



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 one aspect of the mid-term environmental targets it has set for fiscal 2020, and with these targets in mind, we are now implementing activities for environmental protection. Also, to achieve these targets, we are working to reinforce our responses to natural disasters as well as promoting the development and improvement of wastewater treatment technologies.

Results of the Mid-term Corporate Plan for the Environment

Nippon Kayaku has established a mid-term corporate plan for the environment for the period running from fiscal 2011 to fiscal 2020 that consists of six items covering three areas. Fiscal 2018 was the 8th year of this plan. In addition, in response to the interim results of fiscal 2015, we set the target value for fiscal 2020 to a more stringent level.

The scope of reporting covers Nippon Kayaku (non-consolidated).

Mid-term Corporate Master Plan for the Environment (FY 2011 - FY 2020)

	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 2018 results	69.7 thousand tons	25.6 tons	133.7 tons	21,491 tons	81.4% <small>Displacement outside of the factory 20,080 tons of which final disposal volume 870 tons</small>	4.0%
Year-on-year	Decreased 2.2%	Increased 4.5%	Increased 1.2%	Increased 4.5%	Increased 1.7 point	Decreased 1.6 point
Target value for fiscal 2020	Under 79.5 thousand tons	Under 42 tons	Under 150 tons	Under 23,500 tons	More than 80%	Under 3.0%

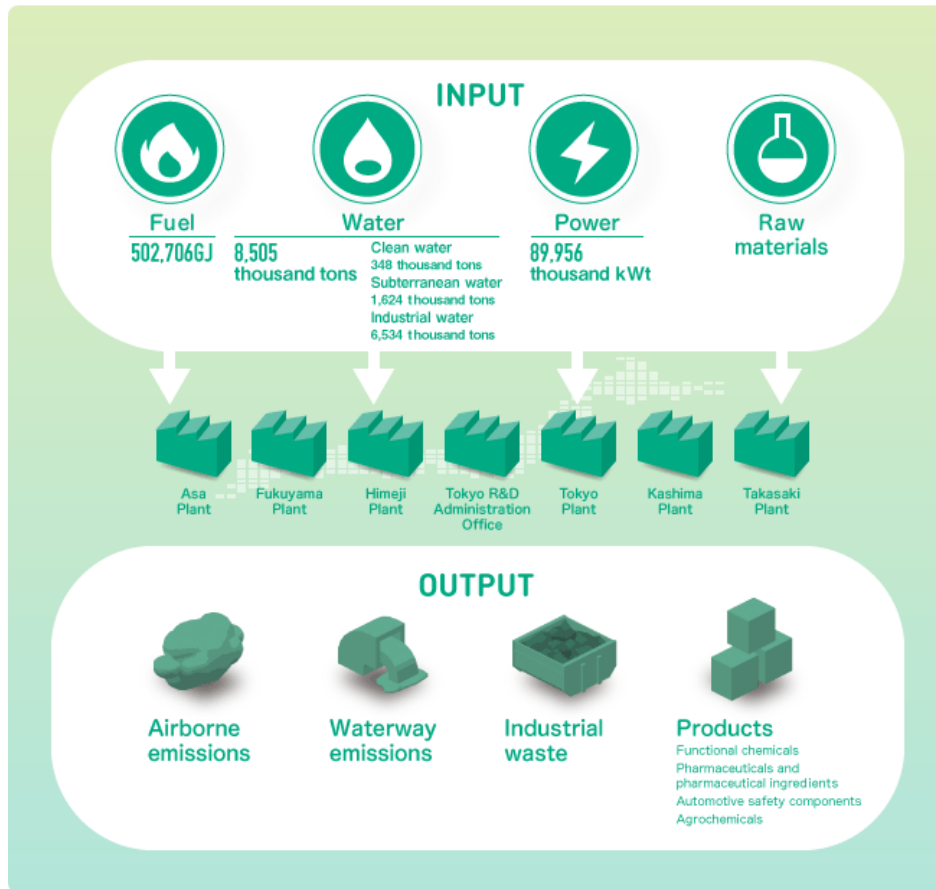
※1 Energy-derived CO₂ emissions: Japanese Government policy is to reduce these emissions by 3.8% versus 2005 (82.6 thousand tons).

※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.

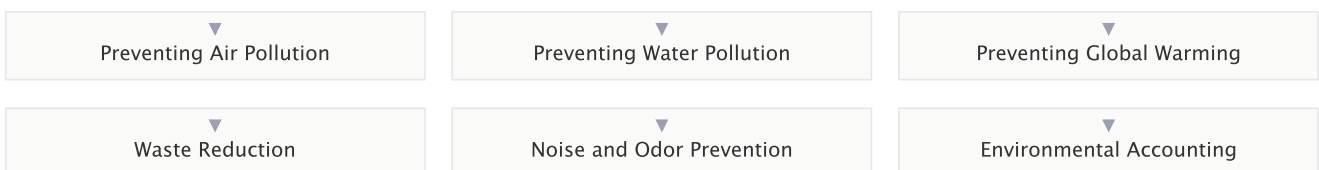
● Overview of business activities and environmental impacts



Scope: Nippon Kayaku (non-consolidated)

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

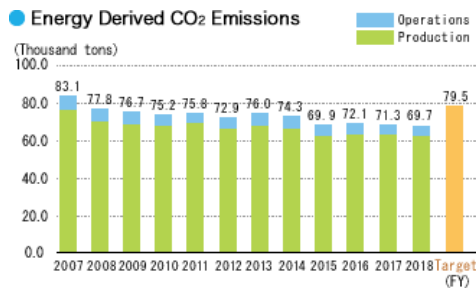
At each business site, we have been working on energy conservation measures such as improving the operation of utility equipment, replacing it with high efficiency equipment, and changing to LED lighting. We will continue making efforts to attain the medium-term environmental goals.

In addition, As part of its efforts to help reduce CO₂ emissions from homes, the Nippon Kayaku Group has established the program to encourage employees to conserve energy at home called "My Home is Currently Conserving Electricity", which focuses exclusively on electricity usage.

In 2015, we created new version of Kayakuma the Bear with the phrase "I'm currently conserving electricity" to raise greater awareness of this campaign.

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Moreover, regarding measures to counter global warming, we are considering making our mid-term environmental targets for fiscal 2030 more stringent in view of the Paris Agreement (COP21). Besides continuing to implement our established energy-saving measures, we are also focusing on activities that address energy loss.

[> FY2018 Energy saving activity summary sheet of Nippon Kayaku Group](#)

Kayaku Safety Systems (Huzhou) Co., Ltd. Initiatives for Reducing Environmental Impacts

KSH^{*1} has switched over to LED lighting, made modifications to its pneumatic system, and carried out energy conservation activities including switching off equipment when not in use and educating employees, in order to contribute to the prevention of global warming. While it is achieving results from these initiatives, KSE is continuing to make efforts by combining the power of its entire workforce. In aiming to be an environmentally friendly company, KSE ensures that dangerous wastes are sorted and disposed of by an accredited vendor. The company has also prepared and registered an emergency response manual for environmental accidents and is working to have the necessary facilities and materials in place for any contingency.

^{*1} KSH: A group company located in China that manufactures automotive safety components.

item	2015	2016	2017	2018	2019 targets
Intensity of electricity usage (Electricity usage/Net sales) (kWh/10,000 RMB) ^{*2}	174.6	169.9	158.8	164.3	153.0
Electricity cost savings (10,000 RMB)	-	17.5	51.4	11.0	40.0
CO ₂ reduction (tons)	-	165.5	463.2	239.0	550.0
SO ₂ reduction (tons)	-	20.1	60.5	0.7	16.0

Himeji Plant Introduction of a Photovoltaic System

The electricity situation for the Himeji Plant has changed a great deal since before the Great East Japan Earthquake as follows.



1. Electricity supply shortages are forecast every year for the Kansai Electric Power Company service area during the summer months because of lost capacity from the shutdown of nuclear power plants, and so customers have been asked to reduce their electricity usage during peak times
2. The minimum necessary electricity needed to contact customers and other related stakeholders during a major disaster is required as part of its BCP measures

The Himeji Plant began operating a power generation system combining a photovoltaic system and lithium-ion batteries in April 2014 to satisfy the following three conditions.

1. Use of a system that can reduce the plant's electricity usage during time of peak demand in non-emergency situations
2. A system that can operate even when external lifelines are cut off
3. A system that can ensure the minimum operations of indirect and sales departments in case of a blackout from a major disaster

The capacity of each component of the system is as follows.

- **Photovoltaic system: 54kW generating capacity**
- **Lithium-ion batteries: Output of 30kVa**

After putting the system into operation, the Himeji Plant has been able to reduce its use of electricity by up to 50kW during peak demand times in the summer. Additionally, the Himeji Plant was forced to initiate an emergency shutdown due to a nearby accident in December 2014. The photovoltaic system and lithium-ion batteries operated as normal and supported the operations of indirect and sales departments. In the future, the Himeji Plant will increase the number of solar panels and take further steps for its BCP and energy saving activities.

Click to show the other activities

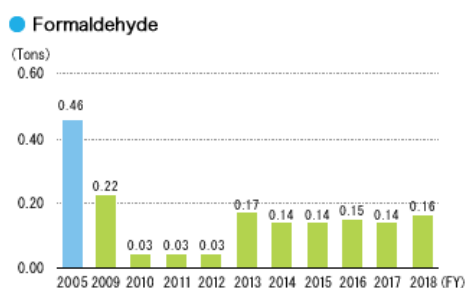
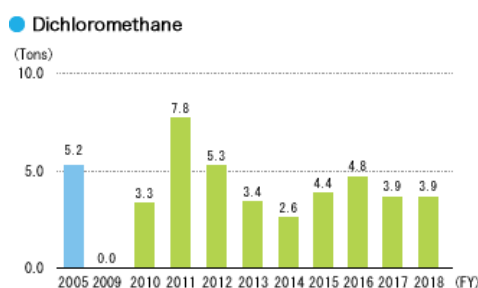
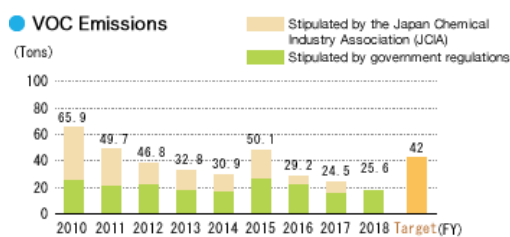
- Activities by Kayaku Safety Systems de Mexico, S.A. de C.V. (KSM) to Reduce its Environmental Impacts ▼
- Wuxi Advanced Kayaku Chemical Co., Ltd. (WAC) Switching to LED lighting ▼
- Rolling Out Eco-friendly Sales Vehicles ▼

Preventing Air Pollution

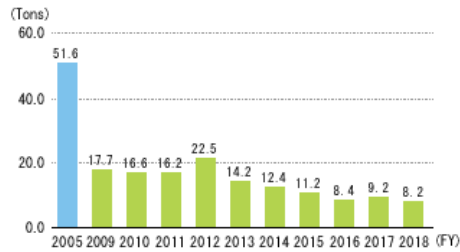
To help prevent air pollution, we carefully manage substances subject to Japan's Air Pollution Control Act, hazardous substances released into the air and other air pollutants.

(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.

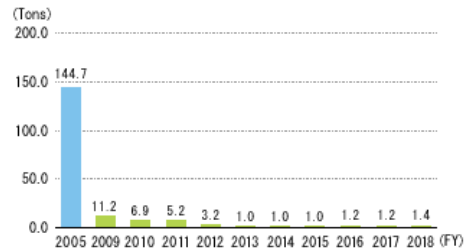
Air pollutants sulfur oxide (SOx)*² and nitrogen oxide (NOx)*³ are emitted during boiler operations. To date, the Nippon Kayaku Group has gradually shifted the fuel for its boilers from Bunker C heavy oil with high sulfur content to other lower sulfur content fuels such as Bunker A, in addition to LPG 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.



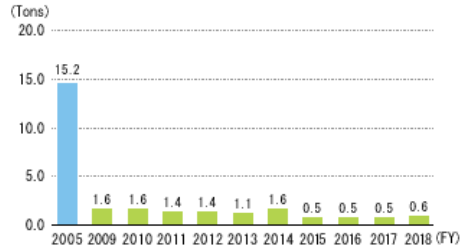
● NOx Emissions



● SOx Emissions



● Dust*Emissions



- ※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

FY	ton
2013	12.0
2014	10.0
2015	11.5
2016	5.6
2017	5.2
2018	6.0

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.

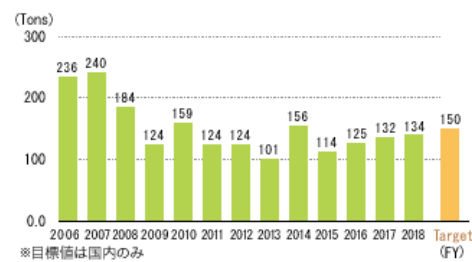
The Nippon Kayaku Group has made efforts to reduce its COD emissions by employing activated sludge treatment equipment at plants with high levels of COD emissions.

PRTR^{*1} Initiatives

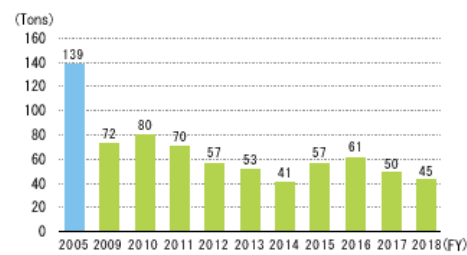
Since 1995, the Nippon Kayaku Group has participated in the Japan Chemical Industry Association led initiative to reduce compounds identified in the PRTR regulation, working to reduce its emissions of PRTR controlled compounds into the environment. In fiscal 2018, our emissions of PRTR controlled substances totaled 28.5 tons which marked about 4% increase from 27.4 tons in fiscal 2017. This was caused in fiscal 2018 by increased amount of use at the PRTR substance of Takasaki Plant and Kashima Plant. Among PRTR substances, toluene emissions were high, but it decreased to 15.5 tons in 2015, and 4.4 tons in fiscal 2018.

The result of the VOC emission reduction effect surely appeared.

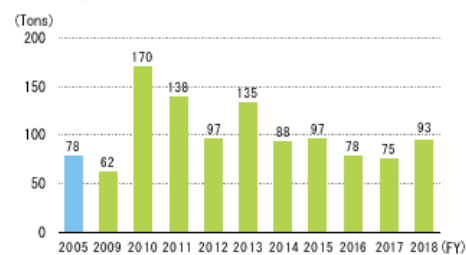
COD Emissions



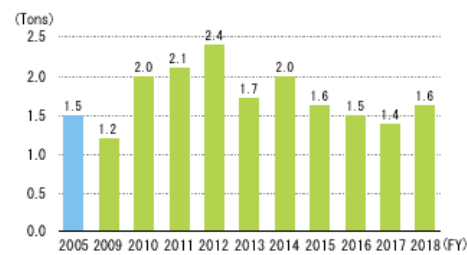
SS^{*2} Emissions



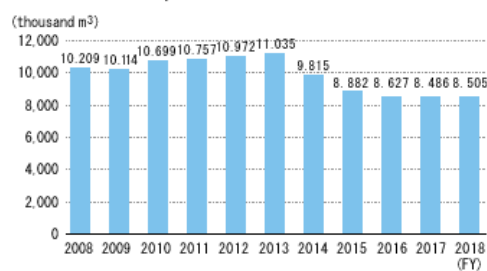
Nitrogen Emissions



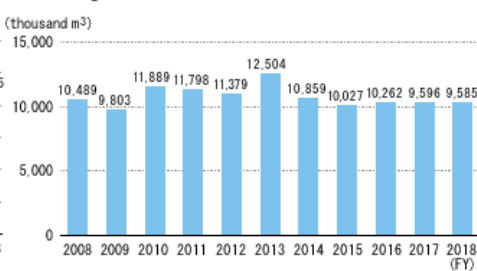
Phosphorus Emissions



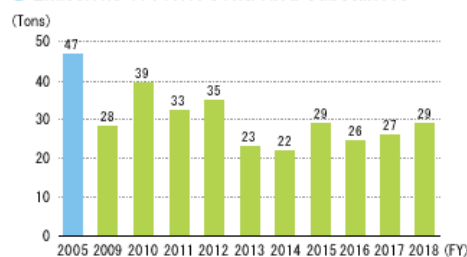
Water Consumption



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.

As of 2015, the amount of contracted volume of industrial water usage was 24,000 m³/day. In November 2015, this amount was amended to 23,000m³/day, which has been further reduced at the present to 22,000 m³/day through our implementation of reduction efforts.

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.

KSE Kayaku Safety Systems Europe a. s.(KSE)
Effective rainwater usage



KSE* introduced a system to utilize rainwater more effectively following capital investment activities to support the environment and its environmental protection policies. This system both complies with the laws and regulations of the Czech Republic and contributes to the Nippon Kayaku Group's CSR-centered management.

This initiative not only received a positive review during a regular inspection on construction management performed by an administrative institution of the Czech Republic's government, but has also lowered costs through less usage of potable water, because it uses non-potable water (before that, drinking water was being used). In 2017, KSE installed a 55m³ water storage tank under its parking lot.

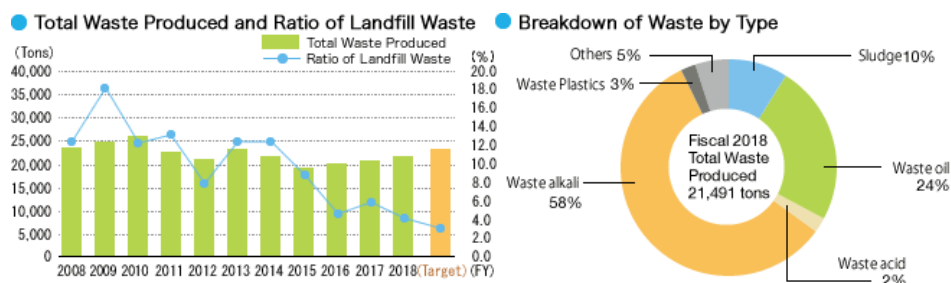
In fiscal 2018, KSE installed two water storage tanks with a total capacity of 75m³ and two more water storage tanks with a total capacity of 152m³ in its production facilities. In 2019, KSE is planning to install three water storage tanks with a total capacity of 198m³.

Water from these water storage tanks is used for toilet flushing.

* [KSE] A group company located in the Czech Republic that manufactures automotive safety components.

Waste Reduction

In fiscal 2018, the Nippon Kayaku generated 21,491 tons of waste, which represents 4.5% increase compared to fiscal 2017. Landfill waste in fiscal 2018 amounted to 870 tons, and Zero Emissions rate of 4.0%. It was a decrease of 1.6 points from fiscal 2017, so we will continue to make efforts toward the 2020 target.



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 vendor 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.

Polatechno Co., Ltd. Industrial Waste Reduction CHANGE&CHALLENGE

Polatechno Co., Ltd. generates waste plastics, waste resin, waste fluids, and other industrial waste materials in the process of producing polarizing plates, its major product. In its continuing efforts to conserve resources and to reduce the generation of and recycle waste, the company formed an Industrial Waste Reduction Subcommittee to change its traditional methods of reducing waste (CHANGE) and challenge itself to come up with new ideas for achieving waste reduction (CHALLENGE).

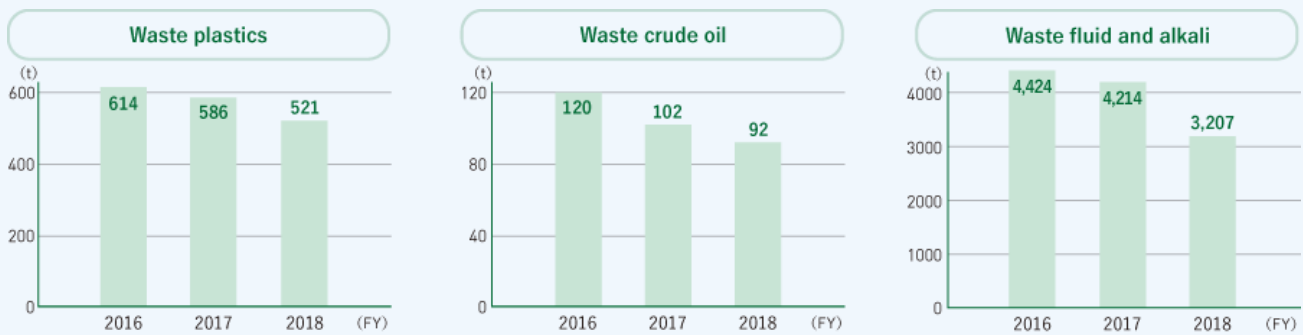


First, the fiscal 2016 results were examined and reviewed from the standpoint of zero emissions. Then, we adjusted raw material and product inventories when we changed our production process to producing small volumes of a large variety of items. After that, we changed to a bulk production process, which cut down on the volume of waste plastics and waste fluids. Next, we reduced our surplus generation of resin by ascertaining the optimal amounts of resin to be used in adhesive processing.

A recycling facility that reuses waste fluids went on line in fiscal 2018, and this makes it possible to achieve a large-scale reduction in waste fluids.

Polatechno continues to find ways to reduce its industrial waste so that its operations will be kind to the environment.

Amount of waste generation Result of FY2016–FY2018



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.



Noise and Odor Prevention

We conduct our business with a conscious effort toward minimizing noise and odor pollution in the areas surrounding our factories. We regularly measure noise levels around our factories, making every effort to be a positive members of the local community or odor-monitor-system. As such, any feedback or requests that we receive from local residents at company-sponsored events such as

community round-tables are treated with the utmost priority. We also conduct regular work environment measurements in the factory to protect our employees from excessive noise and other hazardous chemicals.

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 2018)

(Millions of yen)

Category		Investment	Total	Main Activities	
Cost Incurred in the Workplace	Pollution Prevention Cost	Air Pollution Prevention	85.9	98.3	Odor countermeasures, upgraded exhaust gas treatment facilities, etc.
		Water Pollution Prevention	40.6	223.9	Expanded waste liquid treatment facilities and upgraded equipment, etc.
		Underground seepage prevention	52.0	6.0	Dirt floor maintenance, expanded wastewater drains, etc.
		Noise and Vibration Prevention	4.3	6.1	Soundproofing measures for treatment tower and pumps, etc.
		Other		190.6	Disposal costs of facilities and pollution charges
	Global Environment Cost	Global Warming Prevention and Energy Conservation	102.9	8.1	Upgraded to high efficiency equipment, upgraded pumps, responded to CFC facilities, etc.
Resource Recycling Cost	Waste treatment	3.9	565.3	In-house processing costs and processing outsourcing costs	
Up- / Down-Stream Cost	Container Recycling Outsourcing	-	1.0	Outsourcing costs for repackaging products	
	Sewage Processing Cost	-	90.9	Sewerage treatment costs Tank dredging costs	
Management Activity Cost	System Maintenance and Operation	-	100.4	Internal auditor development cost and ISO14001 renewal costs	
	Environmental Stress Monitoring	-	41.8	Analysis costs and outsourcing costs	
	Information Disclosure	-	8.7	Outsourcing costs for preparing information disclosure documents on the environment	
	Education, Training and Other	-	88.6	Outside lectures, workplace training, etc.	
	Greening	-	97.5	Added plants and improved some greenery along the roadway Outsourcing costs	
R&D Cost			176.1	Environmentally friendly R&D costs and wastewater treatment technology development costs	
Social Activity Cost		-	8.7	Plant tours, community event sponsorship, responsible care, ICCA special committee, LRI research meeting costs	
Environmental Damage Cost		-	0.0		
Total		289.6	1,712.0		

● Return from Environmental Protection Initiatives

(Millions of yen)

Sources of Return		Cost Reduction Return	Main Activities	
Workplace	Pollution Prevention Return	Air Pollution Prevention	0.0	Replacement of NOx decomposition facilities and boilers
		Water Pollution Prevention	0.0	Raising of drainage bits above the ground and replacement of dikes
		Pollution Load Levy Reduction	0.1	
		Noise and vibration Prevention	0.0	Installation of sound-proof covers
	Global Environment Return	Global Warming Prevention and Energy Conservation	53.5	Installation of high-efficiency equipment, switchover to LED lighting, installment of energy-saving equipment
	Resource recycling return	Reduction of Waste	2.1	Solvent recovery
		Sale of Recycled Resources	12.8	Collected valuables, metals, sold paper products outside the group, and sold plastics outside the group
Other		6.3	Made changes to in-house recycling and the waste processing provider	
Up- / Down-Stream	Container Recycling	69.6	Reused plastic drums	
Others		0.0	Implemented greening activities	
Total		144.4		

- Scope: Nippon Kayaku (non-consolidated)
- Investments: Aggregate of all orders placed in fiscal year 2018(April 2018 to March 2019) Capital expenditure: Compilation of capital appropriated for orders in April 2017 to March 2018

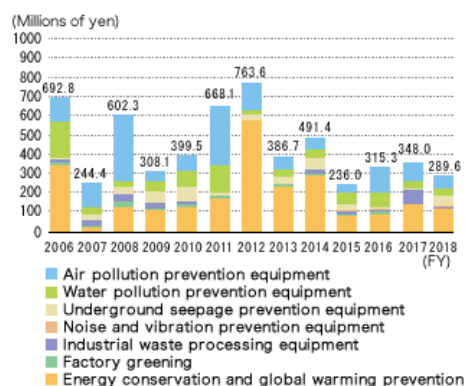
- Management cost: Any cost increase resulting from change in fuel type or change in waste processing method that are deemed appropriate from an environmental perspective are recorded under this category each year for a period of five years from the date the change is first administered.
- From a financial 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

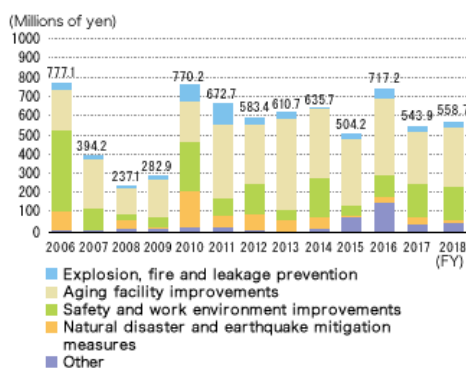
The Nippon Kayaku Group makes well planned and continual investments in environment, safety and health related projects. In fiscal 2018, investments related to the environment totaled at 290 million yen, which is a decrease of about 17% compared to fiscal 2017.

Investments related to health and safety totaled at 558.7 million yen in fiscal 2018, which is an increase of about 3% compared to fiscal 2017. Out of that, investments in equipment renewals accounted for 59% of the total.

● Environment Related Capital Investments



● Safety and Health Related Investments



Environment related data list

fiscal	Nippon Kayaku (Non-Consolidated)		Domestic group		Overseas group		Total	
	2017	2018	2017	2018	2017	2018	2017	2018
Global warming								
Energy input (Crude oil equivalent)	33,152.0	33,669.0	5,725.1	5,978.6	23,283.4	30,274.4	62,160.5	69,922.0
CO ₂ (ton)	71,336.0	69,731.0	12,319.2	12,864.6	50,100.9	65,145.1	133,756.1	147,740.7
Non-energy origin CO ₂ (ton)	2,017.1	2,202.4	13.0	10.0	362.0	1,108.4	2,392.1	3,320.8
GHG : Green house gas (ton) Other GHG (ton)	360.5	973.0	0.4	0.4	87.5	2,272.7	448.0	3,125.4
Emission to air								
NOx (ton)	9.2	8.2			0.1	0.1	9.3	8.3
SOx (ton)	1.2	1.4			0.0	0.0	1.2	1.4
Dish dust (ton)	0.5	0.6			3.1	3.1	3.6	3.7
PRTR substance (Emission to air; ton)	15.9	17.1	0.2	0.2			16.1	17.3

fiscal	Nippon Kayaku (Non-Consolidated)		Domestic group		Overseas group		Total	
	2017	2018	2017	2018	2017	2018	2017	2018
Emission to water area								
Water resource input (thousand m ³)	8,486.0	8,505.0	300.7	258.7	469.3	595.6	9,256.0	9,359.3
Amount of drainage (thousand m ³)	9,596.0	9,585.0	296.6	255.2	284.5	470.8	10,177.2	10,311.0
COD (ton)	132.1	133.7	3.3	2.9	55.3	57.4	190.7	194.0
Nitrogen (ton)	75.2	93.2					75.2	93.2
Phosphorus (ton)	1.4	1.6					1.4	1.6
PRTR substance (Emission to water area; ton)	11.5	11.4	1.3	1.2			12.8	12.6
Waste								
Amount of waste (ton)	20,552.0	21,490.7	5,236.7	4,150.2	913.9	1,005.4	26,702.6	26,646.3
Landfill waste (ton)	1,148.0	869.7	44.0	38.0	1.0	29.6	1,193.0	937.3
Zero emission (%)	5.6	4.0	0.8	0.9	0.1	2.9	4.5	3.5
Recycle rate (%)	79.7	81.4						

※Blank items do not have corresponding facilities or have no obligation to acquire data

FY2018 Energy saving activity summary sheet of Nippon Kayaku Group

☀ : Solar panel installation ☒ : Unrealized due to lease limitaions — : Non-applicable ※High-load machinery: refrigerators/freezers, blowers, air compressors, steam boilers

Business site/Company name	Management of thermostat settings	electricity/water saving and conservation awareness	Reduction of fluorescent lighting ; Switch to LED lighting.	Controlled operation of high - load machinery*	Heat barrier film/paint, water dispersement
Head Office, NIPPON KAYAKU CO., LTD.	●	●	●	—	—
Asa Plant ☀	●	●	●	●	●
Takasaki Plant	●	●	●	●	●
Himeji Plant ☀	●	●	●	●	●
Kashima Plant	●	●	●	●	●
Tokyo business CENTER/ Tokyo P&D Administration Office	●	●	●	●	●
POLATECHNO CO., LTD.	●	●	●	●	×
MOXTEC, INC.	●	●	●	—	●
WUXI POLATECHNO OPTICS CO., LTD.	●	●	●	—	—
Dejima Tech B.V.	●	●	●	●	×
POLATECHNO (HONG KONG) CO., LIMITED	●	●	☒	—	●
NIKKA FINE TECHNO CO., LTD.	●	●	●	—	☒
Nippon Kayaku Korea Co., Ltd.	●	●	☒	—	☒
NIPPON KAYAKU AMERICA, INC.	●	●	☒	—	●
Euro Nippon Kayaku GmbH	—	●	●	—	☒
KAYAKU CHEMICAL (WUXI) CO., LTD.	●	●	●	●	●
MicroChem Corp.	●	●	●	●	—
Wuxi Advanced Kayaku Chemical Co., Ltd.	●	●	●	●	●
Shanghai KAYAKU International Trading Co., Ltd.	●	●	—	—	—
NIPPON KAYAKU FOOD TECHNO CO., LTD.	●	●	●	—	●
Tumor Diagnosis Support Co., Ltd.	●	●	●	—	●
NAC Co., Ltd.	●	●	●	—	—
Taiwan Nippon Kayaku Co., Ltd.	●	●	—	—	—
Kayaku Safety Systems Europe a.s.	●	●	●	●	—
Kayaku Safety Systems (Huzhou) Co., Ltd.	●	●	●	●	●
Kayaku Safety Systems de Mexico, S.A. de C.V. ☀	●	●	●	●	●
Kayaku Safety Systems Malaysia Sdn.Bhd.	●	●	●	—	●
Nishiminato Driving School Corporation	●	●	●	—	●
Okiura Golf Center Co., Ltd.	●	●	●	—	●
Kayaky (Shanghai) Co., Ltd.	●	●	—	—	—
JHMS Co., Ltd	●	●	●	—	—
Wako Toshi Kaihatsu Co., Ltd.	●	●	●	—	—
Kouwa Sangyo Co., Ltd.	●	●	●	—	●
Gunnan Sangyo Co., Ltd.	●	●	●	—	●
Head Office, Kayaku Japan Co., Ltd.	●	●	●	—	☒
Asa Plant, Kayaku Japan Co., Ltd	●	●	●	●	●
Sanko Kagaku Kogyo Co., Ltd.	●	●	●	●	●
Head Office, KAYAKU AKZO CORPORATION	●	●	●	—	☒
Asa Plant, KAYAKU AKZO CORPORATION	●	●	●	●	●