

## Kao's approach

Water is essential to Kao's business activities. In manufacturing, water is used not only as a raw material in liquid cleaning products but also for heating, cooling and cleaning purposes. Consumers also need to use water when using our products. In addition, the water that is used in plants and homes is returned to river and ocean environments as wastewater after receiving wastewater treatment. We are therefore taking steps including managing the water quality of wastewater at our plants and developing products whose wastewater has small impact on the environment.

## Kao's creating value to address social issues

Water is necessary to life for all plants and animals on Earth. Drought and conflicts over water are already becoming problems in some regions and are projected to become increasingly severe due to future population growth and global warming.

It is our duty to ensure that the world has enough available water by reducing water consumption related to our business activities. Work stoppages and the inability to procure raw materials due to natural disasters result in business opportunity loss, while compliance with regulations results in negative financial impact from the increases in costs and investments. At the same time, our activities to reduce water consumption are opportunities to contribute to resolving social issues and to realizing our mission.

At Kao, we recognize the following as risks and opportunities pertaining to water and are incorporating them into our strategy for our business activities.

### Risks and opportunities from regulations

Some national and regional regulations and public policies, such as those limiting water intake and regulating wastewater, impact our manufacturing business activities. Others impact products, such as limits on water consumption volumes during product use and the water footprint of products to be displayed in labeling. We consider these types of regulations and policies to be a risk to our business continuity and growth.

To comply with these regulations, we began taking steps to reduce water consumption at our plants from an early stage and offer water-saving products in countries and regions to expand our business. We have also introduced a system to calculate the environmental impacts of our products.

### Risks and opportunities from physical impacts

The declining amount of available water per person, partially due to growing urban populations and droughts caused by extremes in rainfall associated with climate change, has emerged as a problem. Stronger hurricanes and typhoons and other unavoidable natural disasters such as floods and storm surges from extreme rainfall due to climate change are

risks to our business operations.

Meanwhile, we also believe that the physical impacts are associated with numerous opportunities especially in the Consumer Business. For example, water-saving products address the decline in available water. We aim to expand business by offering products in countries and regions to meet these emerging needs.

### Other risks and opportunities

We believe that offering products that minimize water pollution from wastewater after product use, and efforts to address the above water risks, are indispensable to our business continuity and growth. If these efforts are insufficient, we may have difficulty in entering markets for environmentally friendly products and not be able to gain the trust of various stakeholders.

On the other hand, continuously offering higher value environmentally friendly products and expanding the markets facilitates our business expansion. Proactive information disclosure leads to increase in trust from various stakeholders and contributes to business expansion.

## Risks and opportunities

	Risks	Opportunities
Regulations	<ul style="list-style-type: none"> <li>Water intake restrictions</li> <li>Wastewater regulations</li> <li>Product labelling programs for water-related environmental performance</li> </ul>	<ul style="list-style-type: none"> <li>Offering products that contribute to conserving water and complying with wastewater regulations</li> <li>Cost reductions from conserving water and improving wastewater quality</li> </ul>
Physical impacts	<ul style="list-style-type: none"> <li>Work stoppages caused by natural disasters</li> <li>Inability to procure raw materials due to natural disasters</li> <li>Increased expenses for installing and operating facilities in preparation for extreme weather and natural disasters</li> </ul>	<ul style="list-style-type: none"> <li>Offering water-saving products that are in higher demand due to drought</li> <li>Offering water-saving products to meet needs at natural disasters</li> </ul>
Others	<ul style="list-style-type: none"> <li>Damage to reputation from insufficient conservation of water resources or insufficient information disclosure</li> </ul>	<ul style="list-style-type: none"> <li>Increased credibility from proactive response to water resource conservation and proactive information disclosure</li> </ul>

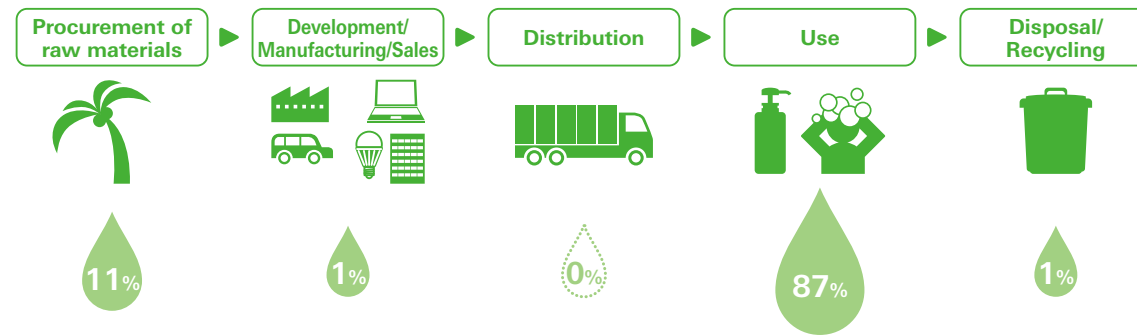
## Contributions to the SDGs



## Policies

We at Kao are working together with our business partners and consumers to introduce and develop technologies to conserve water and water quality at each stage of the product lifecycle.

### Ratio of water consumed at each stage of Kao products' lifecycle



\*2017 results

The use stage accounts for the largest ratio of water consumption at 87%. Notably, almost all water consumption in the product lifecycle occurs in the use stage. This is because Kao offers many products for cleaning purposes that require water during use. As with CO<sub>2</sub> emissions, in 2009 we announced in the Kao Environmental Statement our commitment to contribute to environmental conservation at all stages of the product lifecycle. This was based on the results of our analysis at the time.

Our main efforts to reduce water consumption in the use stage, where most consumption occurs, is offering water-saving products. Using our technological capabilities to develop cleaning agents, we are developing water-saving products and offering them in various fields globally. Our approach is typified by finding solutions to wide-ranging social issues through our expertise in *essential research*.

Water used in the raw materials procurement

stage, which accounts for 11% of total lifecycle water consumption, represents water used at suppliers' plants. For this reason, making efforts together with our suppliers is vital.

The ratio of water used in the development, manufacturing and sales stages is small at 1%, but our plants still have some impact on the communities in which they are located. We have long conducted water conservation activities at our plants, and as far back as the early 1980s, we had realized and operated a closed-loop system for water at our Kyushu Plant. Each of our plants also currently sets water conservation targets and conducts activities accordingly.

We also proactively undertake wastewater management at each stage. We manage wastewater quality in the manufacturing stage. We offer products whose wastewater from product use has small impact at the disposal stage to reduce the environmental impact of household wastewater and help prevent water quality contamination.

## Efforts with suppliers

We evaluate the water risks of suppliers, which represent a large business risk, using tools such as Aqueduct from the WRI\*. For suppliers whose water risks are higher than our set standard, we conduct surveys and gather information about their water consumption and management conditions through the CDP's supply chain program. This also represents an opportunity to reduce water consumption and promote water management at suppliers.

\*WRI  
World Resources Institute.  
A U.S.-based policy center that researches problems related to natural resources and the environment and conducts activities together with government and private groups and environmental experts.

## Efforts at plants

At plants, we use water as a product ingredient as well as to clean and cool equipment. We set targets to reduce water consumption at each plant and are working to reduce consumption and increase recycling based on the 3R's (Reduce, Reuse, and Recycle).

We are also installing wastewater treatment technologies. Our Wakayama Plant in Japan has conducted a demonstration experiment of industrial wastewater treatment technology that uses tubifex worms developed by the Industrial Technology Center of Wakayama Prefecture. It was verified that the technology can reduce pollutants emitted from a treatment center by as much as 80%. We also seek out external technologies to introduce in our plants and are working to reduce waste materials and cut costs.

## Survey of water risks

We regularly conduct water risk assessments at plants using the WRI's Aqueduct tool and internal information. When opening new plants, we also examine the long-term feasibility of using the water resources and the wastewater impacts.

## Initiatives to prevent water pollution

We have installed and conduct high-level maintenance and management of wastewater treatment facilities at many plants. After properly treating plant wastewater, it is discharged outside the plant. We monitor the quality of the discharged water based on laws and regulations as well as agreements with nearby local governments.

## Surveys of groundwater and soil contamination

In light of our history of chemical substance use, every year we voluntarily measure the levels of substances regulated by environmental standards in the groundwater within plant premises.

## Compliance with environmental legislation

We manage facilities and operate pollution prevention control systems to comply with various environmental laws and regulations including for plant wastewater and waste. We conduct high-level maintenance and management to comply with regulations that are becoming more rigorous year after year.

## Efforts in products

We are working to develop products whose wastewater after product use has small impact on water environments. In addition, we are conducting surveys and research on river contamination in cooperation with experts and industry associations.

## Framework

Activities related to water consumption across the entire lifecycle are managed under our Responsible Care (RC) promotion system.

Various Kao divisions and stakeholders are involved in these activities, corresponding to each product lifecycle stage (table below).

For example, in the manufacturing stage, the SCM Division holds the Environment Working Group Meeting with environmental staff at all plants, manages the progress of environmental activities at plants, and internally rolls out new technologies. We are also building a system that horizontally connects divisions in order to strengthen coordination between lifecycle stages. In the Eco Action SCM Meeting, all divisions that manage the stages of raw materials procurement, manufacturing and distribution meet together to share information and discuss cooperation with the aim of total optimization.

Using a database that centrally manages environmental data, Kao ensures data reliability, standardizes work tasks, and increases task efficiency to facilitate conducting activities with targeted outcomes.

### Managing divisions and relevant stakeholders by product lifecycle stage

Product lifecycle stage	Managing divisions at Kao	Relevant stakeholders
Raw materials procurement	R&D Division Procurement Division	Suppliers Contract manufacturers
Development/ Manufacturing/Sales	Marketing Division, R&D Division, SCM Division, Sales Division	Local communities Retailers
Distribution	SCM Division, Logistics Division	Distribution companies Retailers
Use	R&D Division	Consumers
Disposal/Recycling	R&D Division	Government/ Treatment and service providers

## Mid- to long-term targets and performance

We set the 2020 reduction targets for water consumption for all Kao Group sites in 2013 and have aimed to achieve a 1% reduction each year.

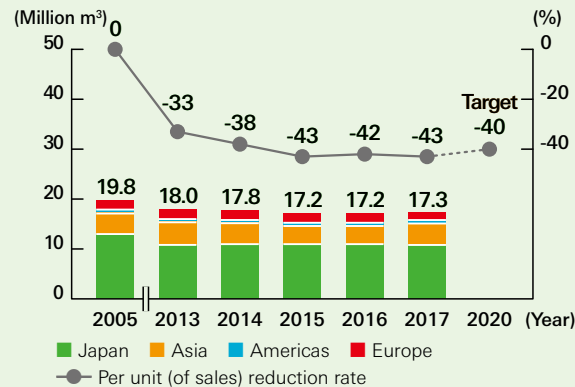
We set the 2020 reduction targets for water consumption during the product use stage for the Kao Group in Japan in 2009.

Targets for water consumption

Index	Scope	2017 targets	2018 targets	2020 targets
Water consumption	All Kao Group sites	38% reduction	39% reduction	40% reduction
	During consumer product use for the Kao Group in Japan	—	—	30% reduction

### Performance in 2017

Water consumption (withdrawal) (all sites)

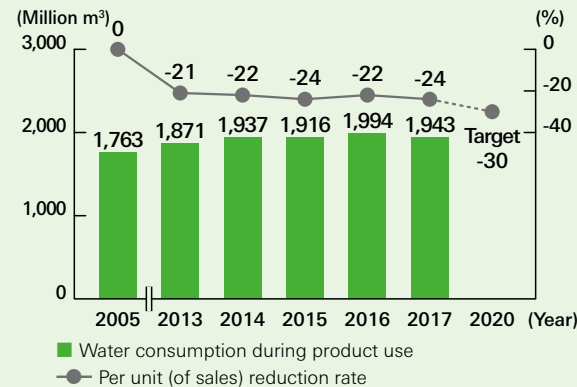


\*Boundary: Through 2014, all Kao Group production sites as well as non-production sites within Japan. For 2015, includes some non-production sites outside Japan, and from 2016 onwards, includes all non-production sites outside Japan.

\*Assurance provided for water consumption (withdrawal).

\*Per unit of sales is calculated based on Japanese standards up to fiscal 2015, and on International Financial Reporting Standards (IFRS) from fiscal 2016.

Water consumption during product use (Kao Group in Japan)

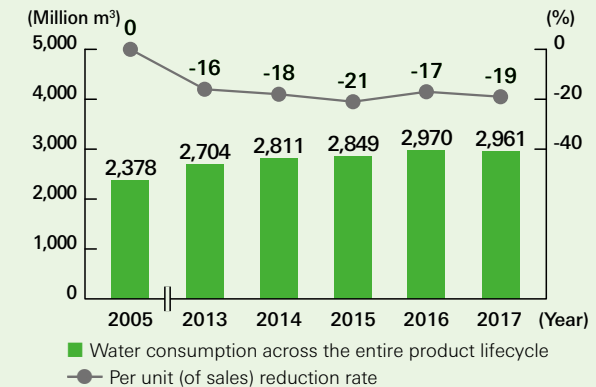


\*Water consumption during product use is calculated by multiplying the water consumption per unit of a product, mainly for consumer products in Japan, by the annual sales quantity of the product, and then adding all the results for these products together.

\*Assurance provided for water consumption and per unit (of sales) reduction rates.

\*Per unit of sales is calculated based on Japanese standards up to fiscal 2015, and on International Financial Reporting Standards (IFRS) from fiscal 2016.

Water consumption across the entire product lifecycle (Kao Group)

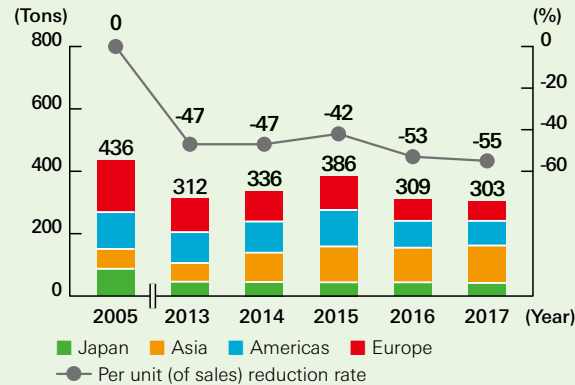


\*\*Water consumption across the entire product lifecycle" is calculated as the combined total for the amount of lifecycle water consumption of individual products sold within and outside Japan, multiplied by their annual sales quantity. Among the lifecycle, the estimated water consumption during the manufacturing and distribution processes is substituted by the actual use during these processes. This amount includes water used for procurement in regard to chemical products but does not include water used in the use and disposal of such products.

\*Assurance provided for water consumption and per unit (of sales) reduction rates.

\*Per unit of sales is calculated based on Japanese standards up to fiscal 2015, and on International Financial Reporting Standards (IFRS) from fiscal 2016.

**COD pollution load** (all production sites)



\*The amount of COD pollution load for wastewater entering sewer systems takes into account the removal rate from sewer systems.  
 \*Assurance provided for COD pollution load.  
 \*Per unit of sales is calculated based on Japanese standards up to fiscal 2015, and on International Financial Reporting Standards (IFRS) from fiscal 2016.

**Water withdrawal amount by source (Million m<sup>3</sup>)**

	2015	2016	2017
Surface water	0	0	0
Brackish water/seawater	0	0	0
Rainwater	0	0	0
Groundwater (renewable)	4.7	4.9	5.0
Groundwater (not renewable)	0	0	0
Oil-contaminated water/process water	0	0	0
City water	12.5	12.3	12.2
Wastewater from other organizations	0	0.1	0.1

\*Boundary: Through 2014, all Kao Group production sites as well as non-production sites within Japan. For 2015, includes some non-production sites outside Japan, and from 2016 onwards, includes all non-production sites outside Japan.

**Wastewater discharge by destination (Million m<sup>3</sup>)**

	2015	2016	2017
Rivers/lakes	2.0	2.1	2.3
Brackish water/seawater	6.3	6.0	5.8
Groundwater	0	0	0
Sewage system	2.7	2.7	2.8
Wastewater to other organizations	0	0	0

\*Boundary: Through 2014, all Kao Group production sites as well as non-production sites within Japan. For 2015, includes some non-production sites outside Japan, and from 2016 onwards, includes all non-production sites outside Japan.

Our water consumption (all sites) came to 17.3 million m<sup>3</sup>, an improvement of 1 point in the reduction rate over the previous year to 43%, taking 2005 as the baseline year. We achieved our 2017 target of a 38% reduction and have achieved our 2020 target of a 40% reduction, continuing from the previous year. In addition, water consumption at manufacturing sites with water intake risks came to 3.6 million m<sup>3</sup>.

Our water consumption across the entire lifecycle of products (Kao Group) and during product use (Kao Group in Japan) fell to 9 million m<sup>3</sup> and 52 million m<sup>3</sup>, respectively. The per unit of sales reduction rates both improved 2 points to a 19% reduction and a 24% reduction, respectively. Enhancement of the water-conservation performance of our washing-up liquid products contributed to these improvements in water consumption.

Our COD pollution load decreased 7 tons over the previous year, and the per unit of sales reduction rate improved 2 points.

The challenge is to reduce water consumption during the use stage. We are working to further expand our water-saving products.

## Collaboration with stakeholders

- We participate in the CDP supply chain program and conduct surveys and gather information about water consumption and management conditions at suppliers whose water risks are higher than our set standard.
- The water conservation campaign that we continue to conduct in cooperation with the Chinese government was held for the sixth consecutive year in 2017. We expanded the areas of activity and conducted awareness-raising for water conservation at 53 universities in China in this year's campaign.

## Our initiatives

### Efforts in raw materials procurement

Suppliers Contract manufacturers

We participate in the CDP supply chain program and conduct surveys and gather information about water consumption and management conditions at suppliers whose water risks are higher than our set standard.

### Efforts in development, manufacturing and sales

Local communities Retailers

We use water as a product ingredient as well as to clean and cool equipment in plants. We set targets to reduce water consumption at each plant and are working to reduce consumption and increase recycling based on the 3R's (Reduce, Reuse and Recycling).

In terms of reducing consumption, multiple plants including Kao Chemicals GmbH in Germany conduct efforts to increase the number of times that water is reused for boilers and for cooling to reduce their water consumption.

Efforts to reuse water include collecting rainwater and using it to water green spaces at the Sumida Office, Kao Chemical Corporation Shanghai and Fatty Chemical (Malaysia).

We are also promoting recycling efforts to treat and reuse water at many plants, such as recovering steam after use and treating and reusing water that has been used in production processes.

As a result of conducting risk assessments on water stress at production sites, we discovered new risks at six sites. We are currently conducting detailed risk assessments at each site and considering what future actions are required.

Kao Chemical Corporation Shanghai reduces its water consumption for the manufacturing of some products by reusing water from reaction processes of other products. Kao Vietnam introduced a spray technique for washing and sanitizing tanks, resulting in reducing its use of water and steam in this process as well as reducing overall water and energy consumption and CO<sub>2</sub> emissions. Kao Industrial (Thailand) returns cooling water overflow to a cooling water pool to help eliminate unnecessary water consumption.

### Surveys of groundwater and soil contamination

The Wakayama Plant, Sumida Office, Sakata Plant, Kawasaki Plant, Tochigi Plant and Odawara Office have independently conducted groundwater and soil contamination surveys and confirmed that all measurement indicators are below the quantifiable lower limit.

### Compliance with environmental legislation

In 2017, there were 11 incidents of violations of environmental laws and regulations, resulting in fines of 699 thousand yen. There were three incidents of violations relating to the Water Pollution Prevention Act at Kao in Japan, one violation relating to drum waste storage at Kao Corporation (Spain), one incident of delayed reporting to the authorities at Kao USA, five violations of wastewater standards and one incident of a delayed waste filter inspection at Kao Specialties Americas. There was a violation at Kao USA under the same circumstances as last year, and many violations at Kao Specialties Americas. Kao is implementing measures to prevent recurrences at each plant.

#### Compliance status with environmental laws and regulations

Category	Unit	2015	2016	2017
Number of violations*1	incidents	1	3	11
Of which, number of leaks	incidents	0	0	0
Total fines*2	1,000 yen	0	2,590	699
Of which, number of leaks	1,000 yen	0	0	0

\*1 All incidents detected by authorities during the reporting period.

\*2 Fines paid during the reporting period.



## Efforts during use

Consumers and others

### Efforts in the Consumer Products Business

We are conducting a wide range of efforts, as water consumption in the use stage accounts for almost all water consumption across the entire lifecycle. Our leading efforts are offering water-saving products and communicating how to use them.

Since launching *Attack Neo* laundry detergent, which requires only one rinse cycle, in Japan in 2009, we have expanded the supply areas. Currently we provide such water-saving laundry detergent in Japan, China, Hong Kong, Malaysia, Singapore and Australia.

We offer *Merit Shampoo*, which since 2010 has been able to reduce the amount of water required for rinsing by 20% over the existing product, *CuCute* dishwashing detergent, which since 2014 has been able to reduce the amount of water required for rinsing by 20%, and *Bath Magiclean* bathroom cleaning liquid, which since 2015 has been able to reduce the amount of water required for rinsing by 10%. These are some of the examples of the wide selection of water-saving products.

We also communicate ways to save water to consumers using a variety of approaches. For example, we have developed eco shampoo techniques to use less water when shampooing hair and we communicate these to consumers. Communicating ways to conserve water while offering water-saving products truly embodies "eco together," the slogan of the Kao Environmental Statement.

### Efforts in the Chemical Business

*Visco Top* is a cement additive in the Chemical Business that can prevent cement from dispersing into surrounding rivers, seas and other water sources when used in construction projects taking place near water. *Visco Top* is also being used in work to remove contaminated water at the Fukushima Daiichi Nuclear Power Plant.

In 2017, *Visco Top* received the 49th JCIA Technology Award sponsored by the Japan Chemical Industry Association (JCIA), which is given to an innovative scientific technology or product that has substantially contributed to the improvement of the environment.



→ p. 101 Community > Communication with corporate customers (Chemical Business) / Topic: Water-based inkjet ink and high-performance specialty thickener *Visco Top* receive award

We will continue to offer water-saving products and products with lower impacts on water environments.

## Efforts for wastewater after product use

Government/treatment and service providers

In product development, we incorporate considerations for impacts on the water environments of discharged water after product use. More specifically, we have investigated the biodegradability of raw materials that may be discharged into the environment and their impacts on common aquatic organisms using river water and activated sludge used at wastewater treatment plants. Through this investigation, we are actively promoting the development and use of raw materials with reduced environmental impact.

In addition, we are focusing on understanding the situation of water environments after product use and we are conducting our own field surveys on an ongoing basis, such as environmental monitoring of river water. To respond to globalization, we are conducting monitoring and working with experts to develop mathematical models that predict the concentration of chemical substances in rivers, aiming to conduct business with consideration for the local environment in countries outside Japan.

Furthermore, cooperating with the Japan Soap and Detergent Association (JSDA), we have conducted environmental monitoring of four major surfactants in urban river systems (7 sites from 4 rivers, 4 measurements/year) for the past 19 years in order to assess environmental risk on aquatic ecosystems. In the surveys conducted so far, the results show that these surfactants have consistently low risks to aquatic organisms.