

Environment

Management Approach

Basic Policy

In keeping with our ESG Charter, we at the Kaneka Group will contribute to realizing sustainable development and the enrichment of society by conserving resources and reducing environmental impacts at each stage of the entire product lifecycle.

Policy

Basic Policies for Responsible Care

- 1. Protect the natural ecosystem and reduce environmental impact**
Focusing on the impact of corporate activities on the global environment and the ecosystem, we endeavor to reduce environmental impact and promote resource conservation and energy saving throughout the lifecycle of products.
- 2. Offer safe products and information**
We endeavor to offer products that are safe to distribute and use, and to provide adequate information on the products such as instructions on how to use and handle products correctly.
- 3. Develop products and technologies in consideration of the environment and safety**
Upon the development of new products, we give consideration to the environment and safety throughout the lifecycle of the products to the greatest extent possible, and endeavor to develop products and technologies with low environmental impact.
- 4. Reduce waste and promote the recycling of plastics**
We reduce waste associated with manufacturing and its processes. We actively develop technologies for the adequate disposal or recycling of plastic waste concerning our products in cooperation with relevant industries, and endeavor to dispose of and recycle waste in a proper manner.

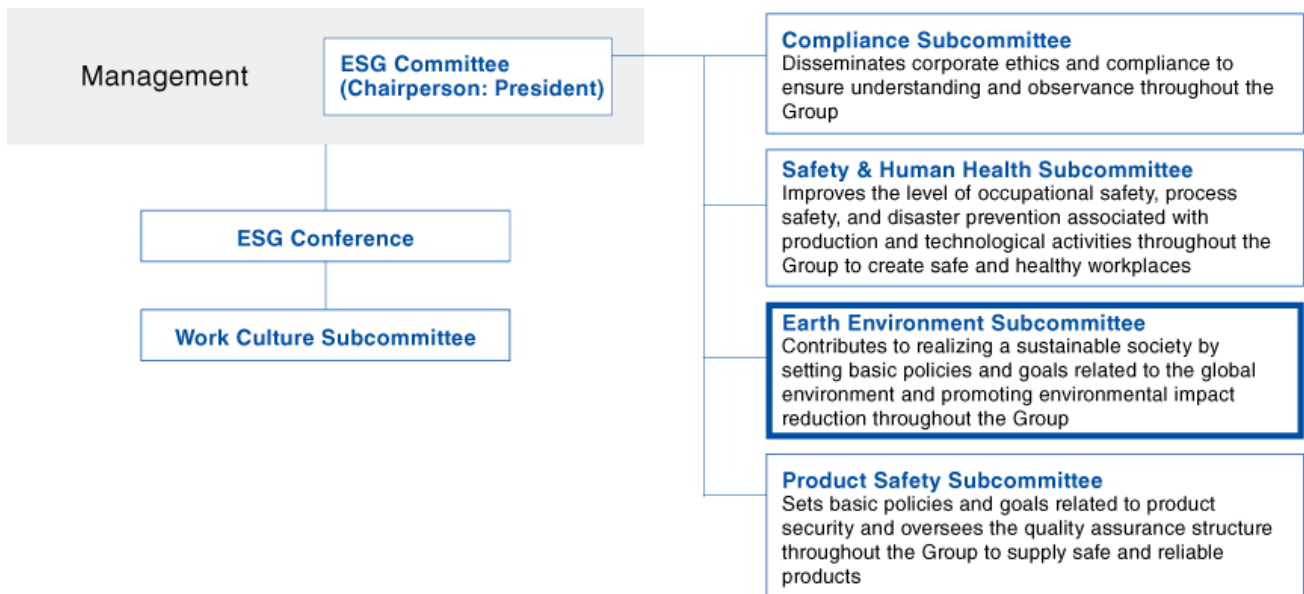
5. Enhance process safety, disaster-prevention, and occupational safety and health
 Safety and disaster prevention constitute the foundations of the local community's trust, and occupational health and safety are issues that need to be fulfilled by chemical companies. We persistently strive to make improvements in these areas.

6. Win public confidence
 From the management to every employee, all our members shall act in compliance with laws, regulations, standards, etc. relating to environment and safety both at home and abroad. Our approach to Responsible Care as such shall be publicized accurately to the public, in hope of rightfully gaining public recognition and confidence.

Promotion System

Important matters pertaining to the protection of the global environment are decided by the Earth Environment Subcommittee and decided by the ESG Committee. Meanwhile, issues on global environment protection are shared and further discussed at the management meeting, the Plant Management Committee, and other meetings. The mid-term management plan also focuses on strengthening initiatives on important matters to further improve our ESG management.

■ Diagram of Promotion System



Environment

Environmental Management

Kaneka Group engages in various environmental initiatives based on the ESG Charter by providing solutions that contribute to the global environment and a rich life and working to reduce environmental impacts and disclose timely information in fundamental business domains.

To realize a sustainable society, Kaneka Group continues working to reduce environmental impacts and risks, by complying with environmental regulations and legislation, such as the Air Pollution Control Act and the Water Pollution Control Act, and with criteria in agreements with local governments and by checking compliance with them through various means, including internal audits and ESG safety and quality inspections.

Eco-Friendly Products

Focusing on eco-friendly management, Kaneka Group has defined, enhanced, and expanded its eco-friendly products (*1), as listed below, since fiscal 2017.

*1 Products that can contribute to reducing global environmental impacts at the stages of customer use, disposal and recycling, compared to conventional products.

Energy Creation	Energy Storage	Energy Saving	Energy Saving	Waste Reduction	Chemical Pollution Prevention
					
Product name VISOLA SoltileX GRANSOLA	Product name Residential electricity storage systems	Product name Kanep pearl	Product name Eperan	Product name Green Planet	Product name KANEKA Surfactin
Intended use Solar power generation systems	Intended use Residential stationary batteries	Intended use Residential/automotive foams	Intended use Automotive parts Package cushioning materials	Intended use Biodegradable Polymers (Packaging materials, garbage bags, foams)	Intended use Biosurfactant, Cleaning agents
Reason for environmental contribution Creating energy with houses equipped with this product	Reason for environmental contribution Storing energy by houses equipped with this product	Reason for environmental contribution Saving energy as insulation and lightweight residential/automotive materials	Reason for environmental contribution Saving energy as lightweight automotive parts	Reason for environmental contribution A naturally derived and biodegradable polymers that has little environmental impact when discarded	Reason for environmental contribution A naturally derived and biodegradable material friendly to the environment

Eco-friendly products have been defined as follows.

Type of Environmental Contribution	Qualitative Definition
GHG Reduction	Products reducing greenhouse gas (GHG) emissions
Energy Saving	Products lowering energy consumption
Energy Creation	Products creating energy
Energy Storage	Products storing energy
Waste Reduction	Products reducing waste
Resource Saving	Products achieving resource savings
Biomass	Products (derived from non-fossil materials) reducing reliance on fossil materials
Water Resources	Products saving water and improving the water environment
Chemical Pollution	Products preventing chemical pollution
Biodiversity	Products conserving biodiversity
Intermediate Materials	Intermediate materials essential to ensuring that finished products contribute to the environment
Disaster Control	Products helping disaster prevention and preparedness and reducing environmental impacts during a disaster
Adaptive Contribution	Products adapting to global warming

Environmental Management Systems

We operate based on ISO 14001 and Eco-Action 21 environmental management systems, with the aim of reducing environmental impacts, preventing environmental problems, and responding quickly if any problems arise.

■ ISO 14001 Certification

Manufacturing Sites and Group Companies	Registration No.
Takasago Manufacturing Site	JCQA-E-0105
Osaka Manufacturing Site	JCQA-E-0053
Shiga Manufacturing Site	YKA4004950
Kashima Manufacturing Site	JCQA-E-0054
Vienex Corporation	JSAE1511
Osaka Synthetic Chemical Laboratories, Inc.	JCQA-E-0343
Kaneka Solartech Corporation	JQA-EM6704
Kanto Styrene Co., Ltd.	JEN-2024,0
Sanvic Inc.	JMAQA-E841
Showa Kaseikogyo Co., Ltd. Hanyu Headquarters Factory	E0062
Cemedine Co., Ltd. Ibaraki Office, Mie Office	JCQA-E-0366
Cemedine Co., Ltd. Kinuura Plant	497791UM15
Tatsuta Chemical Co., Ltd. Koga Plant	3571208
Tochigi Kaneka Co., Ltd.	YKA0958035
Kaneka Belgium N.V.	97 EMS 002g
Kaneka (Malaysia) Sdn. Bhd.	ER0523
Kaneka Innovative Fibers Sdn. Bhd.	ER0523
Kaneka Eperan Sdn. Bhd.	ER0523
Kaneka Paste Polymers Sdn. Bhd.	ER0523
Kaneka Apical Malaysia Sdn. Bhd.	ER0916

■ Eco-Action 21 Certification

Group Company	Certification and Registration No.
OLED Aomori Co., Ltd.	0010329
Kaneka Kanto Styrol Co., Ltd.	0004259
Kaneka Sun Spice Corporation	0003556
Kaneka Chubu Styrol Co., Ltd.	0006600
Kaneka Tohoku Styrol Co., Ltd.	0010773
Kaneka Nishinippon Styrol Co., Ltd. Headquarters, Saga Plant, Kagoshima Plant, and Nagasaki Plant	0003949
Kaneka Foods Manufacturing Corporation	0003491
Kaneka Foam Plastics Co., Ltd. Moka Plant	0003247
Kaneka Hokkaido Styrol Co., Ltd.	0001805
Kaneka Medix Corporation	0001893
Kyushu Kanelite Co., Ltd.	0001637
Kochi Styrol Co., Ltd.	0011039
Taiyo Yushi Corporation	0003575
Tokyo Kaneka Foods Manufacturing Corporation	0003473
Nagashima Shokuhin Co., Ltd.	0003093
Hokkaido Kanelite Co., Ltd.	0001905

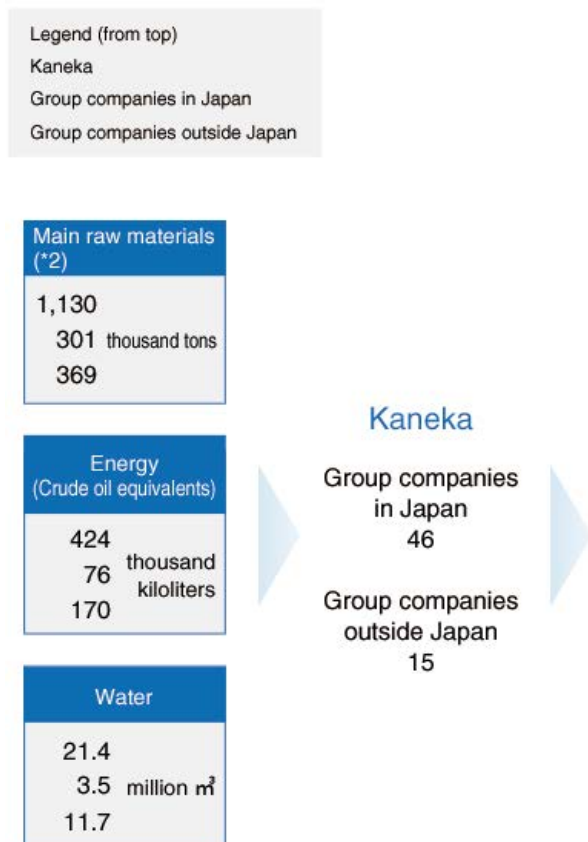
Material Balance in Production Activities

Kaneka Group is working to reduce environmental impacts by aggregating the status of energy and resource inputs and material outputs through emissions and products to grasp production activity volume, targeting Kaneka and Group companies within and outside Japan.

In fiscal 2019, raw material input decreased by 59 thousand tons from the previous year. The product, GHG, SOx, and NOx outputs decreased by 68 thousand tons (3.3%), 109 thousand tons-CO₂e (6.9%), 22.8 tons (20.7%), and 37.5 tons (4.0%), respectively. Meanwhile, final landfill waste output increased by 494 tons (8.9%) due to a rise in production volume and differences in the product mix for some Group companies outside Japan.

■ FY 2019 Results

INPUTS Energy and Resources



OUTPUTS Discharges, Recycling, and Products



*2 Raw materials calculated in or converted to tons

*3 Products calculated in or converted to tons

*4 Greenhouse gas

■ Calculation Methods for Energy Consumption and Greenhouse Gas (GHG) Emissions

Index	Calculation Methods
Energy Consumption (Crude Oil Equivalents)	Energy consumption is calculated based on the Energy Saving Law (Act on the Rationalization etc. of Energy Use of Japan). The boundaries are consistent with the Energy Saving Law and the Action Plan for a Low Carbon Society prepared by the Japan Chemical Industry Association and include all manufacturing sites and other facilities.
GHG Emissions	GHG emissions, calculated in accordance with the Act on Promotion of Global Warming Countermeasures, are the total amount of energy origin CO ₂ emissions, non-energy origin CO ₂ emissions, and the CO ₂ equivalent of methane and N ₂ O emissions. For emission factors for electricity, the basic emission factors are used for calculation. The boundaries are the same as those for energy consumption.

Environmental Accounting

We efficiently and effectively promote environmental conservation activities by quantitatively grasping the investment and expenditure costs related to environmental conservation and the quantitative and economic impacts of environmental measures. We calculate these costs and effects based on the 2005 edition of the Environmental Accounting Guidelines by Japan's Ministry of the Environment with Kaneka's own unique way of thinking, targeting all parent manufacturing sites and 30 Group companies in Japan (manufacturing companies).

In fiscal 2019, environmental costs (investments) were 1,321 million yen, an increase of 419 million yen from the previous fiscal year.

Environmental costs (expenditures) increased by 74 million yen, 112 million yen, and 1,887 million yen for pollution prevention, resource recycling, research and development on energy conservation, respectively, year-on-year.

Regarding the economic impacts of environmental measures, the cost reduction effect due to better resource efficiency (output per unit of input) increased by 42 million yen year-on-year. Meanwhile, revenue from recycling, the reduction effect on waste disposal costs due to recycling, and the cost reduction effect due to energy conservation and other savings decreased by 82 million yen, 197 million yen, and 20 million yen, respectively, year-on-year.

■ Environmental Costs (Investments, Expenditures)

(Millions of yen)

Cost Classifications	Main Efforts	Fiscal 2017		Fiscal 2018		Fiscal 2019	
		Investments	Expenditures	Investments	Expenditures	Investments	Expenditures
Business Area		1,177	5,036	901	5,460	1,314	5,647
1. Pollution Prevention	Air and water pollution prevention	1,130	3,236	899	3,476	1,293	3,550
2. Environmental Conservation	Addressing climate change and energy saving	-	-	-	-	-	-
3. Resource Recycling	Waste processing, recycling, and reduction	47	1,800	2	1,984	20	2,096
Upstream and Downstream	Product recycling, collection, and processing	0	8	0	6	0	8
Management Activities	Environmental education for employees and environmental impact monitoring and measurement	10	412	1	444	7	463
Research and Development	Research and development of products contributing to environmental conservation	-	7,203	-	7,477	-	9,364
Social Activities	Greening, beautification, and disclosure of environmental information	2	82	0	78	0	113
Environmental Damage	Payment of sulfur oxide emission charges	0	10	0	10	0	9
Total		1,188	12,752	902	13,475	1,321	15,604

Note: Figures do not include global environment conservation investments and expenditures and research and development investments. Amounts reported here may not fully match, due to rounding.

■ Quantitative Impact of Environmental Conservation Efforts

Category	Initiatives	Items	Units	Fiscal 2017	Fiscal 2018	Fiscal 2019
Pollution Prevention	Atmospheric and water discharges of hazardous substances	SOx emissions	Tons	102.4	109.5	86.7
		NOx emissions	Tons	919.5	867.6	832.2
		Chemical oxygen demand	Tons	264.1	248.7	234.7
		PRTR Law-designated chemical emissions	Tons	168.5	183.6	186.3
Environment	Greenhouse gas emissions	GHG emissions	Thousand tons-CO ₂ e	1,279.9	1,264.0	1,185.5
	Energy consumption	Crude oil equivalents	Thousand kiloliters	509.0	516.0	500.0
Resource Recycling	Final landfill	Final landfill	Tons	806.9	877.2	760.8
	External recycling	Amounts recycled	Tons	44,900.0	51,002.0	47,383.3

■ Economic Impacts of Environmental Measures

(Millions of yen)

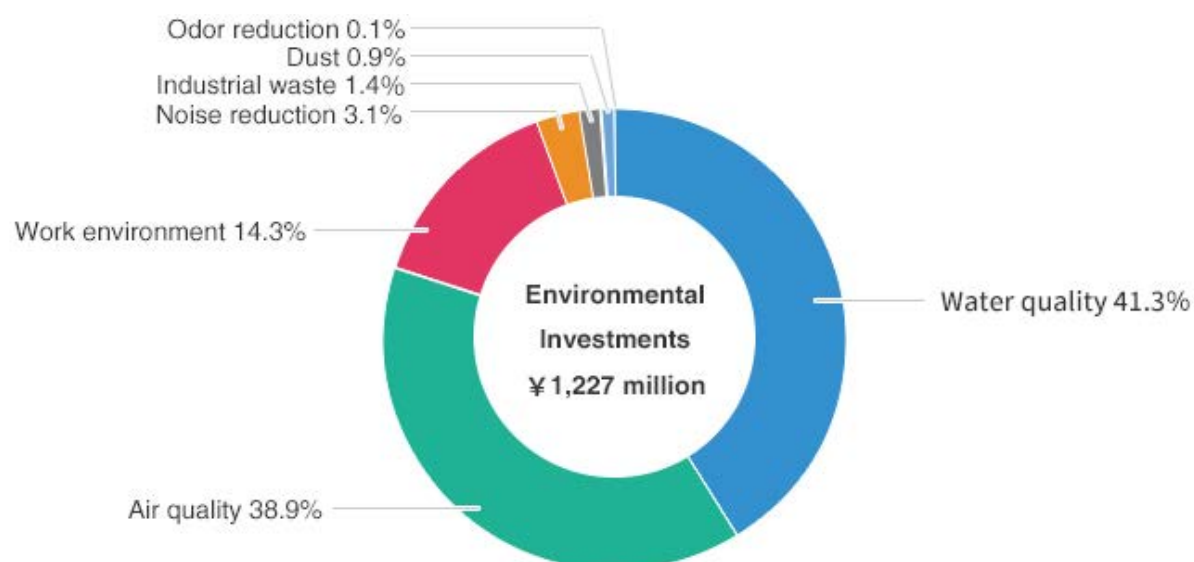
Measures	Fiscal 2017	Fiscal 2018	Fiscal 2019
Revenue from recycling	258	213	131
Cost reductions by better resource efficiency (output per unit of input)	4	-34	8
Waste disposal cost reductions by recycling	327	450	253
Cost reductions by energy conservation	177	247	227
Total	766	876	619

Environmental Investments (Kaneka)

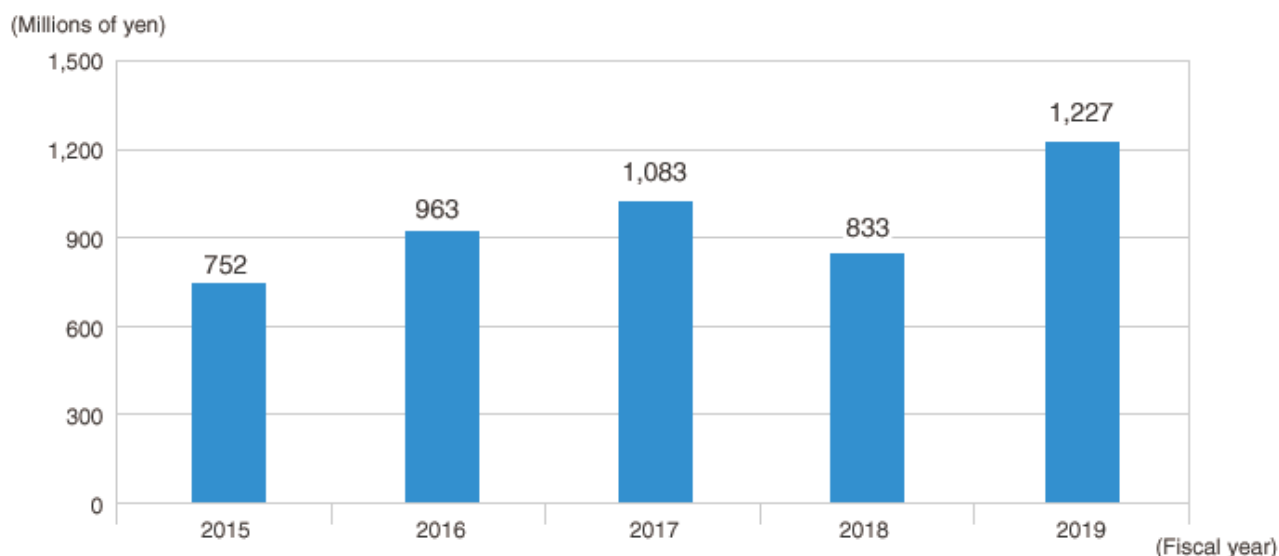
We continue to invest in environmental conservation.

Investments in fiscal 2019 totaled 1,227 million yen due to the replacement of equipment, which 41.3% for water quality, 38.9% for air quality, 14.3% for the work environment, and 3.1% for noise reduction. Environmental investment over the past five years averages about 971.6 million yen, leading with air quality (30.5%), followed by the water quality (27.1%) and the work environment (25.3%). We will continue to invest proactively to maintain and improve the environment.

■ Environmental Investments in Fiscal 2019



■ Cumulative Environmental Investments



Environment Efficiency (Kaneka)

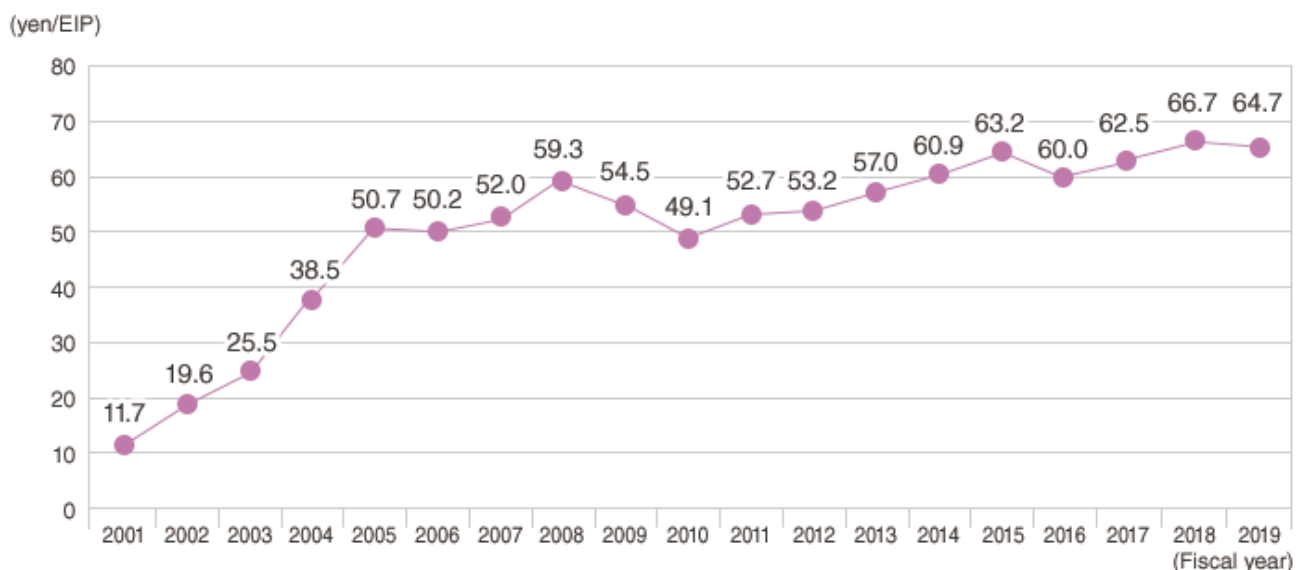
Kaneka assesses the environmental impacts of our production activities using Environmental Impact Points (EIP), which are compiled using the JEPIX methodology (*5), and we use those points to assess our environmental efficiency (*6).

Our total environmental impact in fiscal 2019 increased in terms of ozone-depleting substances, hazardous air pollutants, and phosphorous discharges in coastal waters. However, it decreased in terms of greenhouse gases, nitrogen oxides, chemical oxygen demand discharges in coastal waters, and nitrogen discharges. Consequently, it was 4.51 billion EIPs, an improvement of about 1.3% year-on-year. Meanwhile, our environmental efficiency declined by 3.0% from the previous fiscal year due to a reduction in sales.

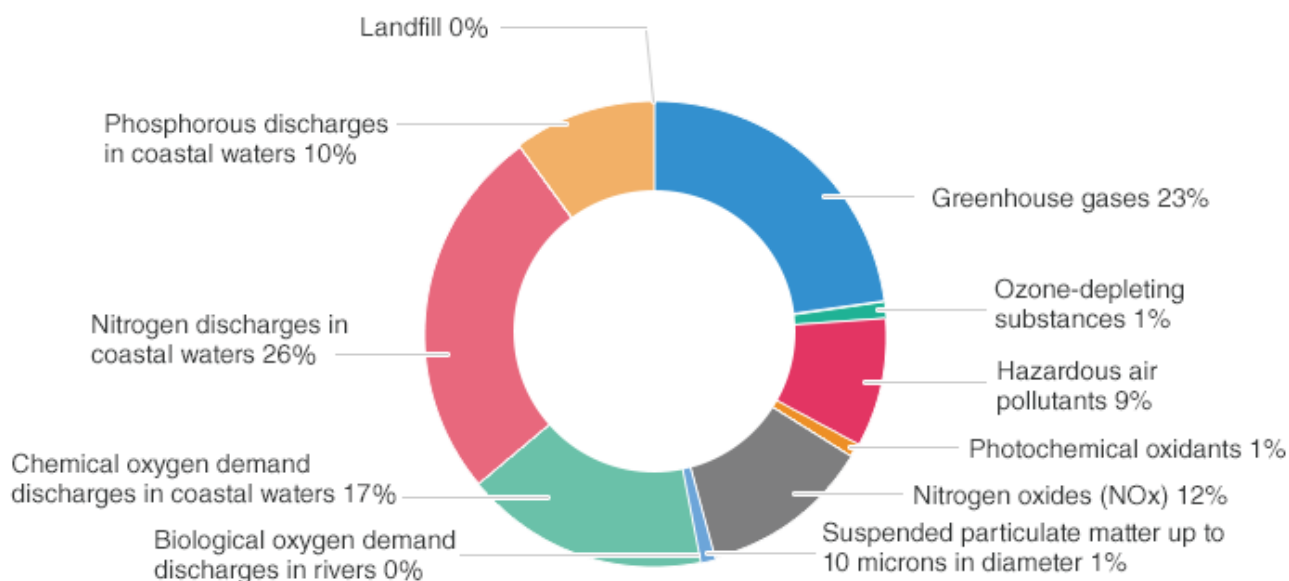
*5 The Japan Environmental Policy Priorities Index (JEPIX) methodology involves the calculation of an "eco-factor" coefficient for each emitted substance that has an environmental impact, using a ratio of the annual target for emissions under national environmental policies versus actual annual emissions ("Distance to Target"). The eco-factors are then multiplied by a quantity for each environmental impact to produce a single integrated indicator known as Environmental Impact Points (EIP). Calculations of eco-factors are done by the JEPIX Project (www.jepix.org, in Japanese).

*6 Environmental efficiency is a yardstick to measure efforts to maximize value while minimizing environmental impacts, with the aim of achieving sustainable growth. Kaneka calculates this by dividing net sales (yen) by the EIP.

■ Environment Efficiency



■ Details of Total Environmental Impact



Fiscal	Net Sales (million yen)	Environmental Impact (100 million EIPs)	Environmental Efficiency (yen/EIP)
2017	293,016	46.9	62.5
2018	304,951	45.7	66.7
2019	292,084	45.1	64.7

CHECK & ACT

Under environmentally friendly management, we continue working to reduce environmental risks by complying with environmental regulations and legislation and criteria in agreements with local governments and by checking compliance with them through various means, including ISO 14001 internal audits and ESG safety and quality inspections.

We will also continue working to further reduce environmental impact and improve environmental efficiency by promoting energy conservation activities.

TOPIC

Green Bond (Environmental Bond) Issued

As its 7th unsecured straight bond, Kaneka issued a green bond (environmental bond) to procure funds for the manufacture and R&D of KANEKA Biodegradable Polymer Green Planet (*7) (“Green Planet”) in September 2019. A green bond is an ESG bond, and fund usage is limited to projects that contribute to resolving environmental issues. It is the first such industrial bond issued by a Japanese chemical company.

Green Planet is a 100% plant-based polymer extracted from microorganisms that process plant oils and is biodegradable in the sea and soil. It is expected to contribute to reducing marine pollution caused by microplastics.

For the issuance of the green bond, Kaneka has established the Green Bond Framework, which conforms to the Green Bond Principles 2018 of the International Capital Market Association (ICMA) and the Green Bond Guidelines 2017 Edition of Japan’s Ministry of the Environment. To obtain eligibility for and transparency of this green bond and raise its appeal for investors, as a third-party evaluation, Kaneka has obtained a second opinion from Rating and Investment Information, Inc. (R&I) of how this framework conforms to the Green Bond Principles 2018 and the Green Bond Guidelines 2017 Edition. Kaneka has also obtained top-level evaluation in the green bond assessment by R&I, the GA1 preliminary evaluation.

The relevant business segments of the green bond principles and the relevant development objectives of the SDGs are shown in the table below.

*7 We changed our product registered trademark from “KANEKA Biodegradable Polymer PHBH” to “KANEKA Biodegradable Polymer Green Planet” in February 2021.

Green bond principles / Green project categories	SDGs Development objectives
<ul style="list-style-type: none"> ▪ Pollution Prevention and Control ▪ Eco-Efficient and/or Circular Economy Adapted Products, Production Technologies and Process 	

Environment

Climate Change Initiatives

To address prevention of global warming, we at the Kaneka Group are working to promote energy conservation and reduce CO₂ emission intensity through various measures, for example by utilizing our own environmental capital investment program.

We also use carbon-Life Cycle Analysis (cLCA) to calculate CO₂ emission reduction benefits by quantitatively assessing CO₂ emissions throughout product lifecycle, making comparisons with similar products. We also calculate indirect greenhouse gas (GHG) emissions (Scope 3) associated with our business activities through supply chains.

Announcing Support for TCFD to Address Climate Change

Kaneka has announced that it supports the recommendations of the Task Force on Climate-related Financial Disclosures (referred to below as TCFD), a task force created by the Financial Stability Board at the request of the G20.

As recommended by the TCFD, Kaneka conducted a structural analysis of the activities of the Kaneka group companies based on risk and opportunity and selected areas of importance and urgency that need to be addressed. Specifically, Kaneka selected three areas they will address from here on: (1) cutting emissions of greenhouse gas (GHG), (2) contributing to a recycling-oriented society, and (3) increasing production of food resources. The progress of these initiatives will be conveyed to all stakeholders in a timely manner.

Kaneka defines its purpose (meaning of existence) as “to solve social issues and realize a sustainable society by providing innovative materials as solutions through the break-through technology and global network”. Kaneka has defined the three crises of “Global Environment / Energy”, “Food” and “Wellness (living an enriched life)” as domains. Kaneka will put into practice ESG management. Through solving problems related to climate change, Kaneka will help realize a more sustainable society and aim for “Wellness First” to make the world healthy.

We will endeavor to realize carbon neutrality by 2050.

Changes in the social environment due to climate change	Supposed changes in the social environment			Business risk and opportunity	Direction of measures	
	2025 (short term)	2030 (medium term)	2050 (long term)		Existing efforts	Additional efforts
1. Cutting emissions of greenhouse gas (GHG)						
1-1. Reduction of GHG emitters	Reduced GHG emission*: 20% compared to fiscal 2015	Reduced GHG emission*: 30% compared to fiscal 2015	Reduced GHG emission*: 60% compared to fiscal 2015	[Opportunity] ● Increase in demand for renewable energy [Risk] ● Rise in cost	● Establishment of GHG emission reduction target by 2030 and implementation of measures ● Promotion of investment for energy saving ● Improvement in energy intensity	● Establishment of a committee that investigates carbon neutral technology and examination of strategies ● Realization of an energy-saving plant through production process innovation ● R&D of products useful for GHG emission reduction and business expansion
1-2. Energy policy Drastic changes in industrial structure due to a major policy shift across the world	● Acceleration of conversion to non-fossil fuel ● Increase in demand for renewable energy ● Changes in social structure	● Expansion of renewable energy-related markets → Progress of electrification in society → Increase in EVs in the transportation sector → Acceleration of use of renewable energy and green hydrogen		[Opportunity] ● Expansion of carbon neutral-related businesses, such as energy saving, energy creation, and energy storage [Risk] ● Rise in cost	● Production and operation innovation through implementation of IoT technology ● Development of a business related to energy-saving and comfortable Solar Circuit (PVs, insulation materials) ● Launch of in-house PV power generation	● Implementation of DX strategies (AI, IoT, etc.) at manufacturing sites ● Development and social implementation of next-generation PV systems and high heat-insulating materials and their use for ZEH/ZEBs ● R&D of storage batteries ● Procurement of green power
2. Contributing to a recycling-oriented society						
Acceleration of circular economy	● Increase in demand for renewable materials in the fields of automobiles, apparel, and electronics ● Establishment of recycling technology for various materials	● Acceleration of social implementation of biodegradable polymers and non-fossil polymers ● Evolution of 3Rs society		[Opportunity] ● Rise in demand for products and technologies that realize resource recycling	● Social implementation of KANEKA Biodegradable Polymer Green Planet™ ● Implementation of 3Rs and landfill waste reduction in production process	● Expansion of application of KANEKA Biodegradable Polymer Green Planet™ ● Development of waste recycling technology and social implementation of a recycling system
3. Increasing production of food resources						
Crisis of sustainability in the primary industry, such as agriculture, livestock, and fisheries	● Decline in agricultural productivity caused by deterioration of crop resistance due to severe environmental change such as soil degradation and desertification ● Issue in the supply of proteins, such as fish and meat	● Expansion of market for safe and reliable food ● Food shortage		[Opportunity] ● Rise in need for the development of sustainable technology capable of enhancing production (productivity) in agriculture and livestock industry ● Increase in demand for safe and reliable food [Risk] ● Concerns about the procurement of safe food raw materials	● Development of food production support technology with no reliance on excessive pesticides or chemical fertilizers (biostimulants, etc.) ● Promotion of the dairy products and lactic acid businesses that support a safe and rich dietary ● Development of technology that reduces food waste	● Development and social implementation of products made using biotechnology (feed business, biopesticides, etc.) ● Promotion of environmentally-friendly recycling-based organic dairy farming ● R&D toward a one health approach

* Amount of GHG emission reduction required of the chemical sector by IEA based on the IEA's Sustainable Development Scenario (SDS).

► Enlarge the figure (42.8KB) 

Energy Conservation Efforts

We are engaged in energy conservation activities, using the energy intensity index (*1) as an indicator for management.

The energy intensity index for all parent manufacturing sites in fiscal 2019 was 94.9, an increase of 3.6% from the previous fiscal year. This was due to the impact of the decrease in production volume, which significantly reduced energy use efficiency. The average rate of change over the past five years was an increase of 0.2%, which did not reach our goal (an annual average decrease of 1%).

Non-consolidated energy consumption(*2) was 424 thousand kiloliters, a decrease of 3.0% from the previous fiscal year, mainly due to a decrease in production volume.

*1 Energy intensity index: Energy intensity is a numerical value calculated by dividing the energy used in manufacturing by the volume of activity (production volume at all parent manufacturing sites). The energy intensity index is calculated by indexing the energy intensity, with fiscal 2013 used as the base year of 100.

*2 Energy consumption is calculated based on the Energy Saving Law (Act on the Rationalization etc. of Energy Use of Japan). The boundaries are consistent with the Energy Saving Law and the Action Plan for a Low Carbon Society prepared by the Japan Chemical Industry Association and include all manufacturing sites and other facilities.

■ Energy Consumption (Crude Oil Equivalents) and Energy Intensity Index



Initiatives to Cut CO₂ Emission Intensity

At Kaneka, we are working to reduce CO₂ emission intensity, using a CO₂ emission intensity index (*3) as an indicator for management, based on CO₂ emissions from energy consumption associated with production activities.

The energy origin CO₂ emission intensity index for all parent manufacturing sites in fiscal 2019 was 95.7, which did not achieve our fiscal 2020 target of 93.2.

Our greenhouse gas (GHG) emissions (*4) decreased by 6.3% from the previous year to 1,027 thousand tons-CO₂e due to a reduction in production volume, a decrease in the CO₂ emission factor for electricity, and the results of energy conservation activities.

We will continue to streamline our production processes through innovation to reduce GHG emissions.

*3 CO₂ emission intensity index: CO₂ emission intensity is a numerical value calculated by dividing CO₂ emissions from energy consumption associated with production activities, which are calculated using a fixed emission factor unique to Kaneka, by the volume of activity. The CO₂ emission intensity index is calculated by indexing the CO₂ emission intensity, with fiscal 2013 used as the base year of 100. Our target for fiscal 2020 is 93.2.

*4 GHG emissions, calculated in accordance with the Act on Promotion of Global Warming Countermeasures, are the total amount of energy origin CO₂ emissions, non-energy origin CO₂ emissions, and the CO₂ equivalent of methane and N₂O emissions. For emission factors for electricity, the basic emission factors are used for calculation. The boundaries are the same as those for energy consumption.

■ GHG Emissions and Energy Origin CO₂ Emission Intensity Index



GHG Emissions from Business Activities throughout the Supply Chain

We have calculated indirect GHG emissions (Scope 3) associated with our business activities through supply chains. The following tables show our GHG emissions by scope and Scope 3 emissions calculated by category.

■ GHG Emissions by Scope (FY 2019 results at Kaneka)

Scope		GHG emissions [Thousand tons-CO ₂ e/year] (year-on-year)
Scope 1	Direct emissions (*5)	769.6 (+0.3%)
Scope 2	Indirect emissions from energy consumption (*6)	257.5 (-21.8%)
Scope 3	Other indirect emissions (upstream/downstream) (*5)	2,580.1 (+24.0%)
Total GHG emissions		3,607.2 (+13.5%)

*5 Non-energy origin CO₂ emissions and CO₂-equivalent emissions of methane and N₂O are included.

*6 As emission factors for electricity, the basic emission factor for each power company was used for calculation. GHG emissions calculated using the location-based method were 322.4 thousand tons-CO₂e (-15.9%).

■ Scope 3 Emissions (FY 2019 results at Kaneka)

Category		GHG emissions [Thousand tons- CO ₂ e/year]
1	Purchased goods/services	1,911.7 (*7)
2	Capital goods	62.4
3	Fuel-and energy-related activities not included in Scope 1 or Scope 2	145.6
4	Upstream transportation and distribution	21.9
5	Waste generated in operations	3.3
6	Business travel	10.1
7	Employee commuting	1.1
8	Upstream leased assets	0.0
9	Downstream transportation and distribution	– (*8)
10	Processing of sold products	– (*8)
13	Downstream leased assets	0.0
14	Franchises	– (*9)
15	Investments	423.9
Scope 3 total		2,580.1

Note: Amounts reported here do not fully match, due to rounding in each category.

Methods for calculating GHG emissions for Category 11 “Use of sold products” and Category 12 “End-of-life treatment of sold products” are under consideration. GHG emissions for these categories will be reported from the next fiscal year onward.

*7 Due to the revision of the calculation method, the calculated values increased by 441 thousand tons-CO₂e compared to those calculated using a conventional method.

*8 GHG emissions for this category were not calculated because we were unable to determine a rational calculation method due to the high percentage of intermediate products.

*9 GHG emissions for this category were not calculated because we have no franchise stores.

■ Calculation Methods for Scope 3 Emissions

Category	Description of the Calculation Method
1	The calculation was made using emission factors listed in the LCI database “IDEA ver. 2.3” (National Institute of Advanced Industrial Science and Technology / Sustainable Management Promotion Organization) with the purchase results in this fiscal year considered as the volume of activity. The coverage rate was 100% on a main raw material weight basis.
2	The calculation was made by multiplying investments in each capital formation area by emission factors listed in the Emissions Unit Database for Calculation of Greenhouse Gas Emissions, etc. by Organizations throughout the Supply Chain, (ver. 3.0) published by the Ministry of the Environment of Japan. The coverage rate was 100%.
3	The calculation was made by multiplying electric power, steam, and fuel consumption by emission factors listed in the Emissions Unit Database for Calculation of Greenhouse Gas Emissions, etc. by Organizations throughout the Supply Chain (ver. 3.0) published by the Ministry of the Environment of Japan and in the IDEA database ver. 2.3 (for the calculation of supply chain GHG emissions) published by the National Institute of Advanced Industrial Science and Technology and the Sustainable Management Promotion Organization. The coverage rate for organizations subject to the calculation was 100%.
4	The calculation was made using a calculation method stipulated in the Measures Pertaining to Consigners of the Energy Saving Law. Emission results have been calculated every year since fiscal 2006 according to the Energy Saving Law. The coverage rate was 100%.
5	The calculation was made by multiplying the volume of waste by type from manufacturing sites by emission factors listed in the Emissions Unit Database for Calculation of Greenhouse Gas Emissions, etc. by Organizations throughout the Supply Chain (ver. 3.0) published by the Ministry of the Environment of Japan. The coverage rate was 100%.
6	The calculation was made by multiplying travel costs by transportation mode and the number of stays by emission factors listed in the Emissions Unit Database for Calculation of Greenhouse Gas Emissions, etc. by Organizations throughout the Supply Chain (ver. 3.0) published by the Ministry of the Environment of Japan. The coverage rate was 100%.
7	The calculation was made by multiplying travel costs by transportation mode by emission factors listed in the Emissions Unit Database for Calculation of Greenhouse Gas Emissions, etc. by Organizations throughout the Supply Chain (ver. 3.0) published by the Ministry of the Environment of Japan. The coverage rate was 100%.
8	According to company policy, we do not use leased assets for upstream operations, in principle. However, if some assets are leased, out of necessity, the emissions from them are included in Scope 1 or 2. The coverage rate was 100%.

Category	Description of the Calculation Method
9	This category was excluded from the scope of calculation because it is difficult to accurately grasp a wide range of downstream logistics operations due to the high percentage of intermediate products and to calculate the emissions using a rational calculation method.
10	This category was excluded from the scope of calculation because it is difficult to accurately grasp a wide range of downstream product processing operations due to the high percentage of intermediate products and to calculate the emissions using a rational calculation method.
13	The calculation was made by multiplying the activity volume of leased assets by emission factors stipulated in the Act on Promotion of Global Warming Countermeasures according to the Basic Guidelines on the Calculation of Greenhouse Gas Emissions throughout the Supply Chain (ver. 2.3) published by the Ministry of the Environment of Japan. Since the emissions associated with assets leased to Group companies are included in the Scope 1 or 2 emissions of each company, they are included in Category 15.
14	This category was considered as an exception for calculation because Kaneka Corporation has no franchise stores.
15	The emissions of Group companies were calculated using a calculation method stipulated in the Act on Promotion of Global Warming Countermeasures according to the Basic Guidelines on the Calculation of Greenhouse Gas Emissions throughout the Supply Chain (ver. 2.3) published by the Ministry of the Environment of Japan and then being multiplied by the relevant equity ratio. Investment in companies other than Group companies was excluded from the scope of calculation because it has not been made to obtain profits.

Investments in Energy-Efficient Facilities

To continue reducing energy intensity and CO₂ emission intensity, we are implementing our own environmental capital investment program, with an annual budget of 200 million yen for small and medium investments that have a relatively long payback period, through activities in three areas – global warming prevention, effective use of resources, and environmental impact reduction – that are priorities in Kaneka's environmental management program. In fiscal 2019 we continued allocating a large portion of this fund to projects that address climate change, including broader initiatives such as visualizing energy consumption. Based on the recognition that a certain effect has been produced, we will promote the use of this investment program for activities to reduce intensities.

■ Results of Our Own Environmental Capital Investment Program

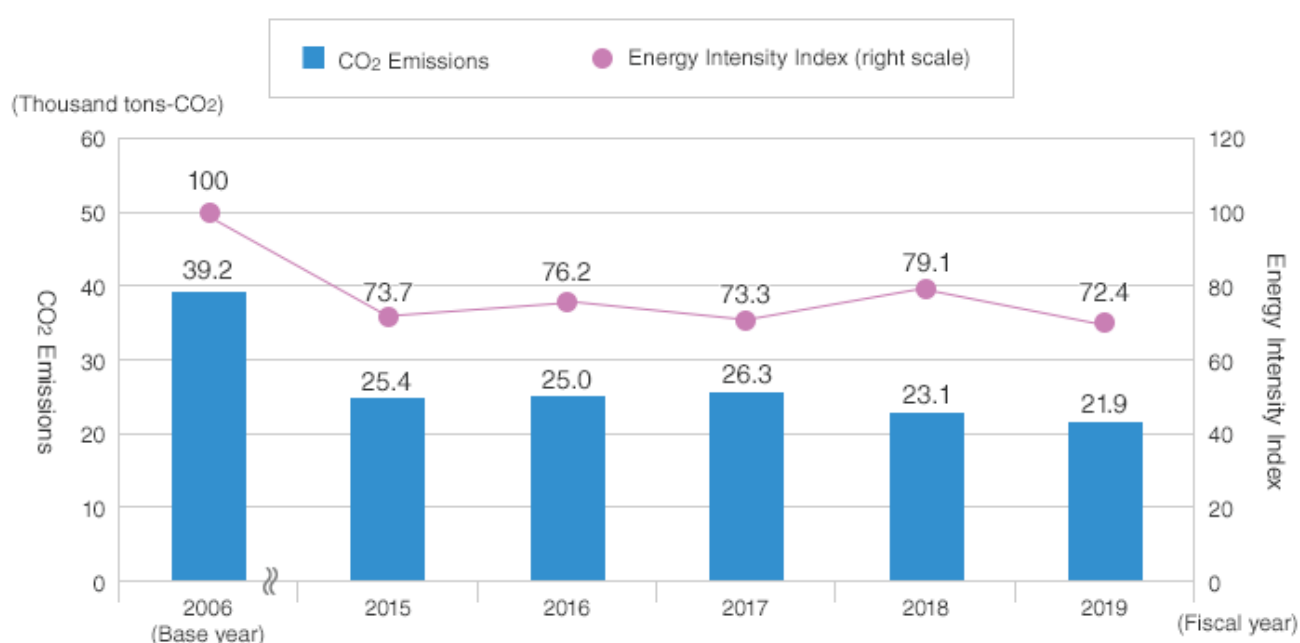
Fiscal Year	Investments	Number	Reduced CO ₂ Emission
2015	¥200 million	22	1,435 tons-CO ₂ /year
2016	¥200 million	23	1,688 tons-CO ₂ /year
2017	¥200 million	15	1,654 tons-CO ₂ /year
2018	¥200 million	24	1,748 tons-CO ₂ /year
2019	¥200 million	29	1,227 tons-CO ₂ /year

Energy-Efficiency Initiatives in Logistics

To achieve an annual 1% reduction in energy intensity and a continuation of 1% improvement in five-year average energy intensity as a specified consigner under the amended Act on Rational Use of Energy, we continued working plant by plant towards implementing modal shifts, promoting joint distribution, and improving cargo load ratios.

In fiscal 2019, the transportation volume (ton-kilometer) increased year-on-year. Meanwhile, our CO₂ emissions decreased by 1,200 tons-CO₂ year-on-year due to the promotion of shipping transportation, resulting in an improvement of 6.7 points in the energy intensity index.

■ CO₂ Emissions and Energy Intensity Index from Logistics (*10)



*10 Energy intensity index from logistics is a numerical value calculated using a CO₂ emission calculation method stipulated in the Measures Pertaining to Consigners of the Energy Saving Law, with fiscal 2006 used as the base year of 100 for indexing the logistics energy intensity.

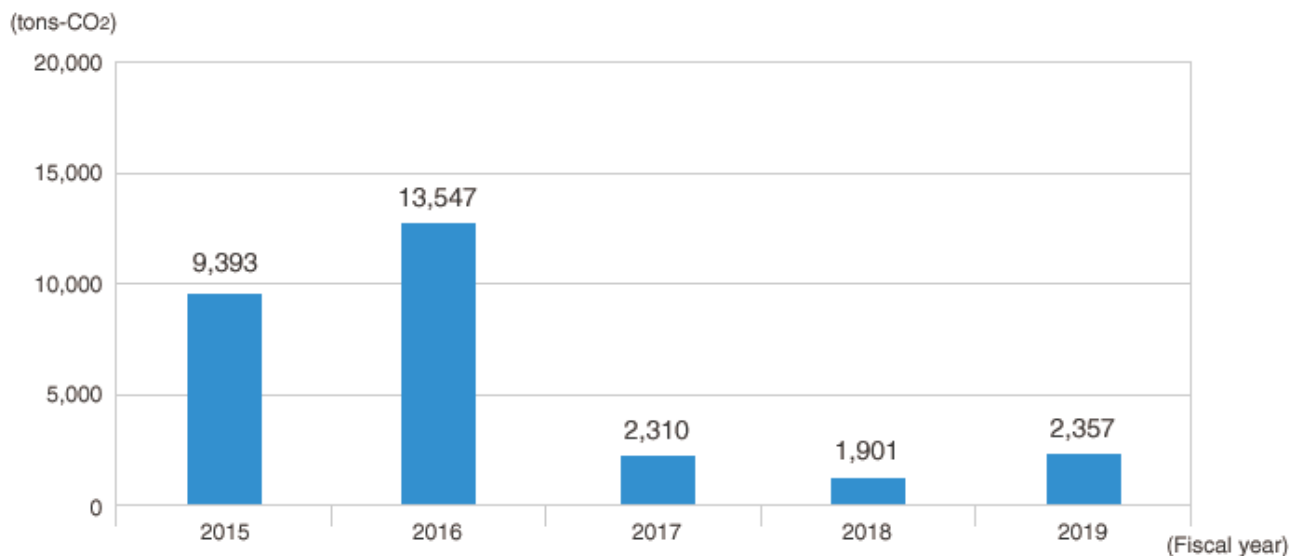
Response to the Fluorocarbons Emission Control Law

Complying with the Act on Rational Use and Appropriate Management of Fluorocarbons in Japan, we are promoting the replacement of aging equipment as well as strengthened management of equipment. The estimated leakage amount of fluorocarbons generated from all parent manufacturing sites in fiscal 2019 was 2,357 tons-CO₂, an increase of 456 tons-CO₂ over the previous fiscal year. No Group companies in Japan exceeded an estimated 1,000 tons-CO₂ leakage of fluorocarbons.

To reduce the estimated leakage of fluorocarbons to less than 1,000 tons-CO₂ by the end of fiscal 2020, we will update aging equipment in a planned way, selecting equipment with low global warming potential (*11) and promoting fluorocarbon-free production. We will also reduce the leakage of fluorocarbons by inspecting equipment to detect and eliminate fluorocarbon leaks at an early stage. For equipment using CFCs, called specific fluorocarbons, we have formulated a plan to update all equipment by 2025.

*11 Global warming potential is a figure that shows, on the basis of carbon dioxide, how other greenhouse gases have the property of causing global warming.

■ Estimated Leakage of Fluorocarbons at Kaneka



Environment

Preventing Pollution and Managing Chemical Substances

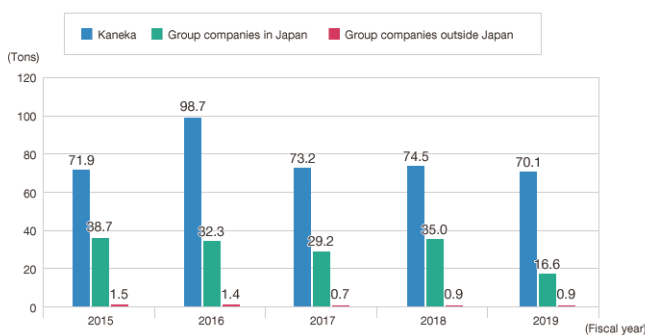
Kaneka Group works to prevent air and water pollution, appropriate management of toxic chemical substances, and the reduction of their emissions.

Preventing Air and Water Pollution

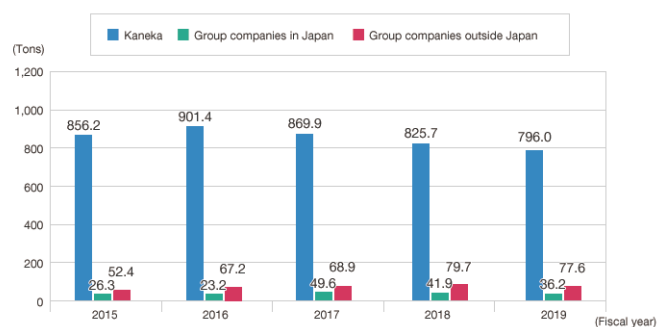
Kaneka engages in production activities in compliance with the standards specified in the Air Pollution Control Act and the Water Pollution Control Act as well as the criteria included in agreements made with local governments.

Regarding the atmosphere, SOx, NOx, and soot and dust emissions from all parent manufacturing sites decreased in fiscal 2019 from the previous fiscal year. SOx and NOx emissions from Group companies in Japan also decreased year-on-year. In terms of water, there were a decrease in COD and nitrogen emissions and an increase in phosphorous and SS emissions at all parent manufacturing sites and non-manufacturing facilities. At Group companies outside Japan, water consumption and COD emissions increased due to the influence of product types.

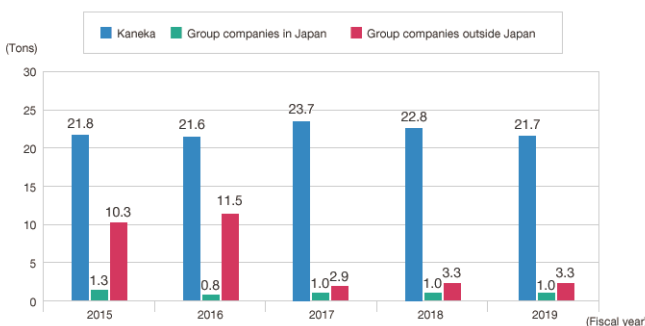
SOx Emissions



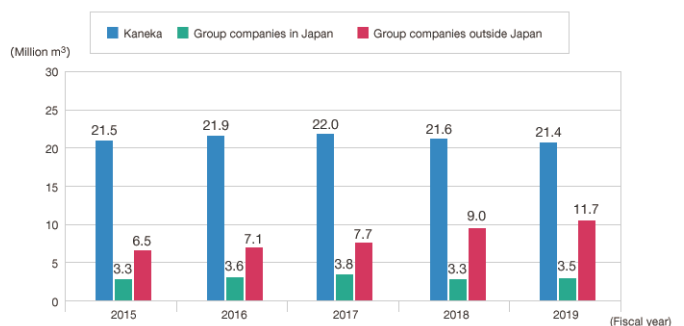
NOx Emissions



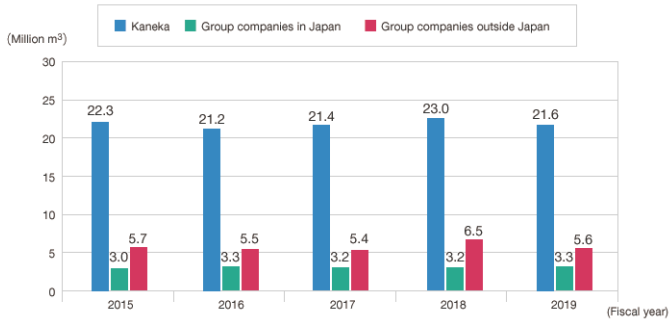
Soot and Dust Emissions



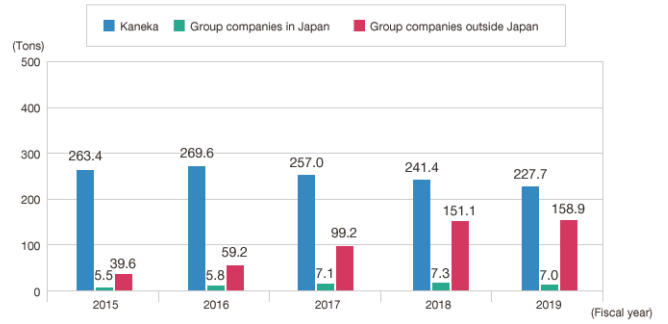
Water Consumption (*1)



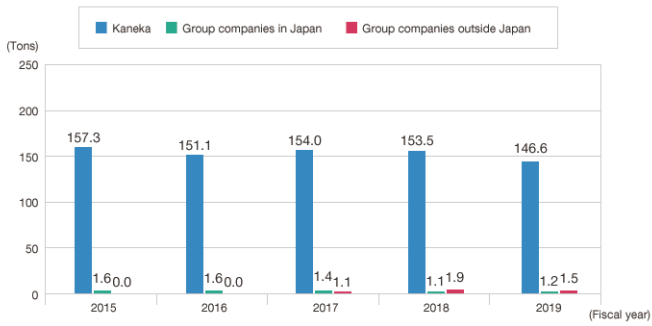
■ Wastewater Discharges (*1)



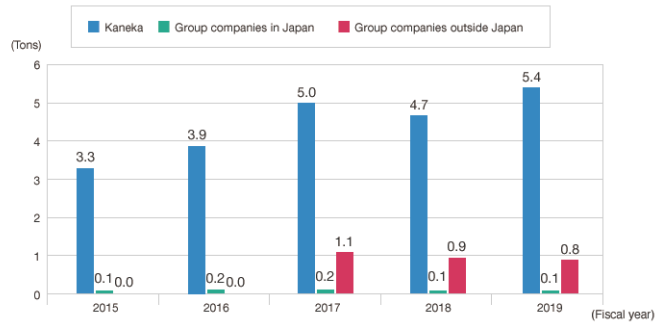
■ Chemical Oxygen Demand in Wastewater (*1)



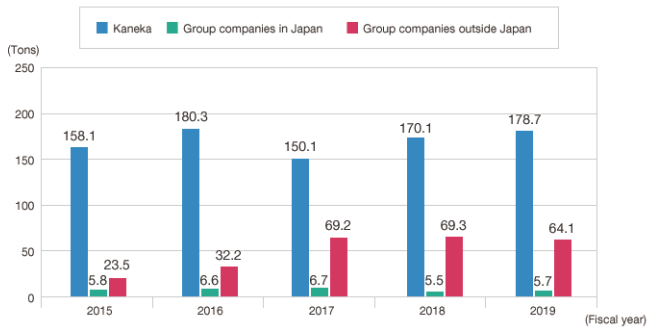
■ Nitrogen in Wastewater (*1)



■ Phosphorous in Wastewater (*1)



■ Suspended solids in Wastewater (*1)



*1 From fiscal 2015, our water consumption and wastewater volume include those generated from non-manufacturing facilities other than the plant department.

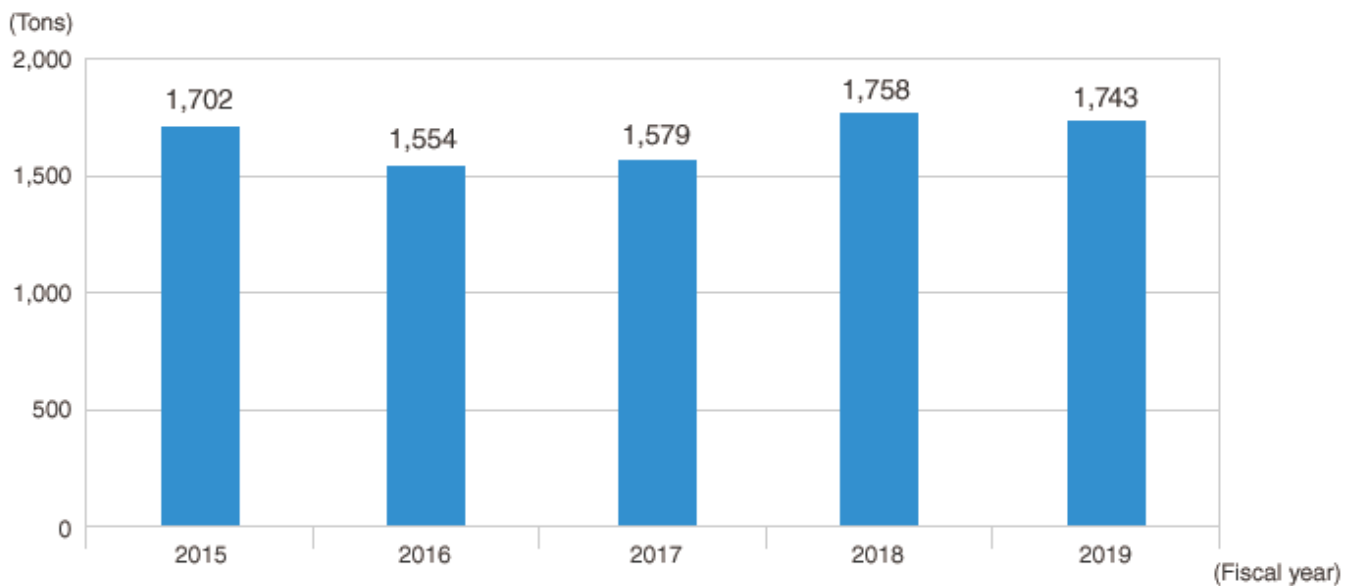
Volatile Organic Compounds Emission Reduction

We are committed to reducing the emission of VOCs (*2), which are known to cause photochemical smog. In fiscal 2015, we at Kaneka set the goal of controlling VOC emissions to below 1,800 tons.

In fiscal 2019, total emissions were 1,743 tons, a decrease of 0.9% from the previous fiscal year. We will continue our efforts to manage VOC emissions.

*2 Volatile Organic Compounds (VOCs) are organic chemical substances that cause suspended particulate matter and photochemical oxidants.

■ Volatile Organic Compounds Emissions (All parent manufacturing sites)

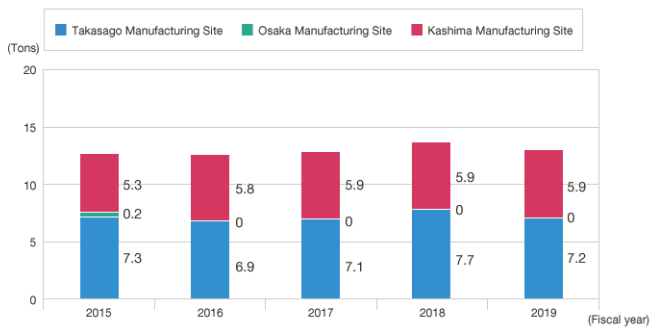


Hazardous Atmospheric Pollutants (Data of six substances for each manufacturing site of Kaneka)

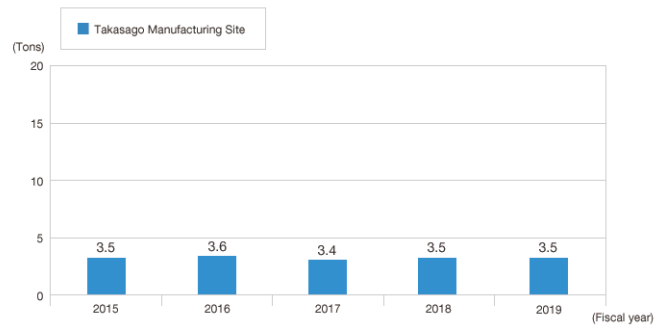
Total emissions in fiscal 2019 of six hazardous atmospheric pollutants (shown by manufacturing site in the following graphs) were 21.4 tons, which represented a year-on-year decrease of 4.3%. The stabilization of operation of exhaust gas treatment equipment and a reduction in product production volume at the Takasago Manufacturing Site led to a decrease in chloroethylene emissions and dichloromethane and 1,3-butadiene emissions, respectively, and contributed to lowering total emissions.

We will continue to make efforts to control total emissions for environmental impact reduction.

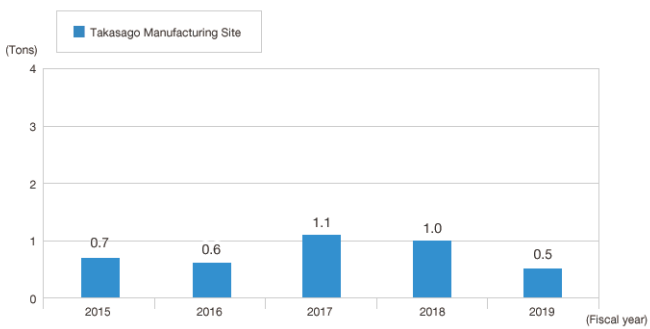
■ Chloroethylene Emissions



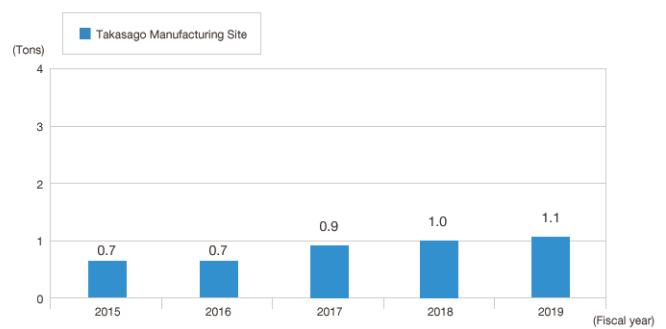
■ 1,2-Dichloroethane Emissions



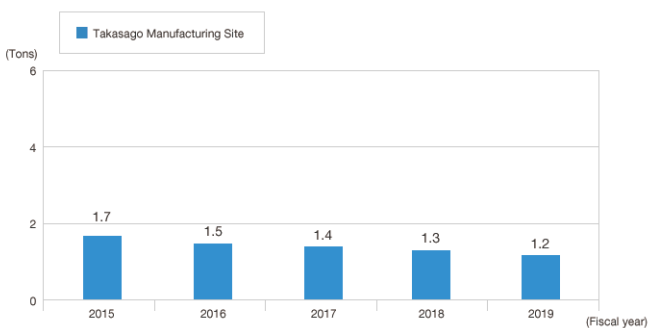
■ Chloroform Emissions



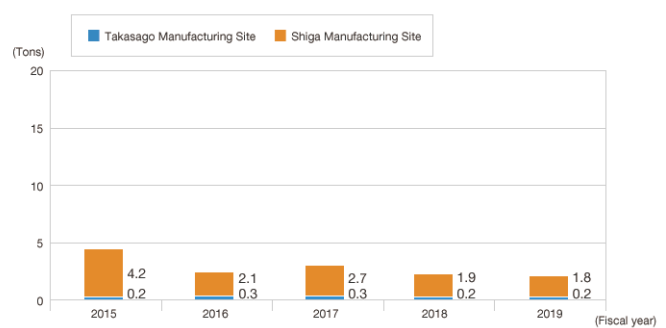
■ Acrylonitrile Emissions



■ 1,3-Butadiene Emissions



■ Dichloromethane Emissions



PRTR Discharge

Based on the Pollutant Release and Transfer Register (PRTR) Law, we calculate the release and transfer amount of chemical substances subject to the law. In fiscal 2019, Kaneka's total discharge of the relevant substances was 79.2 tons, a decrease of 3.1 tons from the previous fiscal year. The total discharge by Group companies in Japan was 107.1 tons, an increase of 5.7 tons compared to the previous fiscal year.

■ Fiscal 2019 Kaneka Emissions Subject to the Pollutant Release and Transfer Register Law (Kilograms)

	Designated Number under Ordinance	Chemical Substances	Fiscal2019						Fiscal 2018
			Emissions					Transferred	Emissions
			Atmospheric Emissions	Discharges into Public Waterways	Discharges into Soil	Internal Landfill	Total	Total	Total
Large Discharges of 10 Substances	392	N-hexane	13,600	0	0	0	13,600	101,938	13,500
	94	Chloroethylene (vinyl chloride)	13,100	200	0	0	13,300	970	13,610
	275	Sodium dodecyl sulfate	0	8,200	0	0	8,200	0	8,300
	240	Styrene	5,410	39	0	0	5,449	9,740	5,840
	420	Methyl methacrylate	5,200	5	0	0	5,205	10	5,606
	134	Vinyl acetate	4,200	240	0	0	4,440	0	4,320
	7	N-butyl acrylate	4,150	0	0	0	4,150	2,840	4,360
	157	1,2-dichloroethane	3,400	80	0	0	3,480	0	3,450
	232	N,N-dimethylformamide	2,500	930	0	0	3,430	220,000	5,200
	336	Hydroquinone	0	2,400	0	0	2,400	0	2,300
Total Other than the 10 Substances Above			9,969	5,551	0	0	15,521	276,521	15,778
Grand Total for All Substances			61,529	17,645	0	0	79,175	612,019	82,264

Note: Of the 462 substances subject to the PRTR, Kaneka reports about 61 items.
Amounts reported here may not fully match, due to rounding.

■ Fiscal 2019 Group Company in Japan Emissions Subject to the Pollutant Release and Transfer Register Law

(Kilograms)

	Designated Number under Ordinance	Chemical Substances	Fiscal 2019						Fiscal 2018
			Emissions					Transferred	Emissions
			Atmospheric Emissions	Discharges into Public Waterways	Discharges into Soil	Internal Landfill	Total	Total	Total
Large Discharges of 10 Substances	232	N,N-dimethylformamide	62,000	0	0	0	62,000	5,900	54,005
	300	Toluene	28,320	0	0	0	28,320	198,038	28,731
	186	Dichloromethane (methylene dichloride)	9,780	0	0	0	9,780	153,210	11,703
	296	1,2,4-trimethylbenzene	2,309	0	0	0	2,309	0	2,359
	80	Xylene	2,152	0	0	0	2,152	0	2,187
	392	N-hexane	1,050	0	0	0	1,050	20,160	210
	355	Bis (2-ethylhexyl) phthalate (DEHP)	592	40	0	0	632	97,000	587
	213	N,N-dimethylacetamide	600	0	0	0	600	30,000	300
	127	Chloroform	255	0	0	0	255	3,505	150
	31	Antimony and its compound	0	1	0	0	1	5	1
Total Other than the 10 Substances Above			0	0	0	0	0	8,867	1,167
Grand Total for All Substances			107,058	41	0	0	107,099	516,685	101,399

Note: Of the 462 substances subject to the PRTR, group companies in Japan reports about 25 items. Amounts reported here may not fully match, due to rounding.

CHECK & ACT

We are working to reduce environmental impacts on air and water quality and ensure rapid response to any abnormality. The increase in emission by Group companies in Japan is mainly due to increased production of products using N,N-dimethylformamide. We will continue our efforts to reduce the discharge of chemical substances.

Environment

Reducing Waste and Recycling Resources

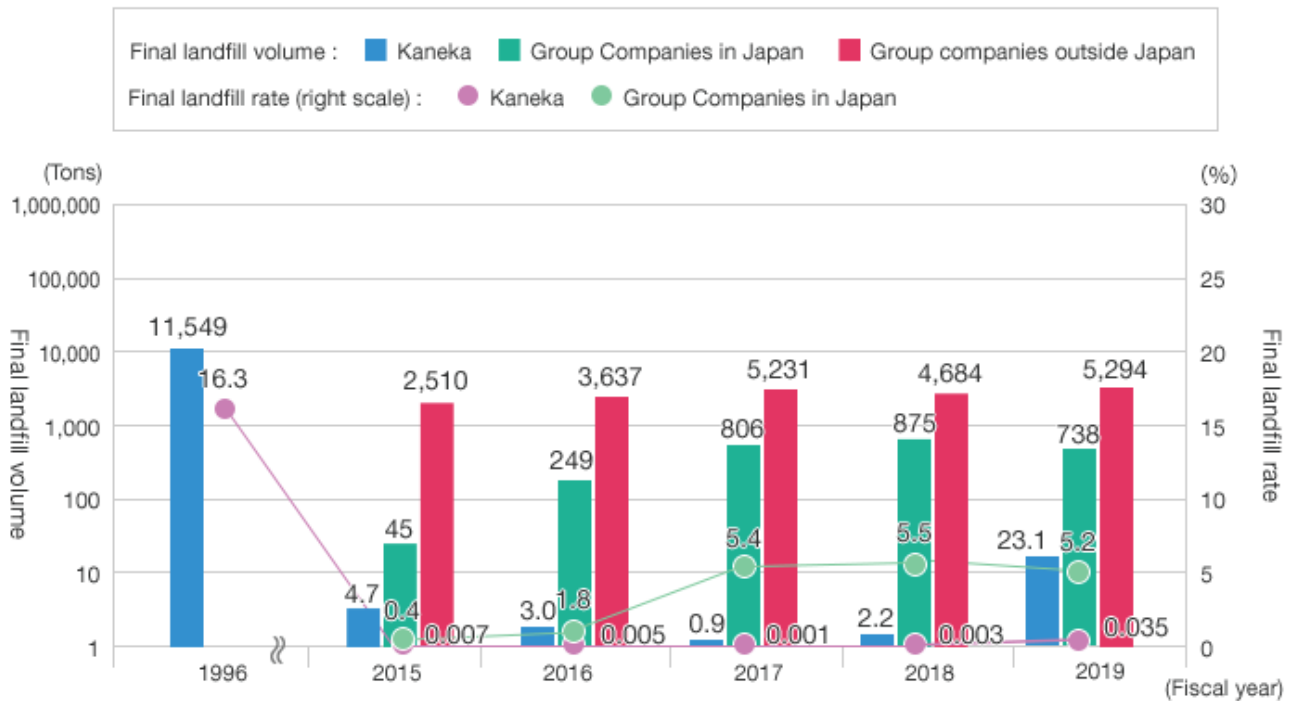
Through pursuing the 3Rs (reduce, reuse and recycle) aimed at the reduction and recycling of industrial waste from our operations, Kaneka has been able to achieve zero emissions (*1) for 14 consecutive years. We are also working toward all group companies in Japan being able to achieve zero emissions.

*1 Zero emission defined by Kaneka: The final landfill waste must be less than 0.5% of the generated waste.

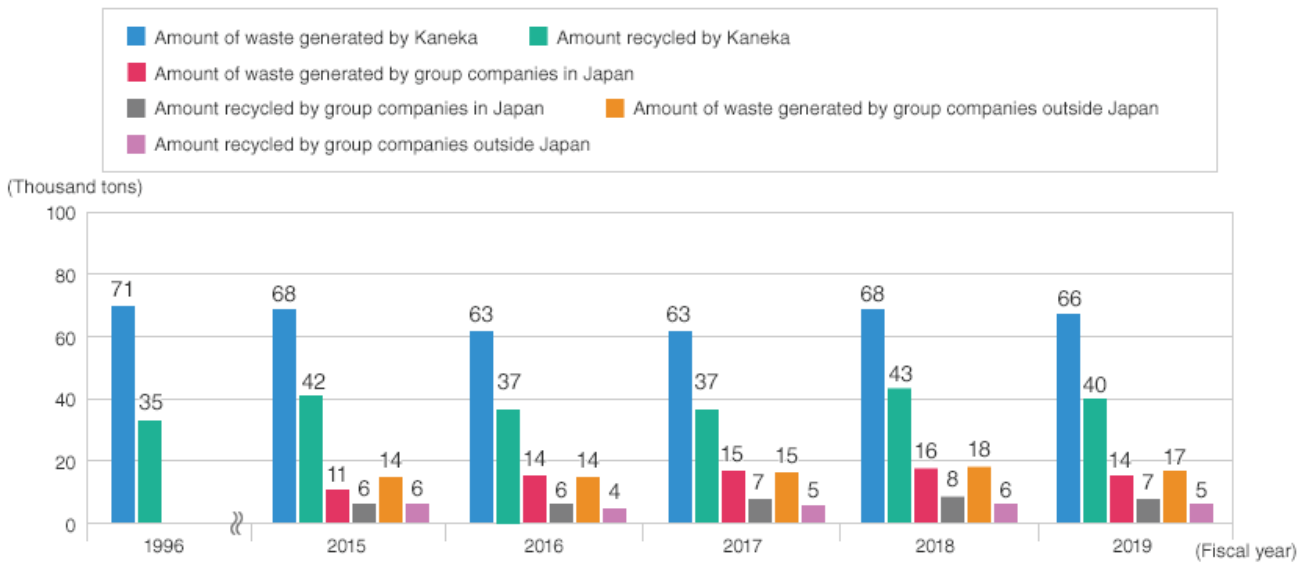
Cutting Waste Sent to Landfill

In fiscal 2019, we effectively achieved zero emissions, with a final landfill volume for all parent manufacturing sites of 23.1 tons, equivalent to a final landfill rate of 0.035%. The final landfill rate of 46 Group companies in Japan was 5.2%, showing an improvement of 0.3% from the previous year, but failed to achieve zero emissions.

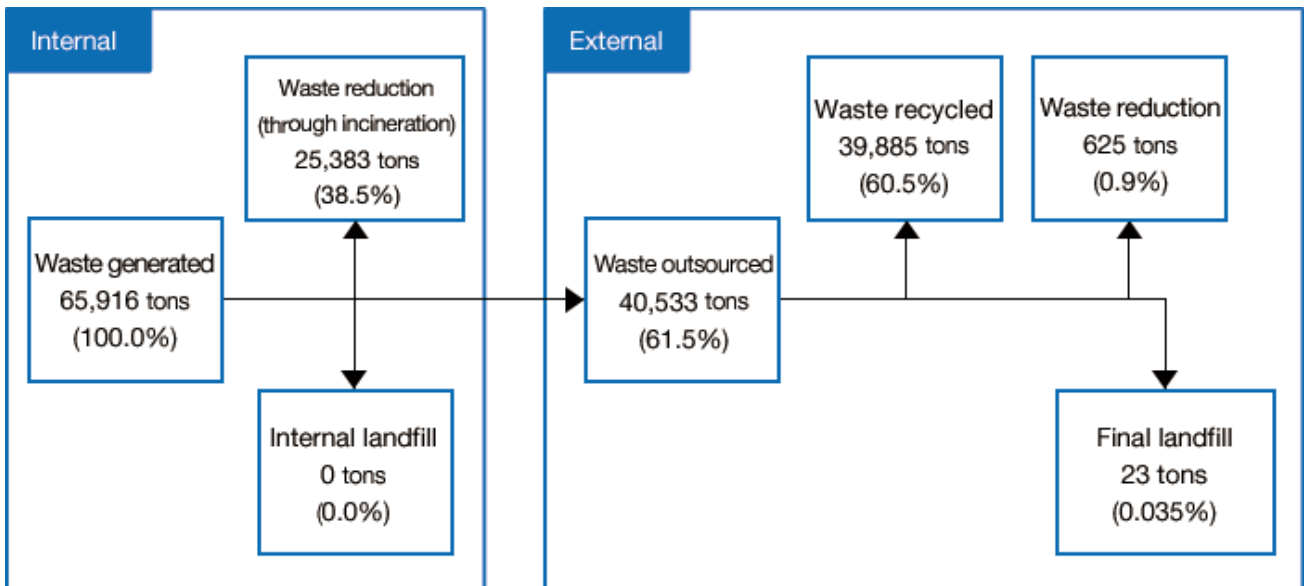
- Volume and Rate of Waste Sent to Landfill



■ Waste Generated and Recycled



■ Waste Flow: From Generation to Landfill (FY 2019 actual)



Proper Disposal of Industrial Waste

In fiscal 2019, we formulated the Guidelines for the Industrial Waste Treatment Commission to disseminate points to note at the time of signing a commission contract. We conduct regular site visits of our waste processing contractors, and carry out inspections based on a checklist to confirm that waste is being processed in the proper manner.

3R Initiatives

Because reducing waste leads to improving global sustainability by means of resource savings, cost reduction, as well as CO₂ emissions reduction, Kaneka is pursuing waste reduction on a company-wide basis.

We at Kaneka and Group companies in Japan are pursuing activities at each of our production facilities, mainly through the "3R" approach to achieve waste reduction and recycling of materials.

We also facilitate continuous improvement activities through process analysis using Material Flow Cost Accounting (MFCA).

CHECK & ACT

For industrial waste, we will control waste generation to increase the recycling rate of waste from our operations at home and abroad.

Environment

Biodiversity

Considering the impacts of our businesses on ecosystems, we at Kaneka strive to develop technologies, materials and products that have less environmental impacts, as well as to mitigate environmental impacts of our production.

As part of our corporate social responsibility efforts, we also collaborate with stakeholders outside the company in biodiversity conservation activities.

Partnership for Biodiversity Conservation

We join the following initiatives.

- Promotion Partners of the Declaration of Biodiversity by Keidanren
- Japan Business and Biodiversity Partnership

Takasago Manufacturing Site “Kaneka Forestry for the Future”

Since 2012, employees at the Takasago Manufacturing Site have been involved in the Kaneka Forestry for the Future project, aimed at preserving a private forest. They have helped to protect a forest of roughly 15 hectares in Taka Town, Hyogo Prefecture.

Since 2013, training of newly hired employees has been part of the project. Assisting each other on the forest terrain in cutting and transporting timber, the participants build solidarity and teamwork.

In April 2019, 70 newly hired employees carried out tree thinning, and 47 employees and their family members participated in another session in November. The carbon sink since the start of the project amounts to 2.08 tons-CO₂. We will continue this private forest preservation project.



Timber felling through cooperation among newly hired employees



Tree thinning by employees and their family members

Osaka Manufacturing Site “Settsu-no-mori Kaneka Biotope”

Since 2012, we have operated the Settsu-no-mori Kaneka Biotope(*) on the premises of the Osaka Manufacturing Site in collaboration with the Settsu Firefly Society, to create a firefly habitat in Settsu City.

Since 2015, along with the appearance of fireflies (May/June), we have held a firefly viewing gathering, inviting local residents. In 2019, the biotope was open to the public for firefly viewing from May 25 to June 2. From 2017, we have also held an ensemble concert by the Japan Century Symphony Orchestra at the Osaka Manufacturing Site during the firefly viewing period. In 2019, a total of 80 local residents, employees, and their family members attended the concert. We will continue our activities as a plant open to the local community.

* Biotope: A place where organisms live as they do in nature. In human environments such as cities, biotopes are artificial environments created to regenerate and preserve a natural habit.



“Firefly Evening Concert”



Adult firefly



Firefly viewing gathering

Shiga Manufacturing Site “Walnut School”

Employees at the Shiga Manufacturing Site have joined the Walnut School’s efforts to conserve the Konooka Biotope as a steering committee member.

The Konooka Biotope is a habitat of diverse creatures. Established as a collaborative effort by Shiga Prefecture, Otsu City, and local community members including employees at the Shiga Manufacturing Site, the Walnut School works to preserve this precious natural environment of Lake Biwa for future generations. We participated in its seasonal nature observation gatherings and regular activities in July and December, such as grass mowing, sidewalk maintenance, the updating of tree signs and so on.

The natural observation gatherings provide valuable learning opportunities for children to observe rare plants, wild birds, and insects in the biotope and to understand its importance. We will continue to contribute to the conservation of the beautiful natural environment of Lake Biwa.



Nature observation gathering