

Kao's approach

In the Paris Agreement adopted in 2015, citizens of the Earth agreed to work together toward the goal of keeping the global rise in temperature to below 2°C above pre-industrial levels. As a citizen of the Earth, we at Kao are conducting activities together with our business partners and consumers to reduce CO₂ emissions at all stages of the product lifecycle.

Kao's creating value to address social issues

The year 2017 was the second-hottest year on NASA's record since record-keeping began, and there were many reports of damage caused by extreme weather.

Managing the risks associated with climate change is a critical management issue for Kao. We see the increase in natural disasters as a result of climate change as well as compliance with related regulations as potential risks. 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, however, these conditions also represent business opportunities. Through our business activities, we believe that we can contribute to reducing CO₂ emissions, a main cause of global warming.

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

Risks and opportunities from regulations

Some national and regional regulations and public policies impact companies' business activities, including energy-efficiency standards, carbon tax schemes and emissions trading systems. Others directly impact products, including the carbon footprint

of the product to be displayed in labeling. We consider these types of regulations and policies themselves to be a risk to our business continuity and growth.

To comply with these regulations, we are expanding our business through various activities conducted by Kao Group companies in each country and region, including offering products that contribute to saving energy. We have also introduced a system to calculate the environmental impact of our products.

Risks and opportunities from physical impacts

The effects of climate change are now becoming apparent. These include longer periods of high temperatures during summer due to global warming, and more intense typhoons and hurricanes and extremes in rainfall due to climate change. Adapting to these changes in nature and the resulting unavoidable disasters represent risks to our business operations.

Meanwhile, we also believe that physical impacts are associated with multiple opportunities. For example, longer periods of high temperatures during summer and extremes in rainfall mean higher demand for products consumed when it is hot and water-saving products. In this way, we aim to expand business by offering products in countries and regions to meet these emerging needs.

Other risks and opportunities

Insufficient efforts to mitigate climate change is

a risk to business continuity and growth. This risk encompasses such aspects as difficulty in entering markets for environmentally friendly products and inability to gain the trust of various stakeholders. On the other hand, continuously offering higher value environmentally friendly products and expanding the market facilitates business expansion. Proactive information disclosure leads to increased trust from various stakeholders and contributes to business expansion in the medium and long term.

Risks and opportunities

	Risks	Opportunities
Regulations	<ul style="list-style-type: none"> Taxation and regulations related to CO₂ emissions Setting of energy-efficiency standards Trading systems for greenhouse gas emissions Carbon footprint labeling programs for products 	<ul style="list-style-type: none"> Offering products that contribute to reducing CO₂ emissions and meeting energy-efficiency regulations Cost reductions from energy savings
Physical impacts	<ul style="list-style-type: none"> Work stoppages caused by natural disasters Inability to procure raw materials due to natural disasters Increased costs for installing and operating facilities in preparation for extreme weather and natural disasters 	<ul style="list-style-type: none"> Offering products that are in higher demand due to hotter temperatures Offering products to meet needs at natural disasters
Others	<ul style="list-style-type: none"> Damage to reputation from insufficient response to climate change or insufficient information disclosure 	<ul style="list-style-type: none"> Increased credibility from proactive response to climate change and proactive information disclosure

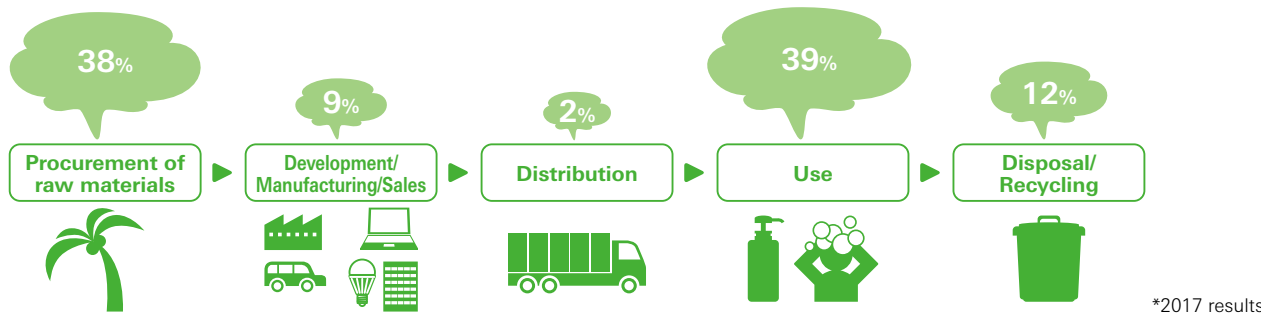
Contributions to the SDGs



Policies

We at Kao are working together with our business partners and consumers to introduce and develop technologies to reduce CO₂ emissions at each stage of the product lifecycle.

Ratio of CO₂ emissions at each stage of the Kao product lifecycle



The use stage accounts for the largest ratio at 39%, with the raw materials procurement stage accounting for the second-largest ratio at 38%. The ratio of direct CO₂ emissions from facilities such as Kao plants accounts for a relatively small 9%, and it is notable that the volume of emissions that are not direct emissions accounts for the larger ratio. The reason why we announced in the Kao Environmental Statement our commitment to contribute to environmental conservation at all stages of the product lifecycle in 2009 was that we gained this results of our analysis.

CO₂ in the use stage is emitted, for example, for laundry detergent when the washing machine uses electricity, and for shampoo and dish detergent when hot water is used during the products use. We offer laundry detergent that reduces the number of required rinse cycles, and shampoo and dish detergent that reduce hot water use, as ways to reduce the amount of CO₂ emitted in the use stage.

To reduce CO₂ emissions in the next-largest raw materials procurement stage, we are taking steps including optimizing the amount and frequency of raw materials deliveries and selecting raw materials with lower CO₂ emissions on a unit basis.

To reduce CO₂ emissions in the disposal and recycling stage, we are taking steps including reducing packaging and other materials that become waste after use by the consumer, and using biomass materials that do not contribute to the global warming when incinerated.

To reduce CO₂ emissions in the manufacturing and sales stages, we are taking steps including reducing the amount of energy consumed, using cleaner energy, and reducing leaks of refrigerants and other greenhouse gases. To reduce CO₂ emissions in the distribution stage, we are taking steps including making products more compact, improving shipping efficiency, shortening shipping distances, and switching to modes of transport with lower CO₂ emissions.

Framework

Activities that produce CO₂ and other emissions across the entire product lifecycle are managed under our Responsible Care (RC) promotion system.

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

For example, in the manufacturing stage, the SCM Division holds the Energy-Saving Working Group Meeting, manages the progress of energy-saving activities at plants, and internally rolls out new technologies. We are also building a system that horizontally connects divisions in order to strengthen coordination among each lifecycle stage. 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

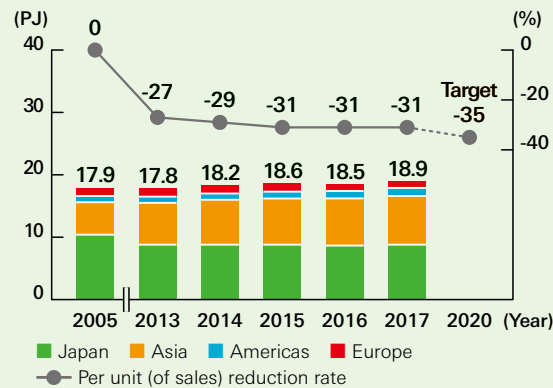
In 2013, we set the 2020 reduction targets for energy consumption and greenhouse gas emissions pertaining to all Kao Group sites and have aimed to achieve a standard reduction of 1% each year. In 2009, we set the 2020 reduction targets for CO₂ emissions pertaining to the entire product lifecycle for the Kao Group in Japan, based on the national reduction targets set by the Japanese government at the time.

Targets for energy and greenhouse gas emissions

Index	Scope	2017 targets	2018 targets	2020 targets
Energy consumption	All Kao Group sites	32% reduction	33% reduction	35% reduction
GHG emissions		31% reduction	32% reduction	35% reduction
CO ₂ emissions	Across the entire product lifecycle for the Kao Group in Japan	—	—	35% reduction

Performance in 2017

Energy consumption (all sites)

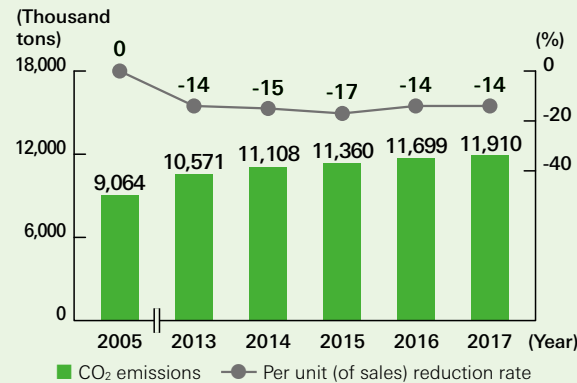


*Boundary: All Kao Group sites including company cars.

*Assurance provided for energy consumption figures.

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

CO₂ emissions across the entire product lifecycle (Kao Group)

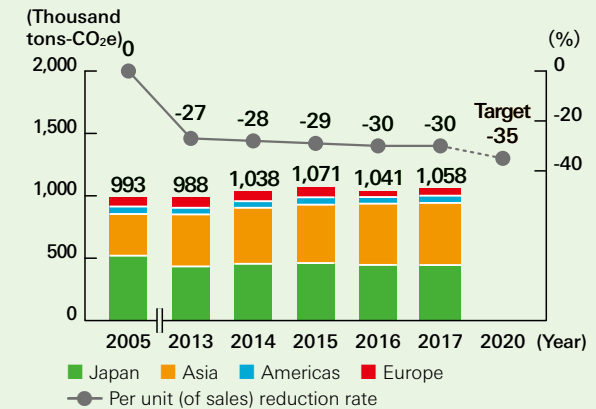


**CO₂ emissions across the entire product lifecycle" is calculated as the combined total for the amount of lifecycle CO₂ emissions of individual products sold within and outside Japan, multiplied by their annual sales quantity. Among the lifecycle, the estimated emissions from the manufacturing and distribution processes are substituted by the actual emissions from these processes. However, this amount does not include emissions related to the use and disposal of chemical products.

*Assurance provided for CO₂ emissions figures 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.

GHG emissions (all sites)



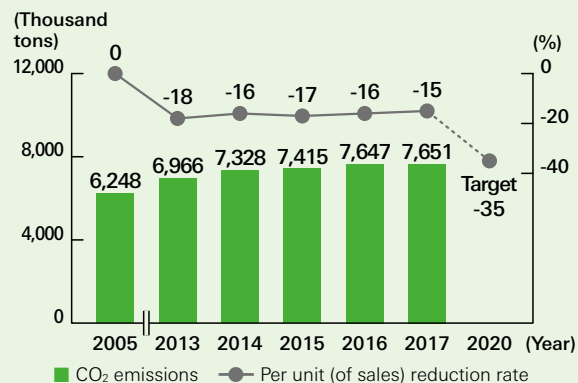
*Boundary: All Kao Group sites including company cars.

*Gases included: The seven GHGs specified by the Kyoto Protocol (only CO₂ for sites outside Japan)

*Assurance provided for GHG emissions figures.

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

CO₂ emissions across the entire product lifecycle (Kao Group in Japan)



“CO₂ emissions across the entire product lifecycle” is calculated as the combined total for the amount of lifecycle CO₂ emissions of individual products sold within and outside Japan, multiplied by their annual sales quantity. Among the lifecycle, the estimated emissions from the manufacturing and distribution processes are substituted by the actual emissions from these processes. However, this amount does not include emissions related to the use and disposal of chemical products.

*Assurance provided for CO₂ emissions figures 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.

Scope 1 CO₂ emissions volumes (Thousand tons-CO₂e)

	2015	2016	2017
Japan	276	272	271
Asia	286	291	290
Americas	37	39	43
Europe	68	47	49
Total	667	649	653

Scope 2 CO₂ emissions volumes (Thousand tons-CO₂e)

	2015	2016	2017
Japan	185	169	173
Asia	181	200	208
Americas	22	14*1	14
Europe	17	8	9
Total	405	391	405

*Emission volumes by scope conform to the Greenhouse Gas Protocol initiative.

Scope 1: GHG emissions emitted directly by the company/ organization

Scope 2: Indirect GHG emissions from purchased electricity, heat, etc.

*Emission factors

Scope 1: In principle, uses factors defined in the Act on Promotion of Global Warming Countermeasures.

Scope 2: In principle, uses the specific factors of the country's laws or regulations. When the specific factor cannot be obtained, the country-based factor released by the International Energy Agency (IEA) is used.

*1: In 2016, figures are affected by a revision to the electricity emission factor (year-on-year reduction of 9 thousand t-CO₂e).

Purchase volumes for electricity, steam, etc. (terajoules)

	2015	2016	2017
Electricity	7,447	7,272	7,648
Heat	0	0	0
Steam	88	132	140
Cooling	0	0	0

*Electricity is calculated as the calorific value of the primary energy (at the receiving end in Japan, generating end outside Japan).

Consumption volumes by fuel type (terajoules)

	2015	2016	2017
Natural gas	9,204	8,915	9,047
Diesel oil	1,282	1,375	1,383
Gasoline	153	162	149
Other	123	111	128
Waste vegetable oil (heat recovery)	555	517	486

Scope 3 CO₂ emissions volumes (Thousand tons-CO₂e)

	2015	2016	2017
1. Purchased goods and services*1	2,037	4,134	4,496
2. Capital goods	252	262	239
3. Fuel- and energy-related activities (not included in scope 1 or scope 2)	27	22	29
4. Upstream transportation and distribution*1	95	242	253
5. Waste generated in operations*1	24	47	58
6. Business travel	4	4	4
7. Employee commuting*1	13	18	18
8. Upstream leased assets	0	0	0
9. Downstream transportation and distribution*1	59	94	97
10. Processing of sold products	100	113	119
11. Use of sold products*1	3,715	4,965	4,687
12. End-of-life treatment of sold products*1	1,106	1,317	1,415
13. Downstream leased assets	0	0	0
14. Franchises	0	0	0
15. Investments	8	7	8
Total	7,450	11,225	11,423

*Kao focuses on the categories of 1, 3, 4, 5, 11 and 12 related to site activities to save energy and reduce waste materials, as well as on the product lifecycle.

*1 The boundary was extended from the Kao Group in Japan to the Kao Group from 2016.

CO₂ emissions across the entire product lifecycle increased by 211 thousand tons-CO₂ over the previous year, and the per unit (of sales) reduction rate remained unchanged at 14% (2005 baseline). CO₂ emissions across the entire product lifecycle in Japan increased by 4 thousand tons-CO₂ over the previous year, and the per unit (of sales) reduction rate deteriorated by 1 point to 15% (2005 baseline).

Per unit energy consumption at all Kao Group sites remained unchanged from the previous year at 31% and per unit greenhouse gas emissions also stayed the same at 30%. We did not achieve the reduction targets of 32% and 31%, respectively. One factor was an increase in production of products that consume a lot

of energy.

We offer a wide selection of household products such as water-saving products that reduce CO₂ emissions during the use stage, and also provide various industrial-use products that can reduce CO₂ emissions during the use stage. The volume of CO₂ emissions in the use and subsequent stages for industrial-use products falls under the scope of our business partners' final products, and therefore the amount is not added to the figures for lifecycle CO₂ emissions listed on p. 29. Including these reduction contributions, the volume of contributed lifecycle CO₂ emission reductions was 3,884 thousand tons*.

The challenge is to reduce the volume of lifecycle CO₂ emissions. We will further expand our range of products that reduce hot water and power consumption in the use stage, which contributes a large portion of total lifecycle emissions, and take steps such as reducing the amount of raw materials used and switching raw materials to those made from renewable sources.

*Value is calculated as the volume of reduced lifecycle CO₂ emissions of the Kao product in Japan, compared with the standard product as of 2005. The scope includes industrial-use products and household products.

Collaboration with stakeholders

We are taking steps to reduce CO₂ emissions in collaboration with various stakeholders at each lifecycle stage.



→ p. 28 Kao's approach: Managing divisions and relevant stakeholders by product lifecycle stage

- We provide our efforts to the Green Value Chain Platform operated by the Japanese Ministry of the Environment in order for other companies to use as a reference in calculating supply chain emissions.

- We are a member of the LCA Working Group organized by the Japan Chemical Industry Association (JCIA). At part of its activities, a case of our carbon lifecycle analysis (c-LCA) was disclosed publicly to communicate contributions to CO₂ reductions from the use of chemical products.

- We are participating in the Supply Chain Program conducted by the CDP and request our suppliers to report regarding CO₂ reduction activities. We feedback the results of our evaluations of their activities to the suppliers.

- We are collaborating with packaging suppliers to develop packaging that contributes to CO₂ reductions.

- Efforts at the distribution stage



→ p. 34 Our initiatives > Efforts in distribution

Our initiatives

Efforts in raw materials procurement

Suppliers Contract manufacturers

- In 2009, we became the first Japanese company to participate in the Carbon Disclosure Project (CDP) Supply Chain Program. In 2017, we began evaluating the data on CO₂ reduction activities reported by suppliers and provided the results of our evaluations back to the suppliers.



→ p. 134 Corporate Culture > Sustainable and responsible procurement

- In collaboration with suppliers, we are reducing CO₂ emissions from the manufacture of packaging by using renewable and recycled resins and thinner cardboard.
- By optimizing the volume and frequency of raw materials deliveries, we are reducing CO₂ emissions in the transport of raw materials.
- With the cooperation of suppliers, we are collecting data on CO₂ emissions produced in the procurement and processing of raw materials. This not only improves the accuracy of our CO₂ emissions calculations, but also allows us to offer various support to suppliers by gaining an understanding of CO₂ emissions volumes at their sites, which can then be reflected in lifecycle CO₂ emissions reductions of Kao products.

Efforts in development, manufacturing and sales

Local communities Retailers

Efforts in the development stage

When deciding to launch new and improved products, we verify that the products satisfy environmental standards. At the same time, we evaluate CO₂ emissions across the entire lifecycle. The results of these evaluations are used not only to determine product launches, but are also incorporated in future product development.

Kao products with small environmental impact display the "eco together" logo. Our rigorous certification standards require products to reduce lifecycle CO₂ emissions compared with comparable standard products and clear at least one of the certification criteria that we have set.

Efforts in manufacturing (plants, offices, logistics centers)

Despite the following activities, scope 1 and scope 2 CO₂ emissions volumes at Kao have increased by 6.0 thousand tons and 12.9 thousand tons, respectively, year on year.

1. Efforts to reduce energy consumption

- Introduction of high-efficiency equipment, efficient operation of equipment
Continuing from the previous year, equipment such as chillers, air conditioners and compressors were replaced with Best Practice Technologies (BPT) equipment in 2017. A gas cogeneration system was additionally installed in the Kao Indonesia Chemicals plant.

Through optimized control using multiple units of air conditioners and compressors, we are more efficiently operating equipment corresponding to fluctuating demand.

In addition, we are switching lights to LED around the world. Plants, logistics centers and offices in Japan have switched 86% of their lights to LED in total, which reduces CO₂ emissions by approximately 4.0 thousand tons annually. Affiliated companies outside Japan are also proactively switching to LED lights.

- Eliminating wasted energy

As in the previous year, in 2017 we continued to take steps to find areas with wasted energy, reduce energy use to the minimum required and use unused energy in other processes. For example, Kao Industrial (Thailand) has contributed to saving energy by reusing high-temperature waste heat from a reactor in its boiler.

Aiming to improve the efficiency of steam use, we are continuing to strengthen our steam trap maintenance and increase the amount of steam we recover. We are also actively implementing improvement activities at sites to reduce the amount of required energy, including lowering the set temperature of tanks and shortening operating times.

Eliminating wasteful use of energy at offices is another activity. Some of the steps we are taking include turning off unnecessary lights, using person sensors to automatically turn lights on and off, optimizing air conditioner temperature settings and encouraging people to take the stairs to reduce unnecessary elevator use.

We undertook 204 of energy-saving activities at Japanese plants and offices in 2017, resulting in approximately 7,558 tons of CO₂ reductions and 379 million yen of cost reductions for the year.

2. Efforts to use cleaner energy

- Clean-burning fuel

Gas fuel, especially natural gas, is the cleanest fossil fuel. We use natural gas at all plants outfitted with the necessary infrastructure. Our plants do not use any coal.

- Use of renewable energy

Kao-owned facilities, such as Kao Corporation's Wakayama Research Laboratories building and the Atsugi Logistics Center, have begun installing solar power generation panels (total electricity generation of 459 MWh). In 2017, we studied installation of a solar photovoltaic power system on a new building at our Ehime Plant and plan to put the system into operation in 2018.

Kao companies in Europe have also begun purchasing renewable energy. Four subsidiaries including Kao Chemicals GmbH in Germany and Molton Brown in the UK have converted all purchased power to renewable energy sources (30.3 GWh). Using this power from renewable energy has



Solar photovoltaic panel installed on the roof of the Logistics Center

reduced CO₂ emissions by 15.4 thousand tons.

- Use of power with low GHG emission factors
To reduce the CO₂ emissions of the purchased power we use, we take GHG emission factors into consideration when selecting power suppliers.

3. Reducing the volume of leaked refrigerants and other greenhouse gases

Air conditioners and chillers used in manufacturing are charged with fluorocarbon that has extremely high global warming potential (GWP). To reduce the volume of fluorocarbon leaks from equipment, we have been strengthening our regular equipment inspections.

In addition, we are switching newly installed chillers to those that use low-GWP refrigerant. We installed three systems that use low-GWP refrigerant in Japan.

These systems use R-1233zd(E), an HFO refrigerant, which is readily broken down in the atmosphere. Compared with R-134a, an HFC that is the standard refrigerant for chillers and has a GWP of 1,300, R-1233zd(E) has a GWP of 1, the same as CO₂, and offers excellent performance.

Efforts in distribution

[Distribution companies](#) [Retailers](#)

1. Increase shipment volumes per shipment

We are proactively making adjustments including improving loading efficiency, changing product sizes and using larger vehicles.

2. Shorten shipping distances

We are continuing to look at ways to revise shipping routes, optimize manufacturing plants and shift which logistics center is used.

3. Use cleaner shipping methods

We are pursuing steps such as switching from truck to shipping methods such as rail and ship, which have lower CO₂ emissions (modal shift).

4. Improve loading ratios

Having trucks return from their shipping destination with a load, instead of returning empty after unloading, i.e., improving the loading ratio, contributes to improving energy efficiency and CO₂ emissions in shipping. Together with AEON Global SCM Co., Ltd., a consolidated subsidiary of AEON Co., Ltd., which handles logistics, we have adopted a trailer relay transportation system in which drivers switch the trailers they are hauling at a relay point midway between the delivery and return points of the Tokyo metropolitan area and the Chubu region. This is the first such collaboration between companies of different industries in Japan.



Containers featuring a design with the corporate colors of AEON and Kao publicize this initiative

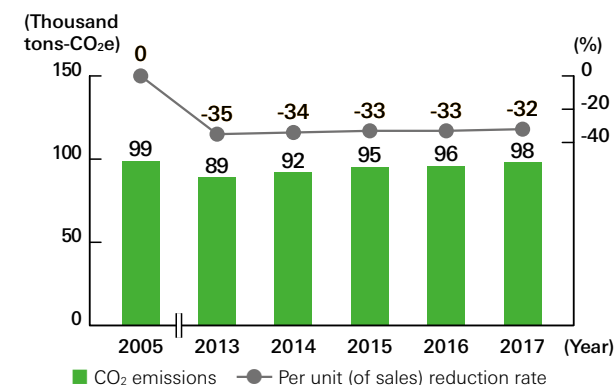
5. Visually map shipping energy and CO₂ emissions outside Japan

In 2017, we made preparations to begin calculating shipping energy and CO₂ emissions outside Japan starting in 2018, including developing a calculation tool and holding informational sessions in Tokyo to explain how to make calculations to affiliated companies. Currently, we calculate and report CO₂ emissions for shipping outside Japan using estimates. In 2019, we plan to report volumes based on actual shipping data.



→ p. 71, Conservation > Product lifecycle and environmental impact

CO₂ emission during distribution (Japan)



*Boundary: Kao Corporation and Kanebo Cosmetics Inc.

*Assurance provided for CO₂ emissions.

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

CO₂ emissions during distribution in Japan were 98 thousand tons-CO₂e in 2017, a 32% reduction (per unit of sales, 2005 baseline). One of the main reasons for this result was the increase in the sales share of products that have a large volume relative to their weight.

Efforts during use

Consumers and others

We offer a wide selection of products that reduce CO₂ emissions during the use stage.

Some of these leading products include concentrated laundry detergents that only require one rinse cycle, and shampoo, body wash and dish detergent that reduce the amount of hot water required for rinsing.

One example of a product that has reduced lifecycle CO₂ emissions is *Ultra Attack Neo* laundry detergent, which reduces lifecycle CO₂ emissions per laundry load by approximately 22%. This product was the first proposed laundry detergent to require only one rinse cycle and has changed how consumers do laundry, so much that now washing machines come with a button to select a single rinse cycle as a standard feature. This product requires only one rinse cycle and is 2.5 times more compact than existing standard detergents. Laundry detergents that require only one rinse cycle are offered in Japan, China, Hong Kong, Malaysia, Singapore and Australia.

Another novel product we offer is shampoo that can reduce the electricity used to dry hair with a hair dryer. This shampoo prevents tangles of hair, making it easier for heated air from the hair dryer to penetrate hair and shorten the drying time.

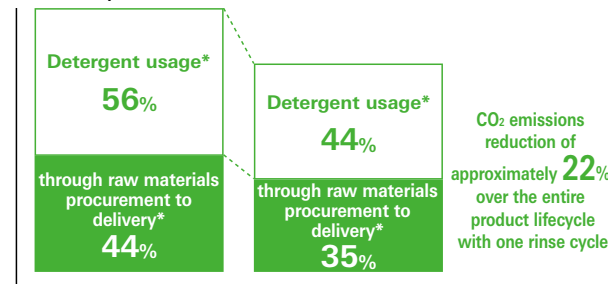
We also offer a wide selection of products for industry that allow customers to reduce their CO₂ emissions during the use stage. These include a

toner with low-temperature fixing, which reduces the photocopier's power consumption, washing and rinsing agents that can wash and rinse steel plates at low temperature to reduce CO₂ emissions from fuel consumption, a water-based precision substrate cleanser that replaces fluorocarbon-based cleansers, an additive for coating material that helps improve fuel economy by reducing the coating weight of wire harnesses for automobiles, and an additive essential to improving dispersion of a required material for fuel-efficient tires to demonstrate their performance.



→ p. 98, Community > Communication with corporate customers (Chemical Business)

Comparison of CO₂ emissions from detergent used per load of laundry



Existing standard Kao liquid detergent (Product container: Refill pack= 2:8)

Ultra Attack Neo (Product container: Refill pack= 2:8)

*Includes some waste and recycling.

(Under conditions of using a fully automatic washing machine (8-kg capacity), 4 kg of laundry, and a water volume of 47 l. When using two rinse cycles, the total water volume is 130 l and electricity use is 67 Wh. When using one rinse cycle, the total water volume is 102 l and electricity use is 52 Wh. CO₂ emissions of Kao's existing standard liquid detergent is set as 100.)

Efforts in disposal and recycling

Government/treatment and service providers

There are two main types of CO₂ emissions in the disposal and recycling stage. One type is the CO₂ emitted as materials and ingredients made from petroleum degrade when packaging, diapers and other materials disposed of by consumers after use are incinerated, or when wastewater containing cleansing and other agents is treated. The other type is CO₂ emitted from using energy required to operate incinerating and recycling equipment and wastewater treatment facilities.

We are working to reduce the raw materials used in packaging and diapers as well as cleansing agents to reduce these CO₂ emissions. We are also using biomass and bioplastics. The CO₂ emitted when these materials degrade is not deemed to contribute to global warming.



→ p. 66, Conservation > Packaging