



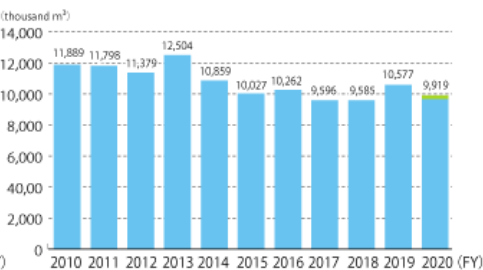
● Phosphorus Emissions



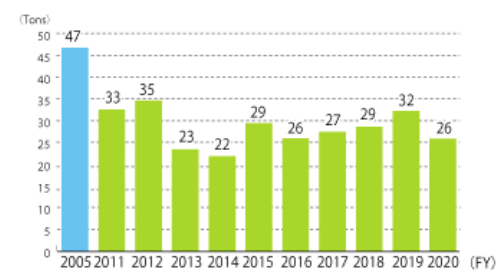
● Water Consumption



● Drainage



● Emissions of PRTR Controlled Substances



- * 1 PRTR: Pollutant Release and Transfer Register. The PRTR regulation is designed to prevent occurrences of environmental safety incidents by encouraging businesses to improve their own chemical substance management.
- * 2 SS: Suspended Solids. SS is a water-quality indicator generally referring to insoluble substances of 2 mm or less in diameter suspended in water. The organic matter and metal originating in particulate-like mineral, animals-and-plants plankton and its corpse, a sewer, factory effluent, etc. are contained. The increase in SS worsens transparency, and influences underwater photosynthesis by preventing light penetration.

Fukuyama Plant Initiative to Reduce Water Usage

As of 2015, the amount of contracted volume of industrial water usage was 24,000 m³/day. In addition, we have reduced from 23,000 m³/day to 22,000 m³/day from fiscal 2018.

The Fukuyama Plant conducts treatment of waste water resulting from the colorant manufacturing process at its own expense. The treated water is then released into the Seto Inland Sea. Since the beginning of 2000, we have strived to optimize the treatment method of waste water resulting from the manufacturing of colorants for inkjet printer ink. This included many efforts to implement individualized treatment by brand and to revise the manufacturing process to realize reduced wastewater amounts.

Through these efforts, we have achieved a reduction in industrial water usage as stated above since 2015. At present, we are still working to develop better wastewater treatment techniques. Moreover, in addition to industrial water, we also use the city water supply during the manufacturing and equipment cleaning processes, which is also target for our reduction initiative.

Kayaku Safety Systems Europe a. s. (KSE)
Effective Rainwater Usage



KSE* has introduced a system in order to utilize rainwater more effectively following capital investment activities to support the environment and environmental protection policies. This system both contributes to the Nippon Kayaku Group's CSR-centered management and saves on costs both through reduced usage of potable water and the efficient use of non-potable water.

Up to the end of fiscal 2019, water storage tanks with capacities totaling 650.5m³ have been put into service. In 2020, KSE installed water storage tanks with a capacity of 100m³. By the end of 2019, a total of 4,433 m³ of water had been stored giving a saving of about 2.82 million yen. In 2020, the amount of water stored was 6,177 m³ against a projection of 4,877 m³ with an effective amount saved at about 3.61 million yen. The amount of potable water saved (effective amount) at KSE corresponds to the annual drinking water consumption of all KSE employees and their families (approx. 4,000 people).

In addition to rainwater, wastewater from reverse osmosis stations supplies water tanks. KSE production areas require regulated humidification controlled by an air-conditioning system. This air-conditioning system requires demineralized water, which is attained through mineral removal in osmosis stations. Half of the water treated in this manner becomes wastewater. This wastewater serves as an additional source feeding the water tanks.

In these times, when a lack of precipitation is becoming a global issue, it is more essential than ever to implement water-recycling practices close to the source. In achieving this initiative, KSE comes closer to the fulfillment of the KAYAKU spirit.

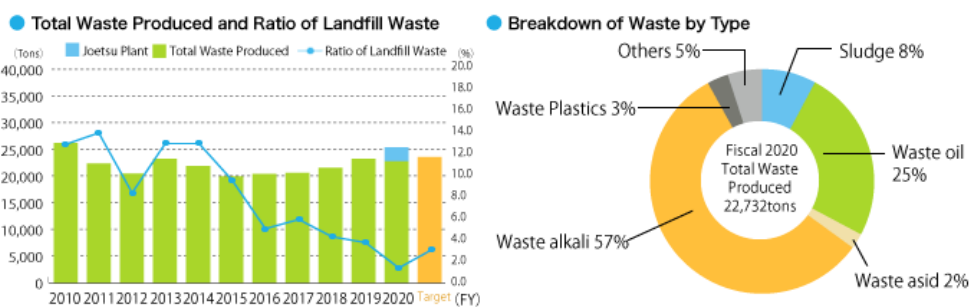
* [KSE] A company belonging to the KAYAKU Group located in the Czech Republic that manufactures automotive safety components.

Waste Reduction

In fiscal 2019, the Nippon Kayaku generated 23,204 tons of waste (excluding the Joetsu Plant), which represents 8.0% decrease compared to fiscal 2018. In addition, landfill waste in fiscal 2020 amounted to 323 tons, which was less than 40% on the previous year, and the zero emission rate was 1.4%, a decrease of 2.2 points from the previous year. As a result, we achieved our 2020 mid-term environmental targets not only for the amount of waste generated but also for the zero emission rate.

The zero emission rate was 13.1% in fiscal 2011 when the mid-term environmental targets began, but this has improved significantly in the last 10 years up to fiscal 2020. In particular, the zero emission rate has been greatly improved by promoting the recycling of waste that had been landfilled at the Fukuyama and Asa Plants.

Going forward, we will continue to reduce waste while making constant efforts toward the 2020 target while monitoring production volumes at each plant.



Fukuyama Plant

Fukuyama Plant Achieved Zero Net Emissions through Changes to its Sludge Treatment Process

Many types of wastes are produced during the Fukuyama Plant's production activities. Sludge that occurs from the treatment of waste liquids accounts for a considerably large portion of these wastes.

This sludge is difficult to dispose of because it contains moisture. In the past, this sludge was disposed of in landfills after undergoing appropriate treatment, but after examining whether this sludge could be recycled to reduce environmental impacts, the Fukuyama Plant found that it could be utilized as fuel for adjusting the heat used in waste incineration plants. Also, our waste disposal vender now has a source of recycled fuel, so both it and the Fukuyama Plant are able to utilize this sludge more effectively.

As a result, the Fukuyama Plant was able to reach its zero emission 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 lower disposal costs.

Joetsu Plant Efforts to Reduce Industrial Waste

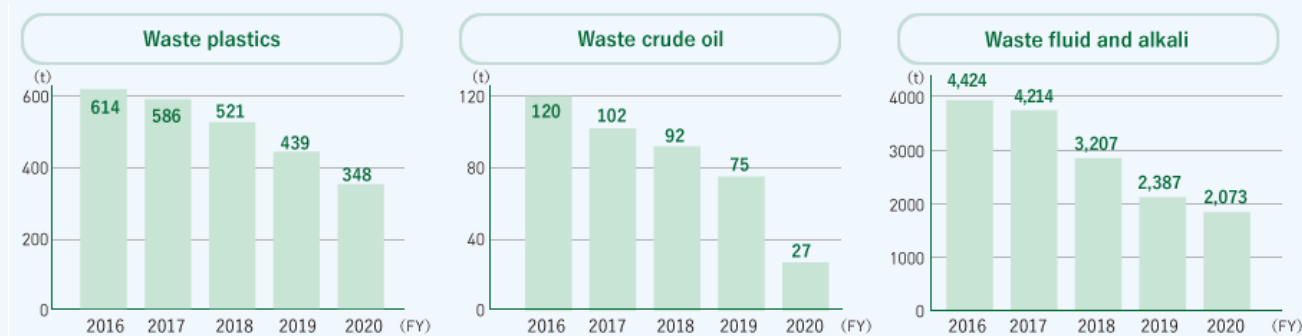
At the Joetsu Plant, industrial waste such as waste plastic, resin, and liquid is generated from many processes related to the production of our mainstay polarizing plates. In continued efforts to reduce and recycle these types of waste, we have formed an Industrial Waste Reduction Subcommittee to minimize the impact on the global environment.

The Industrial Waste Reduction Subcommittee promotes reductions in industrial waste by checking on the progress of reduction themes set for each fiscal year as well as affirming, by members appointed from within the Joetsu Plant, the amount of industrial waste produced every month. Since fiscal 2016, we have reduced the amount of waste plastics and liquids by normalizing bulk production through the review of production plans by reconsidering small-lot, high-mix products. Recycling facilities have been installed and went on line in fiscal 2018 significantly reducing waste liquid, and recycling equipment is operating stably. In fiscal 2020, we standardized the optimum amount of resin produced according to the length of film inserted, helping to reduce excess resin and consequently the amount of waste resin generated.

With new reduction themes in 2021, we will continue to promote sustainable production activities that contribute to society while aiming to reduce industrial waste and zero emissions in order to help protect the global environment.



Joetsu Plant – Amount of waste generation Result of FY2016–FY2020



Kayaku Safety Systems de Mexico, S.A. de C.V. (KSM) Waste management: an approach to life cycle

KSM works to recycle solid waste, such as wood, cardboard, ferrous metals, aluminum and plastics by finding external suppliers which can re-use those wastes. After collecting those wastes from production sites, we store them in the plant until the certified waste collect suppliers to come pick them up. Those suppliers use woods to manufacture wood pallets, cardboard and plastic are recycled, aluminum and ferrous metals are used to generate new raw materials. This program extends to the non-productive areas such as rest areas, our collaborators classify waste like aluminum cans and plastic bottles for recycling, and we also classify organic and inorganic waste for proper disposal.



Biodiversity / Noise and Odor Prevention

These days, efforts to address biodiversity is an important environmental issue around the world, and the Nippon Kayaku Group also highlights its impact on ecosystems as stated in its Responsible Care Policy. Environmental pollution and deforestation are major factors in the loss of biodiversity and so the Nippon Kayaku Group is working to prevent water pollution as a means to combat pollution to the environment.

■ Preventing Water Pollution

For details, see Response to Water Risks

Furthermore, Nippon Kayaku conducts business with a conscious effort toward minimizing noise and odor pollution in areas surrounding its plants. As well as regularly measuring noise levels around our factories, we are making every effort to be positive members of the local community by treating any feedback or requests received from local residents, from such things as the odor monitor system and community round-tables, with the utmost priority. We also conduct regular work environment measurements in the factory, striving to improve the place of work to protect our employees from excessive noise and other hazardous substances.

Environmental Accounting

Nippon Kayaku has tracked and shared all cost data associated with its environmental protection initiatives since fiscal 2000. Also, from fiscal 2003, we began calculating the returns from our environmental protection initiatives. Calculation of environmental costs and returns are made according to Environmental Accounting Guidelines (2005 Version) published by the Ministry of the Environment of Japan, and Environmental Accounting Guidelines for Chemical Companies published by the Japan Chemical Industry Association.

● Environmental Protection Costs(Fiscal 2020)

(Millions of yen)

Category		Investment	Total	Main Activities	
Cost Incurred in the Workplace	Pollution Prevention Cost	Air Pollution Prevention	20.9	97.0	Upgraded dust collection facilities, boilers, etc.
		Water Pollution Prevention	109.7	174.8	Expanded waste liquid treatment facilities and upgraded equipment, etc.
		Underground seepage prevention	5.5	3.7	Moved pits and pipelines above ground, etc.
		Noise and Vibration Prevention	17.2	6.2	Noise abatement measures for scrubber towers, etc.
		Other		435.0	Disposal costs of facilities and pollution charges
	Global Environment Cost	Global Warming Prevention and Energy Conservation	172.6	100.4	Remodeled high-efficiency equipment and pumps, improved A/C energy usage, etc.
	Resource Recycling Cost	Waste treatment	106.6	709.8	In-house processing costs and processing outsourcing costs
Up- / Down-Stream Cost	Container Recycling Outsourcing		0.4	Contracting to the Japan Containers and Packaging Recycling Association, etc.	
	Sewage Processing Cost		78.7	Sewerage treatment costs Tank dredging costs	
Management Activity Cost	System Maintenance and Operation	-	105.3	Internal auditor development cost and ISO14001 renewal costs	
	Environmental Stress Monitoring	-	42.5	Analysis costs and outsourcing costs	
	Information Disclosure	-	6.3	Outsourcing costs for preparing information disclosure documents on the environment	
	Education, Training and Other	-	59.4	Outside lectures, workplace training, etc.	
R&D Cost	Greening		70.0	Added plants and improved some greenery along the roadway Outsourcing costs	
R&D Cost		-	57.2	Environmentally friendly R&D costs and wastewater treatment technology development costs	
Social Activity Cost		-	8.9	Plant tours, community event sponsorship, responsible care, ICCA special committee, LRI research meeting costs	
Environmental Damage Cost		-	0.0		
Total		432.5	1,955.5		

● Return from Environmental Protection Initiatives(Fiscal 2020)

(Millions of yen)

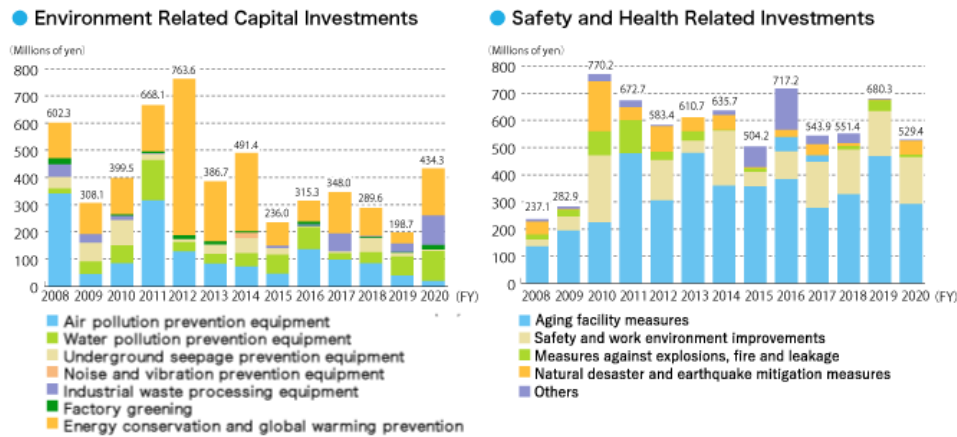
Sources of Return		Cost Reduction Return	Main Activities	
Workplace	Pollution Prevention Return	Air Pollution Prevention	0.0	Renewed air conditioners at guard stations (relating to the Fluorocarbon Act), and replaced hot air generator fuels at catalyst factory
		Water Pollution Prevention	0.0	Renewed drainage facilities and pipes at catalyst factory, repaired effluent wall surfaces, and duplicated wastewater pits, etc.
		Pollution Load Levy Reduction	0.4	
		Noise and Vibration Prevention	0.0	Renewed heat source equipment, and soundproofed outdoor equipment ducts
	Resource recycling return	Global Warming Prevention and Energy Conservation	112.8	Installed efficient flooring, installed decompression device vacuum pump ejector, and LED lighting, etc.
		Reduction of Waste	9.5	Recovery and reuse of solutions, in-house treatment of waste solvents, and renewed compressed packaging equipment
		Sale of Recycled Resources	12.9	Collected valuables and metals, and sold waste plastics outside the Group, etc.
Up- / Down-Stream	Container Recycling	73.6	Cleaned and reused SUS drums and plastic drums, and reused other containers	
Others		0.0	Implemented greening activities	
Total		206.8		

- Scope: Nippon Kayaku (non-consolidated)
- Investments: Aggregate of all orders placed in fiscal year 2019(April 2019 to March 2020) Capital expenditure: Compilation of capital appropriated for orders in April 2018 to March 2019
- Management cost: Any cost increase resulting from change in fuel type or change in waste processing method that are deemed appropriate from an environmental perspective are recorded under this category each year for a period of five years from the date the change is first administered.
- From a financial accounting standpoint, earnings realized from environmental protection initiatives are recorded in the fiscal year in which such earnings are realized.
- Earnings such as expense reduction and environmental impact reduction that are not considered from a financial accounting standpoint are reported for five years from the date it is first realized.

Investments Related to the Environment, Health and Safety

The Nippon Kayaku Group makes well planned and continual investments in environment, safety and health related projects. In fiscal 2020, environment-related capital investment totaled 434 million yen, an increase of about 120% compared to the previous year. In particular, industrial waste treatment equipment increased from 31 million yen to 107 million yen (up approx. 240%), and equipment related to energy saving and global warming prevention increased from 40 million yen to 173 million yen (up approx. 330%).

In addition, capital investment related to health and safety totaled 529 million yen in fiscal 2020, a decrease of about 22% compared to fiscal 2019. Out of that, investments in equipment renewals accounted for 55% of the total.



Environment related datalist

fiscal	Nippon Kayaku (Non-Consolidated)		Domestic group		Overseas group		Total	
	2019	2020	2019	2020	2019	2020	2019	2020
Global warming								
Energy input (Crude oil equivalent)	34,939	38,700	4,721	-	-	-	-	-
CO ₂ (ton)	69,241	69,903	9,693	30	45,111	44,072	124,045	114,005
Non-energy origin CO ₂ (ton)	2,371	2,301	0	0	12	39	2,383	2,340
GHG : Green house gas (ton) Other GHG (ton)	520	194	38	0	206	381	764	575
Emission to air								
NO _x (ton)	9.1	7.5	0.0	0.0	0.9	0.7	10.0	8.2
SO _x (ton)	1.3	1.0	0.0	0.0	0.0	0.0	1.3	1.0
Dish dust (ton)	0.9	0.5	0.0	0.0	3.3	2.0	4.2	2.5
PRTR substance (Emission to air; ton)	18.9	16.8	-	-	-	-	-	-
Emission to water area								
Water resource input (thousand m ³)	10,160	10,092	216	5	2,506	2,518	12,882	12,615
Amount of drainage (thousand m ³)	10,577	9,919	213	5	1,513	1,389	12,303	11,313
COD (ton)	145.2	122.6	0.0	0.0	62.2	67.6	207.4	190.2

fiscal	Nippon Kayaku (Non-Consolidated)		Domestic group		Overseas group		Total	
	2019	2020	2019	2020	2019	2020	2019	2020
Nitrogen (ton)	72.0	83.2	-	-	-	-	-	-
Phosphorus (ton)	4.1	3.2	-	-	-	-	-	-
PRTR substance (Emission to water area; ton)	13.3	9.1	-	-	-	-	-	-
Waste								
Amount of waste (ton)	23,204	25,331	3,240	43	674	1,046	27,118	26,420
Landfill waste (ton)	844	404	34	2	20	113	898	519
Zero emission (%)	3.6	1.6	1.0	5.4	3.0	10.8	3.3	2.0
Recycle rate (%)	84.4	81.3	-	-	-	-	-	-

From 2020, Nippon Kayaku (non-consolidated) will include the Joetsu Plant. Polatechno Co., Ltd. is not included in the domestic Group.