Kao's approach

In the Paris Agreement adopted in 2015, citizens of the Earth agreed to work together toward pursuing efforts including keeping the global rise in temperature to less than 2°C above pre-industrial levels, reducing the temperature to 1.5°C, improving adaptability, and so on. As a citizen of the Earth, we at Kao are promoting efforts to reduce our impact at all stages of the product lifecycle with our business partners and consumers. Furthermore, we offer products that contribute to adaptability.

Kao's creating value to address social issues

Social issues we are aware of

According to the World Meteorological Organization, in 2018 the average global temperature rose by 0.98°C compared to levels prior to the Industrial Revolution, and has been at an all-time high for four consecutive years since 2015. It was reported in the 1.5°C Special Report announcement by the IPCC* in October of 2018 that if the current situation continues, there is a high likelihood that temperatures will rise above 1.5°C between 2030 and 2052, and that in order to keep temperatures from rising above 1.5°C, it would be necessary to reduce total CO_2 emissions to zero by around 2050, among other measures.

Unusual weather is already occurring due to global warming, and with this threat expected to grow in the future, the immediate implementation of measures toward adaptation is required.

* IPCC
Intergovernmental Panel on Climate Change
An organization was established by the United Nations Environment Programme and the World Meteorological Organization in 1988 for the purpose of conducting comprehensive evaluations from scientific, technical, and socio-economic perspectives regarding climate change, its impact, adaptation and mitigation measures.

Kao's creating value

In order to reduce greenhouse gas emissions associated with our business activity, we have set reduction targets at our plants and other facilities, and are continuing activities which improving energy efficiency and turning energy used into green energy. Additionally, as part of our product lifecycle analysis, we are carrying out activities that reduce raw material procurement and use during necessary stages, waste during each stage, as well as greenhouse gas emissions.

We are working to enrich the lives of people and contribute to the sustainability of society by providing products that respond to changing consumer lifestyles in light of climate change, and that are environmentally conscious in response to transitional and physical risks.

Contributions to the SDGs

Risks and opportunities related to realization of our vision by 2030

We have developed its own scenario based on the 2°C scenario for assessing risk and opportunity.

In addition, formulating brief 1.5°C scenario*1 and NDC scenario*2, the company assesses the qualitative magnitude of risk and opportunity changes regarding the 2°C scenario.

*1 1.5°C scenario
Scenario based on the emission path shown in the IPCC 1.5 Special Report.
*2 NDC scenario
Scenario based on the GHG reduction target decided by participating countries based on Paris Agreement Article 4. The NDC is the draft of Intended Nationally Determined Contribution (INDC) submitted to the UNFCCC secretariat (UN Climate Change secretariat) before ratification of the Paris Agreement. Its implementation is required after 2020.

Risks and opportunities related to realization of our vision by 2030

Items			Content	2°C scenario			2°C scenario comparison	
				Short-term (until 2020)	Mid-term (until 2025)	Long-term (until 2050)	1.5°C scenario	NDC scenario
Risks	Transitional risk	Policies, legal restrictions	By introducing an emissions trading system and a carbon tax in plant location areas, there is a risk that profits will decrease as equipment and operational costs increase through improving equipment to reduce the amount of activity concerning these regulations. Moreover, if these regulations limit production there is a risk that sales may decrease. Once a carbon footprint system for products is established, there is a risk that profits will decrease as management costs increase to handle it.	Minor	Major	Major		
		Technology	As product research and development costs grow to meet the rapid changes in product demand associated with climate change, there is a risk that profits may decrease due to an increase in operating expenses. Furthermore, if technology development fails, there is a risk that sales goals cannot be achieved.	Minor	Major	Major		
		Markets	There is a risk that sales growth may not go according to plan if unable to respond appropriately to rapid changes in product demand due to climate change, and a risk that profits may decrease if product demand differs from region to region and developmental costs increase. On the other hand, there is also a risk that fossil fuel use will increase the cost of fossil-derived raw materials and profits will decline.	Medium	Major	Major		
		Reputation	There is risk of reputation decline from an inadequate response to the above risks or insufficient information disclosure.	Minor	Medium	Major	•No change to items where effort is necessary. •Greater impact on transitional risk.	•No change to items where effort is necessary. •Lesser impact on transitional risk.
	Physical risks	Acute	There is a risk that plant operation may stop and product production cannot be continued due to short-term droughts and floods caused by frequent heavy rainfall. If the same phenomenon occurs at the supplier factories, there is a risk that necessary raw materials cannot be procured, and as a result, product production cannot continue. Additionally, there is a risk that the supply chain from suppliers to our plants and from our plants to customers may be disrupted by the same phenomenon. These risks reduce sales because products cannot be supplied to the market or costs to respond increase, meaning profits decrease. Furthermore, if there is infrastructure damage due to the occurrence of massive floods associated with climate change, consumers' livelihoods may become severely restricted, meaning a decline in consumption and a risk that sales will decrease.	Medium	Major	Major		
		Chronic	If our plants or our suppliers' plants exist in areas where long-term drought may occur due to climate change, they will not be able to cope with the production increases required for future growth, and there is a risk that growth may be limited.	Minor	Medium	Major		
Opportunities	Resource efficiency		We continuously carry out the following activities, aiming to utilize resources more efficiently and reduce operating expenses. • Energy-saving activities at plants and on location and during the transport process / • Recycling waste created on location / • Enhancing energy use efficiency on location	Medium	Major	Major	•Lesser impact on physical risk. •Generally a greater impact on opportunity.	•Greater impact on physical risk. •Generally a lesser impact on opportunity.
	Energy sources		By expanding renewable energy use, we can achieve CO_2 and cost reductions in several countries. We have actively introduced solar panels and begun purchasing renewable energy-derived power, helping to reduce operating costs. Through the use of government subsidies, it is also possible to control investment.	Minor	Minor	Medium		
	Products, services		As part of its products that contribute to mitigating climate change, we offer consumers film packages which significantly reduce the amount of plastic, products like diapers that retain product functionality while reducing material usage, and water-saving products which include laundry detergents. Professional-grade products include various cleaning agents that prevent infectious disease, and industrial products such as low temperature fixing toner. Other products that contribute to mitigating climate change include concrete additives which will grow in demand with future infrastructure development as well as others like metal casting products.	Medium	Major	Major		
	Markets		Demand for products that contribute to greenhouse gas reduction is expected to grow. Additionally, as SDGs recognition continues to grow, we expect lifestyles, including product selection behavior, to move in a more ethical direction and to change as consumers' consumption habits shift. As global warming progresses, it is apparent that there is a tendency toward higher temperatures and an increased number of sunny days. Demand for UV care products as well as antiperspirants, etc. are expected to increase during summer.	Minor	Medium	Major		
	Resilience		Regardless of fossil or plant origin, we believe that unless we reduce our use of resource, it will not be possible to realize a One Planet Living vision for environmental sustainability. We are promoting the technology development and use of certified raw materials to reduce energy consumption, shift to renewable energy use, and reduce raw material usage.	Minor	Medium	Major		

Minor impact level: very little impact, Medium: small impact, Major: large impact

Policies

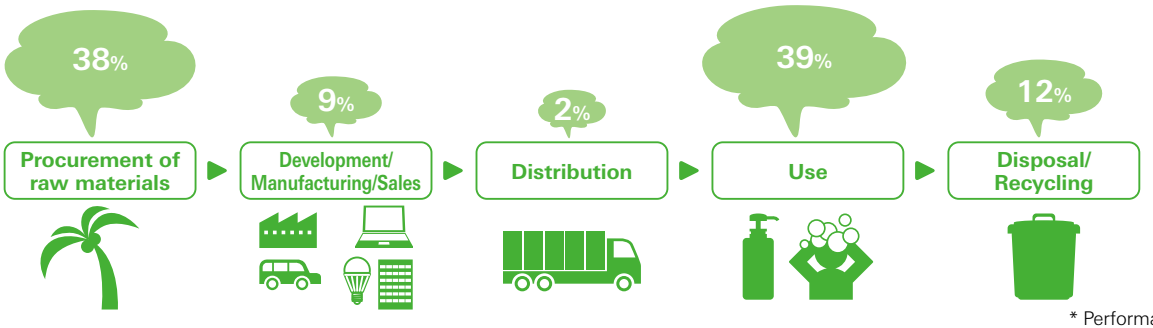
We are working toward climate change mitigation and adaptation at each stage of the product lifecycle. Mitigation is comprised of activities that contribute to the reduction of greenhouse gas emissions in order to reduce rising temperatures to less than 2°C or even 1.5°C. Adaptation is comprised of activities preparing for the impact of climate change, as temperatures have currently risen to almost 1°C higher than pre-Industrial Revolution temperatures and are expected to further rise.

We regard our amount of emissions (scope 1 + 2) associated with our own locational and sales activities as the most important issue, and are making an effort to reduce this amount.

Within each stage of Kao product lifecycles, 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 CO_2 emissions from facilities such as Kao plants accounts for a relatively small 9%, and it is notable that the 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 result of our analysis.

At the same time, we are taking steps to reduce CO_2 emissions as part of its "eco together" activities in collaboration with various stakeholders.

Ratio of CO_2 emissions at each stage of the Kao product lifecycle



* Performance in 2018

"eco together"

"eco together" with consumers

In order to reduce CO_2 at use stage, it is necessary not only to improve product functionality, but to use products in accordance with design specifications. For example, ultra-concentrated liquid laundry detergent, a water-saving product, requires only a small amount with each use and can clean with a single rinse, but it will not lead to water-saving and energy-saving expectations unless customers are aware of its usage.

Therefore, we strive to develop and provide high-performance products combined with awareness-raising activities.

"eco together" with business partners

We believe that sharing our views on the raw material (including contract manufacturers), transportation, and disposal stages will lead to a greater effect, and are promoting our "eco together" activities with several business partners.

"eco together" with society

Through introducing our efforts to reduce greenhouse gas emissions through the products it implements to society as well as working with it and seeking social approval, in addition to promoting activities that fall in line with government administration and other companies, our company believes that it can achieve a greater effect.

Framework

Risk management is carried out by the Internal Control Committee and opportunity management is carried out by the ESG Committee, under the supervision of the Board of Directors. Both of these committees are chaired by the President and CEO.

The Responsible Care Promotion Committee, which manages policy/regulatory regime and technology risks, and the Risk and Crisis Management Committee, which manages market, reputational and acute risks, are under the Internal Control Committee. These committees are headed by the executive officer in charge of the Corporate Strategy.

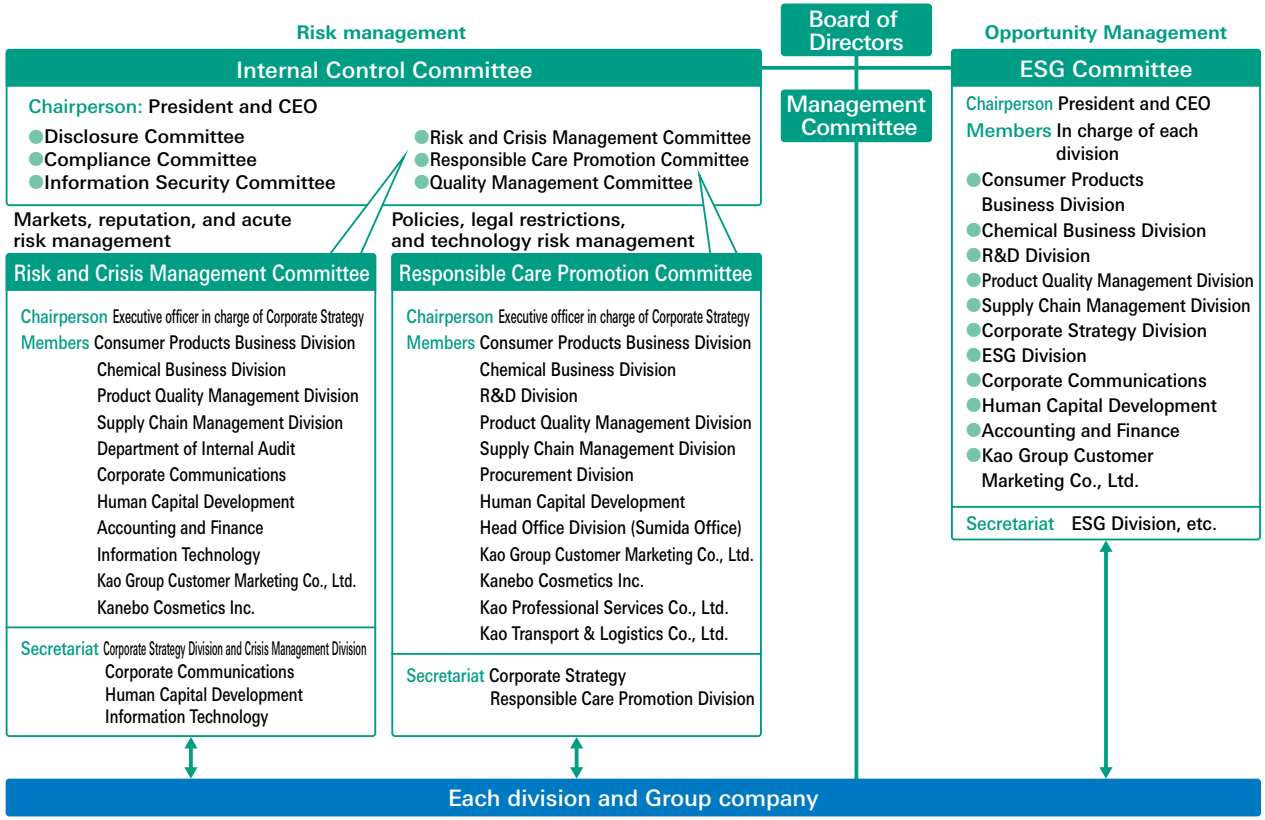
The Responsible Care Promotion Committee of Corporate Strategy Division is in charge of the Responsible Care Promotion Committee Secretariat while the Crisis Management Department of Corporate Strategy Division acts as the Risk and Crisis Management Committee Secretariat.

The Responsible Care Promotion Committee meets twice a year to report on and discuss compliance with laws and regulations, status of CO_2 reduction and other matters. It also sets targets for the following year. The Responsible Care Promotion Committee conducts monthly checks on compliance with laws and regulations, monitors CO_2 emission and water use, mainly at plants which have a large impact, and keeps abreast of the amount of chemical substances in wastewater, reporting on these and other matters to the head of the committee, committee members, members of the Internal Control Committee, auditors and others. The Risk and Crisis Management Committee which manages natural disaster and reputational risks, meets four times a year.

The Internal Control Committee meets one or more times a year, receiving activity reports from the Responsible Care Promotion Committee and the Risk and Crisis Management Committee which it oversees and auditing the activities of the two committees.

Opportunity management relating to climate change issues is handled by the ESG Committee, which meets four times a year. Committee members are the persons in charge of the business, sales, R&D, SCM and other divisions, an arrangement which connects divisions horizontally. The Internal Control Committee, and the ESG Committee which it supervises, discuss climate change and environmental issues as well as social and governance issues.

Risk and opportunity management systems regarding climate change



* As of December 2018.

Mid- to long-term targets and performance

2020 mid-term targets

In 2013, we set the 2020 targets for energy consumption and greenhouse gas emissions pertaining to all Kao Group sites and have aimed to achieve a standard 1% reduction each year.

In 2009, we set the 2020 reduction targets for CO_2 emissions pertaining to the entire product lifecycle for the 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	2018 targets	2019 targets	2020 targets
Energy consumption	All Kao Group sites	33% reduction	34% reduction	35% reduction
GHG emissions		32% reduction	33% reduction	35% reduction
CO_2 emissions	Across the entire product lifecycle for the Kao Group in Japan	—	—	35% reduction

Anticipated benefits from achieving mid- to long-term targets

Cost reductions or profit increase

Achieving targets (for energy consumption and greenhouse gas emissions) for all sites in the group leads to better profits as they contribute to the reduction of business activity operating costs. Additionally, the reduction of CO_2 emissions across product lifecycles can be achieved by reducing raw material use and increasing sales of products with low CO_2 emissions during usage, leading to reduced operating costs and sales growth.

Impacts on society

By achieving the above goals, we can reduce greenhouse gas emissions and contribute to reducing the impact of global warming. Additionally, products with low CO_2 emissions during usage can contribute to reduction in consumer spending because they consume less energy and water. Furthermore, they are also effective in reducing the burden of social infrastructure maintenance and renewal concerning energy, water and sewage system.

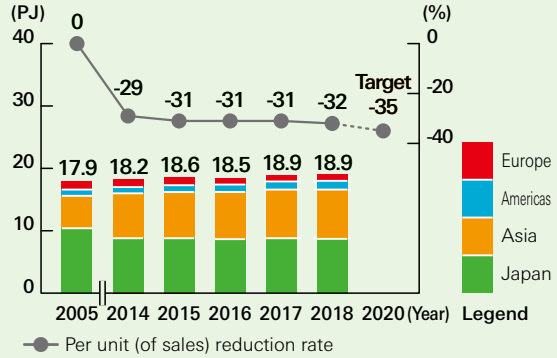
2030 long-term targets

Items	Scope	2030 long-term targets
GHG emissions (absolute quantity)	All Kao Group sites	22% reduction (Compared to 2017)
Energy consumption (Per sales unit)		1% reduction yearly (year-on-year, from 2021)
Purchased power		100% renewable sources
CO_2 emissions (absolute quantity)	Across the entire Kao Group product lifecycle	22% reduction (Compared to 2017)

Performance in 2018

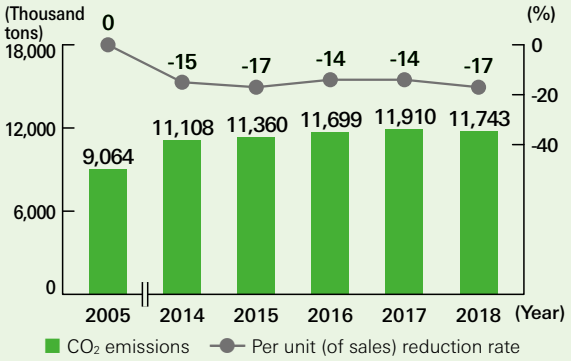
Performance*

Energy consumption☑ (all sites)



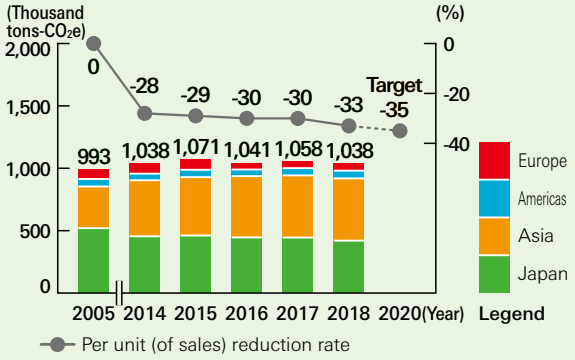
* Boundary: All Kao Group sites including company cars.
* Assurance provided for energy consumption figures.

CO_2 emissions across the entire product lifecycle ☑ (Kao Group)



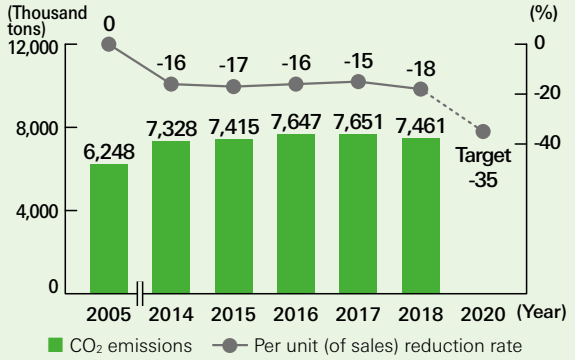
* "CO_2 emissions across the entire product lifecycle" is calculated as the combined total for the amount of lifecycle CO_2 emissions of individual products sold within and outside Japan, multiplied by their annual sales quantity. Among the lifecycle, the estimated emissions from the manufacturing and 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 CO_2 emissions figures and per unit (of sales) reduction rates.

GHG emissions☑ (all sites)



* Boundary: All Kao Group sites including company cars.
* Gases included: The seven GHGs specified by the Kyoto Protocol (only CO_2 for sites outside Japan)
* Assurance provided for GHG emissions figures.

CO_2 emissions across the entire product lifecycle☑ (Kao Group in Japan)



* "CO_2 emissions across the entire product lifecycle" is calculated as the combined total for the amount of lifecycle CO_2 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 CO_2 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.

Reviews of performance

CO_2 emissions across the entire product lifecycle in Japan decreased by 68 thousand tons-CO_2 over the previous year, and the per unit (of sales) reduction rate improved by 3 points to 17% (2005 baseline) over the previous year. CO_2 emissions across the entire product lifecycle in Japan were reduced by 190 thousand tons-CO_2 over the previous year, and the per unit (of sales) reduction rate improved by 3 points to 18% (2005 baseline) over the previous year. The main cause was the expansion of our lineup of single rinse laundry detergents. While energy consumption per unit of sales reduction rate at all Kao Group sites increased from the previous year to a 32% reduction, we did not achieve the reduction target of 33%. GHG emissions per unit of sales reduction rate at all Kao Group sites increased from the previous year to a 33% reduction, and achieved the reduction target of 32%.

We offer a wide selection of household products such as water-saving products that reduce CO_2 emissions during the use stage, and also provide various industrial-use products that do the same. However, the CO_2 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 CO_2 emissions listed on p. 37. Including these reductions, the contributed lifecycle CO_2 emission reduction was 3,961 thousand tons*.

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 reduced lifecycle CO_2 emissions of the Kao product in Japan, compared with the standard product as of 2005. The scope includes industrial-use products and household products.

Kao's approach

Scope 1 CO_2 emissions☑ (Thousand tons-CO_2e)

	2016	2017	2018
Japan	272	271	263
Asia	291	290	291
Americas	39	43	49
Europe	47	49	49
Total	649	653	652

Scope 2 CO_2 emissions☑ (Thousand tons-CO_2e)

	2016	2017	2018
Japan	169	173	157
Asia	200	208	207
Americas	14	14	14
Europe	8	9	9
Total	391	405	386

* Emissions 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.

Purchased electricity, steam, etc. (terajoules)

	2016	2017	2018
Electricity	7,272	7,648	7,260
Heat	0	0	0
Steam	132	140	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).

Fuel consumption by fuel type (terajoules)

	2016	2017	2018
Natural gas	8,915	9,047	9,123
Diesel oil	1,375	1,383	1,331
Gasoline	162	149	135
Other	111	128	145
Waste vegetable oil (heat recovery)	517	486	553

Scope 3 CO_2 emissions (Thousand tons-CO_2e)

	2016	2017	2018
1. Purchased goods and services*1☑	4,134	4,496	4,430
2. Capital goods	262	239	269
3. Fuel- and energy-related activities (not included in scope 1 or scope 2)	22	29	27
4. Upstream transportation and distribution*1☑	242	253	253
5. Waste generated in operations*1	47	58	60
6. Business travel	4	4	4
7. Employee commuting*1	18	18	21
8. Upstream leased assets	0	0	0
9. Downstream transportation and distribution*1	94	97	106
10. Processing of sold products	113	119	119
11. Use of sold products*1☑	4,965	4,687	4,570
12. End-of-life treatment of sold products*1☑	1,317	1,415	1,452
13. Downstream leased assets	0	0	0
14. Franchises	0	0	0
15. Investments	7	8	8
Total	11,225	11,423	11,319

* 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.

Collaboration with stakeholders

"eco together" with consumers

We participate in environmental events hosted by local governments and distribution companies, and carries out awareness-raising activity.

- To make consumers aware of products with less environmental impact, the "eco together" logo is affixed to the relevant products.
- Our "Let's eco together" booklet, which tells consumers about our commitment to the environment, was created and distributed at various environmental events.

"eco together" with business partners

- Participation in the Green Value Chain Platform and 2°C Target Network Corporate Edition administered by the Ministry of the Environment, offering Kao's Scope 3 efforts as an example and contributing to the calculation of Scope 3 emissions by corporate consumers.
- Over 10 years of continuous participation in the CDP Supply Chain Program. We give corporate evaluations and feedback based on responses, and promote supplier CO_2 reduction activities.
- Collaborating with packaging suppliers to develop packaging that contributes to CO_2 reduction.
- Carrying out collaborative transportation efforts.

"eco together" with society

- Participation in the Japan Climate Initiative and the spread of information and opinion exchange on climate change measures promoted by various constituents besides the national government.
- Cool Choice awareness, promoted by the Ministry of the Environment, and the contribution to lifestyle change for consumers toward decarbonization.
- Participation as a member of the LCA Working Group organized by the Japan Chemical Industry Association (JCIA). Publicly disclosing corporate carbon lifecycle analysis (c-LCA) to communicate contributions to CO_2 reductions from the use of chemical products.
- Environment communication at the Kao Eco-Lab Museum.

Our initiatives

Efforts in raw materials procurement

Mitigation

We recognize that stopping and restoring deforestation has the same effect as reducing one-third of greenhouse gas emissions. In addition, we recognize that there are risks in sustainable development regarding the deterioration of biodiversity and human rights issues of local workers, and we support zero deforestation of habitats during the procurement of palm oil, paper, and pulp, among other things, by 2020.

As part of this effort, we have participated in the CDP "Forest" Supply Chain Program since 2018. We expect suppliers to begin sustainable and responsible procurement of palm oil, paper, pulp and more, which includes procurement preventing deforestation.

In 2009, we became the first Japanese company to participate in the CDP Supply Chain Program. From 2017, in expectation that our suppliers will become more active toward promoting CO_2 reduction activities, we have been evaluating CO_2 reduction activities and have been working to provide the results of these evaluations back to our suppliers. As a result, supplier effort is increasing each year.

In collaboration with suppliers, we are reducing CO_2 emissions from the manufacture of packaging by using renewable and recycled resins and thinner cardboard.

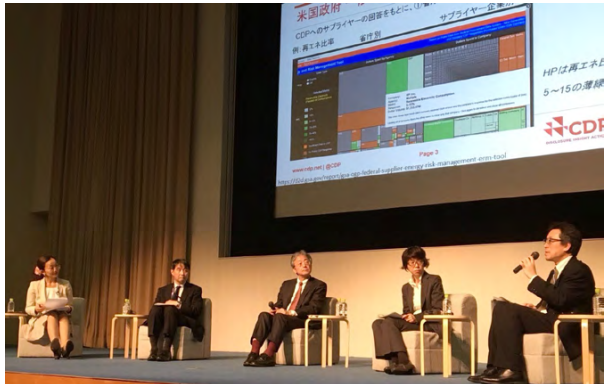
By optimizing the volume and frequency of raw materials deliveries, we are reducing CO_2 emissions in the transport of raw materials.

With the cooperation of suppliers, we are collecting data on CO_2 emissions produced in the procurement and processing of raw materials. This not only improves the accuracy of our CO_2 emission calculations during the raw material procurement process, but also allows us to offer various support to suppliers by gaining an understanding of CO_2 emissions at their sites, which can then be reflected in lifecycle CO_2 emissions reductions of Kao products.

➡ p. 139 Corporate Culture > Sustainable and responsible procurement

Adaptation

Due to climate change, unusual weather is occurring in different places. For instance, there is an increase in short-term frequent heavy rain. In order to highlight the importance of suppliers' awareness toward putting a system for water risk in place against river to be aware of the need to put in place a system for water risk against flooding of rivers and sewage systems caused by heavy rain, we have been a participant of the CDP "Water" Supply Chain Program since 2015.



Kao employees participated as panelists in the Ministry of the Environment and CDP co-sponsored Supply Chain Asia Summit 2018.

Developmental efforts

Mitigation

When deciding to launch new and improved products, we verify that the products satisfy the environmental standards outlined by the Design for environment guidelines. At the same time, we evaluate CO_2 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.

Especially regarding products that require water during usage, we are aware that the process of water production and treatment post-use requires much energy and generates CO_2, and are actively promoting the development of water-saving products. Furthermore, as products like shampoos that use hot water generate more CO_2 as part of the process of producing hot water, the water conservation of products that require hot water is more effective.

➡ p. 27 Conservation > Initiatives for the environment

Adaptation

As global warming progresses, it is apparent that there is a tendency toward higher temperatures and an increased number of sunny days. Demand for UV care products as well as antiperspirants, etc. are expected to increase during summer, and we are actively promoting developments of these products due to these expectations. Additionally, as the probability of droughts occurring increases, the demand for water-saving products is also expected to increase.

Moreover, it is predicted that there will be a significant restriction on resources, and we are now focusing on the development of our surfactants (Bio IOS), which use a biomass that doesn't compete with food, making it highly efficient.

The investment and cost of environmentally-friendly research and development in response to climate change in 2018 was 347 million yen and 3,913 million yen, respectively.

Our Technology Innovation Presentation will announce new technologies to reduce the complete lifecycle CO_2 emissions.

Efforts in manufacturing (plants, offices, logistics centers)

Mitigation

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 2018. 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. Our plants, logistics centers and offices in Japan have accomplished plans announced in 2015, reducing CO_2 emissions by approximately 4.65 thousand tons annually. Affiliated companies outside Japan are also proactively switching to LED lights.

• Eliminating wasted energy

As in the previous year, in 2018 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.

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 heat-insulated tanks and shortening operating times.

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 219 energy-saving activities at Japanese plants and offices in 2018, resulting in approximately 5,496 tons of CO_2 reduction and 140 million yen in cost reduction 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

We are promoting the introduction of solar panels at each of our Kao-owned facilities. During 2018, operations were Ehime Plant (total generation 318 MWh), Kao Penang Group (total generation 179 MWh), Kao Industrial (Thailand) (total generation 8,401 MWh), Kao Corporation Shanghai (total generation approximately 300 MWh), and Kao USA (total generation approximately 50 MWh), and we are promoting solar panel installation at our Tochigi and Toyohashi plants.

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). In Japan, our Odawara Plant started purchasing renewable power from June, and our Tochigi, Kashima, Kawasaki, and Ehime plants started purchasing renewable power in October. As a result, the Ehime Plant derived of its energy from renewable energy. Using this power from renewable energy has reduced CO_2 emissions by 27.4 thousand tons.

• Use of power with low GHG emission factors

To reduce the CO_2 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 CO_2, and offers excellent performance.

Despite these activities, scope 1 and scope 2 CO_2 emissions at Kao have decreased by 1 thousand tons and 19 thousand tons, respectively, in 2018.

Adaptation

With rising summer temperatures, heat stroke prevention is essential in Japan. Especially for our outdoor workers, we have taken measures such to share the day's heat index, shorten continuous working hours, and prepare drinking water.

Additionally, as new water risks are likely to emerge with climate change, annual water risk surveys are conducted at our plants.

➡ p. 48 Conservation > Water

Solar power is installed at the Kao Industrial (Thailand) plant

Efforts in distribution

Mitigation

CO_2 emissions during distribution in Japan were 97 thousand tons-CO_2 in 2018, 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.

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 CO_2 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 CO_2 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 in 2017. This was the first such collaboration between companies of different industries in Japan.

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

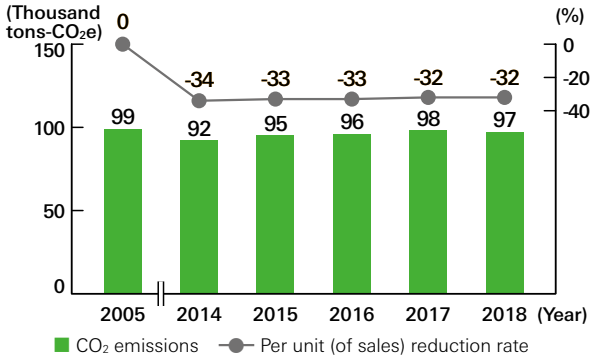
5. Visually mapping shipping energy and CO_2 emissions outside Japan

We had been making preparations to begin calculating distribution-related energy usage and CO_2 emissions outside Japan starting from 2018. However, the calculation and reporting of distribution-related CO_2 emissions outside Japan for 2018 has been based on estimates. It is anticipated that, for 2019, it will be possible to report amount based on actual distribution data.

Adaptation

When short-term and local heavy rains intensify, there is a break in the supply chain from Kao's plants to consumers where products are undeliverable, and if a long-term detour route is adopted, there is additional risk that the environmental load will increase. When risks appear, in order to take appropriate measures in a short amount of time, subsidiaries are charged with managing product transport to our main market in Japan.

CO_2 emission during distribution☑ (Japan)



* Boundary: Kao Corporation and Kanebo Cosmetics Inc.
* Assurance provided for CO_2 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.

Efforts during use

Mitigation

We offer a wide selection of products that reduce CO_2 emissions during the use stage.

Some of these leading products include ultra-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 CO_2 emissions is our *Attack Neo* laundry detergent that Kao first put on the market in 2009, which reduces lifecycle CO_2 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. The content of this product is 2.5 times more compact than existing standard detergents.

Laundry detergents that require only one rinse cycle are offered in Japan, Taiwan, Singapore and Australia.

In 2019, we launched *Attack ZERO*, a concentrated liquid clothing detergent based on the Bio IOS, the highest cleaning base in our history, which redefined cleaning concepts prior to its release. We aim to further expand our one rinse cycle laundry detergents.

Additionally, we offer shampoos and other products that prevent hair from tangling, making it easier for heated air from hair dryers to penetrate hair and shorten drying time, reducing their energy consumption.

We also offer a wide selection of products for industry that allow customers to reduce their CO_2 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 CO_2 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.

Attack ZERO
This concentrated liquid detergent for clothing can easily be dispensed with on hand with the new container's "one hand push", while keeping its washing and deodorizing power with zero residue left behind.

Essential Smart Blow-Dry
Prevents hair from getting tangled and cuts 20% of dryer time through improving the direction of dryer air.

Adaptation

As global warming progresses, it is apparent that there is a tendency toward higher temperatures and an increased number of sunny days. Demand for UV care products as well as antiperspirants, etc. are expected to increase during summer. Additionally, as the probability of droughts occurring increases, the demand for water-saving products is also expected to increase.

In case the misfortune of natural disaster should occur, we launched our *sonaeru* website in December 2017, which contains useful daily necessities and other information that focuses on introducing sanitary and hygienic products for use during evacuation measures.

➡ Kao *sonaeru* website
www.kao.co.jp/hisaiji/ (Japanese)

Efforts in disposal and recycling

Mitigation

CO_2 emissions in the disposal and recycling stage consist of the following two types. One type is the CO_2 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 CO_2 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 CO_2 emissions. We are also using biomass and bioplastics. The CO_2 emitted when these materials degrade is not deemed to contribute to global warming.

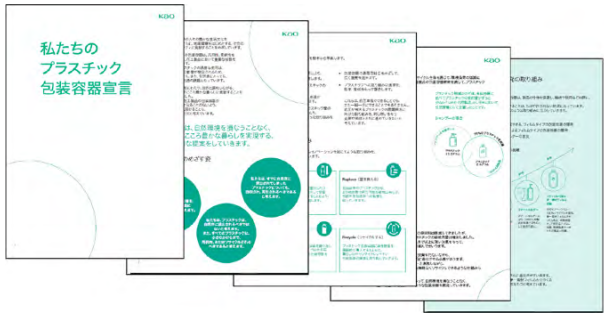
Adaptation

While the population increases in the future, it is predicted that there will be a significant restriction on resources in light of the Paris Agreement, and we are now focusing on the development of high performance surfactants (Bio-IOS), using a biomass that doesn't compete with food, as well as our Package RecyCreation, which aims to zero marine plastic, utilize recycled plastic and eliminate residual liquid in containers.

In addition, our policy on plastic containers and packaging is disclosed in our "Statement regarding our plastic packaging", and furthermore we are working to actively respond to the promotion of open innovation among other measures.

➡ p. 79 Conservation > Packaging

➡ Statement regarding our plastic packaging
www.kao.com/global/en/sustainability/environment/statement-policy/eco-friendly-products/plastic-packaging/



Statement regarding our plastic packaging

Topic

Active exchange with external organizations

In 2018, we introduced our environmental efforts to several external organizations. Furthermore, we opened up opinion exchanges at seminars and training sessions.

- **TCFD Research Gathering participant**
We participated as a member of the TCFD Research Gathering on the Ministry of Economy, Trade, and Industry Green Finance and the disclosure of corporate information.

- **Supporting the OSLO Climate Leadership Declaration**
Aiming to promote corporate climate change initiatives, we made a statement of our support.

- **Taranoa dialogue**
As one of COP24's main agendas, our efforts were introduced as one of Japan's examples as part of the Taranoa dialogue. In addition, our efforts were published on the Japanese Taranoa Dialogue website.

- **CDP-related seminars and training sessions**
We held our Kao In-house Seminar in response to requests from our suppliers. For the purpose addressing requests and going over answer methods according CDP Japan, we introduced energy saving methods that the company is conducting toward reducing our suppliers' GHG.