Philosophy, strategy & framework

Zero waste 102-15, 103-1, 103-2, 103-3, 306-1 (Waste 2020)

Inspired by a philosophy of avoiding unnecessary waste, we aim to contribute toward the realization of a zero waste society by ensuring that used products and product packaging are utilized to the maximum possible extent, if necessary by changing their function.

Kao's creating value to address social issues

Social issues we are aware of

Efforts to build high-level circular economic societies with high-level economic growth are increasingly needed throughout the world. Considering that the world's resources are limited, standards of living are rising, and the resources needed are steadily increasing as the global population continuously grows, the one-way economic models of the past will no longer support prosperous lifestyles and culture into the future.

In regions where social infrastructure (i.e., waste treatment systems) is not sufficiently developed for the increases in the amount of waste generated including household waste, there are numerous instances of environmental pollution due to waste being dumped or insufficiently treated at disposal facilities. In addition, improper conduct by consumers after use results in waste dumped on land entering the oceans. Plastic in particular does not decompose naturally, and the volume of marine plastic waste continues to increase. Estimates are that by 2050, there will be more plastic in the ocean environment by weight than the weight of all the fish in the oceans. This marine plastic is starting to have detrimental impacts on marine ecosystems.

To keep the temperature rise due to climate change under 1.5°C, consumption of fossil fuels must

be drastically reduced. Consequently, production of fossil-based plastics may fall dramatically compared to current levels. It is clear that existing plastic containers made with large amounts of fossil-based plastic are not sustainable.

Although fossil fuel usage fell in 2020 due to the impact of the COVID-19 pandemic, it will be necessary to keep fossil fuel use under control and address the rising demand for plastics in order to strike an appropriate balance between fostering economic recovery and the transition to a decarbonized society. In light of this situation, we recognize the growing importance of reducing plastic usage and of recycling.

Currently, because there is a stable supply of plastic products and packaging, and because they are reasonably priced, lightweight, multi-functional and corrosion-resistant, they play an indispensable role in realizing consumers' Kirei Lifestyle. However, because plastic products and containers are mostly made from fossil fuels, if they are not disposed of properly after use they can cause environmental problems.

An additional issue is that, currently, around one-third of all food produced in the world is thrown away as waste. Given that around 8% of annual GHG emissions derive from food waste, there is a clear need to reduce the amount of food that is wasted.

In 2021, we supplied products that included 106 thousand tons of plastic packaging, such as bottles and film-type refill packs. We also generated 723 tons

of food waste.

We aim to help realize a zero waste society, not only by minimizing the resources used in all processes from new product development through to disposal of used products, but also by trying to ensure that, after use, all products are reused, recycled, or effectively utilized in some other way. We also believe that, in cases where it is unavoidable for something to be disposed of as waste, it should undergo appropriate treatment.

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Appendix

Risks related to realization of What Kao Aims to Be by 2030

Items	Contents
Policies, laws and regulations	Stricter regulations on the processing of waste generated at worksites, increased regulation on consumption of plastic packaging (mandatory use of recycled plastic, taxation), mandatory labeling of information on plastic use, etc.
Technology	Increased volumes of waste generated from worksites in conjunction with the manufacture of new products and unsuccessful attempts to develop technology for reducing plastic consumption or using recycled plastic
Markets	Higher disposal costs as a result of increases in the volume of waste generated in excess of disposal capacity throughout society, changes in consumer preferences, rising costs for virgin plastic or recycled plastic, increased consumption of hygiene- related product packaging due to enhanced consumer hygiene awareness resulting from the COVID-19 pandemic, etc.
Reputation	Criticism of the industry or of individual companies, stronger concerns among stakeholders, changes in consumer preferences, etc.

Opportunities related to realization of What Kao Aims to Be by 2030

Items	Contents			
Resource efficiency	Lower disposal costs as a result of decreases in the volume of waste generated from worksites and lower costs for packaging, better transportation efficiency, etc. as a result of reducing plastic consumption			
Products, services	Reduction in the volume of waste generated through the development of resource-saving products, higher sales due to expanded use of packaging using less plastic and development of innovative packaging, higher income due to licensing of development technology			
Markets	Higher sales due to improved access to new markets, use of public incentives for developing innovative technologies, etc.			
Resilience	Improved resilience through actively continuing to promote 3R activities for plastic packaging, and by providing even more environmentally friendly plastic packaging, rather than merely returning to the situation that existed before the COVID-19 pandemic			

Kao's creating value

We are continuously implementing 3R activities to reduce, reuse and recycle waste generated at plants, distribution sites and offices and with regard to products and packaging.

In the area of plastic packaging in particular, we are undertaking ongoing development and use of film packaging that reduces plastic usage by around 75%, and products in refillable film packaging are becoming popular in Japan. We are also rolling out these technologies to overseas group companies, making it possible to reduce the amount of plastic used in packaging.

Besides our efforts in regard to film packaging, we are also implementing initiatives to reduce plastic usage through the reuse of bottles.

Through effective coordination between the recycler and the manufacturer, we are getting used products recycled to create recycled products that are useful in consumers' daily lives. Working together with distributors, competitors, local government authorities and other stakeholders, we are putting in place a framework for the collection of used packaging. Having as many other stakeholders as possible participate in this initiative will help make the benefits even more substantial.

Furthermore, efforts to recover waste that has already been released into the environment greatly contribute to the protection of marine and land ecosystems.

Contributions to the SDGs



Policies

We believe that, in all processes from new product development through to disposal of used products, we should make an effort, as far as possible, to reduce the quantity of product that is subject to being disposed of and recycled, and that we should try to ensure that all waste, regardless of whether it is solid or liquid, is utilized in a way that is useful for society, with the ultimate goal of achieving a net zero waste society. As we see it, we should seek to maximize recycled resources, and when the generation of waste is unavoidable, it should be utilized appropriately.

Our Basic Principle and Basic Policies on Environment and Safety states that "We shall contribute to social sustainability by giving thorough consideration to environmental conservation and human safety in every aspect of our operations, including product development, manufacture, distribution, usage and waste disposal." Furthermore, the Kao Group Responsible Care Policy contains the following declaration: "We shall reduce, reuse and recycle waste and strive to continuously reduce environmental impact."

Our Environmental Statement embodies our commitment to ensuring that "Kao products utilize original Kao-developed technologies to minimize the impact they have on the environment, not just in the manufacturing process, but in the daily life of the customers who use them. From materials procurement and manufacturing, to distribution, sales, use and final disposal, we want to engage in 'eco together' with

stakeholders and consumers worldwide."

Zero waste 306-2 (Waste 2020)

With the aim of realizing these policies in concrete terms, in October 2018 we announced Our Philosophy & Action on Plastic Packaging, which clearly enunciates that our action on plastic packaging is driven by our 4R (reduce, reuse, replace, recycle) program based on continuous improvement and bold innovation.

In September 2019 we announced that, as part of our efforts to realize ESG-driven Yoki-Monozukuri, we would be taking responsibility for our products not only until they are sold, but until they are disposed of, and that we would be focusing heavily on Innovation in Reduction and Innovation in Recycling aimed at building the plastic resource circulating society. In May 2020, we established the Recycling Science Research Center in our R&D Division to drive business development with a plastic resource circulating model that incorporates RecyCreation. To realize our vision, we are collaborating with other business enterprises, local governments and universities as we seek to realize a resource-circulating society.

A further point is that food waste connected to our businesses is of relevance to Kao's beverage business. In regard to food waste, we are working to reduce the amount of waste generated as much as possible, and striving to ensure that when the generation of waste is unavoidable, this waste is recycled.





Our Philosophy & Action on Plastic Packaging www.kao.com/content/dam/sites/kao/www-kao-com/ global/en/sustainability/pdf/plastic-packaging-001.pdf

Kao's New Challenges for the Future: Accelerating Purposeful Business Commitment with ESG www.kao.com/global/en/news/business-

finance/2019/20190926-001/

Basic Principle and Basic Policies on Environment and Safety

www.kao.com/content/dam/sites/kao/www-kao-com/ global/en/sustainability/pdf/environment-safety-principl e-policies.pdf

Kao Group Responsible Care Policy www.kao.com/content/dam/sites/kao/www-kao-com/ global/en/sustainability/pdf/responsible-care-policy.pdf

Kao Environmental Statement

www.kao.com/content/dam/sites/kao/www-kao-com/ global/en/sustainability/pdf/environmental-statement.pdf

Efforts in raw materials procurement

To reduce waste generated at our plants, we continuously work with external suppliers to adjust the volume and frequency of raw materials deliveries. This contributes to reducing the amount of packaging materials our suppliers procure as well as reducing CO₂ emissions from the transport of raw materials.

In addition, in order to reduce waste throughout the product lifecycle, we are continuing our efforts to improve the production methods used by our subcontractors for contracted product manufacturing, for example by providing them with relevant

technology. This contributes to reducing CO₂ emissions associated with raw materials procurement.

Initiatives taken in relation to our products

We offer products such as disposable diapers and cleaning sheets that become waste after consumer use. While ensuring product performance, we are developing technologies to reduce the amount of materials used in products and contribute to reducing waste in order to reduce the amount of waste generated after product use. This also reduces costs and CO₂ emissions in conjunction with waste processing.

We also use recycled plastic for some of our products. As a result, we are able to reduce the amount of virgin plastic used, which leads to a reduction in the use of fossil fuels, the raw material for plastic. We are aware that these measures are important for solving the problem of plastic and creating a decarbonized society.

In addition, regarding the eye-catching plastic stickers used on products to attract consumers' attention, we have switched over to using certified paper for these when their use is unavoidable, and we eliminated all non-essential use of these stickers in 2021.

Initiatives targeting packaging

We are aiming to realize net zero waste for plastic packaging by 2040, and negative waste for plastic packaging by 2050. To achieve these goals, we are undertaking measures in compliance with the ISO 18600 series standards for packaging and the

Product lifecycle and environmental impact invironmental accounting

Zero waste 306-2 (Waste 2020)

environment. Specifically, we are reducing the amount of materials used in packaging, and in particular we are reducing the use of plastic packaging, which has become a serious issue for society, by adopting a 4R (reduce, reuse, replace, recycle) approach from an Innovation in Reduction and Innovation in Recycling perspective.

Innovation in Reduction

This involves initiatives to reduce the amount of fossil-based plastic used.

Reduce

We are continuing to take steps to make containers and packaging thinner, as a means of reducing the amount of plastic used in individual products.

Reuse

We are promoting the adoption of refill and replacement products. The use of plastic film packaging enables us to slash the use of plastic by around 75% compared to plastic bottles. To expand the use of film packaging, we have continued to make improvements to these refill products according to bottle size, the viscosity of the contents and so on to make refilling easier for consumers, and we encourage the internal and external use of innovative film packaging. We are exploring the possibility of in-store refilling whereby consumers bring packaging to the store and purchase only the products they are filled with. In addition, we have adopted a "take-back" system for some products, whereby we take back used containers from customers and then clean them and reuse them.

Replace

We are implementing initiatives to replace fossilbased plastics with alternative materials such as paper and metal. We are also proceeding with initiatives to use bio-based plastic as an alternative for fossil-based plastics. We have been using recycled paper for the carton boxes and instructional inserts for many products, including powdered laundry detergent, since the 1960s, and we plan to expand their use.

Innovation in Recycling

This involves initiatives to recover used packaging and recycle it so that it can be used again as recycled plastic.

Recycle

Recycling includes initiatives to develop packaging that is easy to recycle. Based on the fundamental technology that we have accumulated until now, we are focused on creating innovative recycling technologies for used plastic, including the use of recycled plastic for packaging, as well as developing and using high-quality, low-cost recycled plastics, encouraging activities that generate value from used plastic, and using plastic waste for industrial applications. We are also undertaking initiatives to replace refill packaging made from multiple layers of different plastic materials with a single material.

We are establishing a framework to recover used packaging and recycle it, in collaboration with stakeholders such as distributors, competitors and local government authorities, with the aim of helping to build the resource-circulating society. We are also working actively to promote the use of recycled plastic.

Efforts in development, manufacturing and sales

We are reducing the amount of waste generated at our plants and offices, and we are reusing and recycling waste and other materials inside and outside the company. We have set reduction targets for how much waste we generate and are working companywide to achieve them.

At plants, we are reducing loss of raw materials and products. For example, for liquid products, wastewater sludge is produced as a result of cleaning the mixing and storage tanks at the production facility when the product produced is switched. For sheet-type products, a portion of the sheet material is left unused when the material is switched out. We are studying loss reduction countermeasures on an ongoing basis according to the type of loss that occurs. We then implement improvements to reduce waste.

Because products that are returned from stores are ultimately disposed of as waste, considerable expense and environmental impact arise including the waste of resources and GHG emissions during the disposal process as well as considerable disposalrelated expense. Going forward, we will work with

Environmental accounting

Zero waste 306-2 (Waste 2020), 404-2

Zero waste

stores to review product shipping and stock replenishment methods in an effort to minimize waste.

In addition, sales promotion materials are discarded after use, so we are making a transition to disseminating information using digital means.

Enhancing waste recycling

It would be difficult to reduce generated waste to zero with currently available technology. Accordingly, we ensure that generated waste is thoroughly sorted, and we select the most appropriate recycling methods in cooperation with contracted waste treatment providers. We monitor the amount of waste recycled and sent for final disposal along with the amount of waste generated to improve how waste is treated overall.

Preventing illegal dumping of waste

When contracting waste treatment service providers to dispose of waste generated at our plants and offices, there is a risk of illegal dumping. To reduce this risk, we regularly visit the service providers to verify that the contracted waste is being disposed of appropriately. The Kao Group in Japan has created a database containing information including contracts with waste treatment service providers and the results obtained from surveys of appropriate waste treatment to prevent illegal dumping. This system is also connected to the Electronic Manifest System, which also ensures prevention of illegal dumping.

Proper storage and treatment of PCB waste

Polychlorinated biphenyls (PCBs) were formerly used in insulating oil, such as in transformers and ballasts, but they have low degradability and therefore pose a risk to human health and can create hazards in living environments. We appropriately store and treat PCBcontaining waste in accordance with the law until its disposal is contracted to a service provider.

Reducing food waste

We are working with the business partners of our Beverage business to review the rules governing product returns for products that are nearing their expiry date. Some returned products can be utilized effectively in methane fermentation and composting. Through activities such as these, we are taking steps to reduce food waste.

Education and promotion

Many of our products become waste after use. We are facing this fact earnestly and recognize the importance of giving our employees the chance to learn about the generation of waste from our business activities and used products through various programs and to actively engage in waste reduction measures of their own accord. To this end, we have created many opportunities for employee education.

If, in addition to plants' waste reduction activities and technology development that is oriented toward using fewer resources in manufacturing, there is also a strengthening of employees' waste awareness, then this will help to enhance our activities in this area. A further point is that employees are also consumers, and in their role as consumers it is important that they choose products more carefully and take steps to deal with waste properly.

With regard to packaging, our research laboratories, Procurement, SCM, Business divisions, the ESG Division, etc. engage in a periodic exchange of views regarding our strategy in this area, the issues faced, and how to address them.

Collaboration and engagement with stakeholders

We recognize that, in order to help consumers realize the Kirei Lifestyle, it is vital for us to deepen mutual understanding with a wide range of stakeholders and collaborate with them, by developing mutual communication.

As the waste generated by our production activities impacts on local communities, having good communication with local communities is also vitally important. Many of our plants compile an annual environmental report, and communicate with local residents.

Methods of processing waste generated from our business activities as well as waste generated by consumers and customers after using our products are regulated by government agencies. In order that more waste can be recycled, and to make the

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vironmental accounting

Zero waste 102-43

processing of waste easier, lobbying undertaken in collaboration with industry organizations is very important.

It is also vitally important to share ideas with suppliers and undertake collaborative R&D with them, in order to reduce the amount of plastic used in packaging and enhance its recyclability.

To realize a Kirei Lifestyle for consumers, a change in consumers' behavior is needed. We provide opportunities to think about the Kirei Lifestyle through visits to museums and plants that take Kao products as the theme. This visit program includes displays that enable participants to get a real feel for the amount of waste generated from products manufactured using limited amounts of resources.

Framework

Under the supervision of the Board of Directors, risk management in relation to zero waste issues is carried out by the Internal Control Committee and opportunity management is carried out by the ESG Managing Committee. The ESG Managing Committee decides on overall strategy regarding zero waste initiatives, and implements strategy decision-making and management with regard to waste generated from used products, and packaging. The Internal Control Committee handles management of waste generated from business activities. These committees are headed by the President.

The Senior Vice President responsible for Corporate Strategy serves as chair of the Responsible Care Promotion Committee, and the Responsible Care group of the Corporate Strategy Division serves as the secretariat for the committee. The committee meets twice annually to report on and discuss the state of compliance with laws and regulations at all worksites throughout the world, the amount of waste generated, the status of recycling and other matters, and sets targets for the following year. The **Responsible Care Promotion Committee Secretariat** conducts monthly checks on compliance with laws and regulations, monitors waste amounts and the status of recycling, mainly at plants which have a large impact, and reports on these and other matters to the head of the committee, committee members, members of the Internal Control Committee, auditors and others.

Activities related to waste issues are reported at the Japan RC Meeting and Global RC Meeting under the supervision of the Responsible Care Promotion Committee. The SCM Division, which manages our plants that account for the majority of waste generated by our plants and offices, holds the Environment Working Group Meeting with environmental staff at all plants, manages progress relating to activity targets regarding recycling and reducing waste at plants, and internally develops best practices.

The Internal Control Committee meets one or

more times each year, receiving activity reports from the Responsible Care Promotion Committee and other subordinate committees that it oversees and auditing the activities of those committees.

Management of waste generated from used products, and of its recycling, is handled by the ESG Managing Committee, which meets six 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 ESG Managing Committee, and the ESG Promotion Meeting which it supervises, discuss environmental issues including waste derived from packaging as well as social and governance issues.

Site inspections of waste treatment service providers are conducted systematically in cooperation with the SCM Division, Procurement Division, Logistics Division, Enterprise Information Solutions Division, Sales Division and related companies.

Data reliability is ensured by using a database that centrally manages environmental data for all Kao Group sites throughout the world, and by standardizing tasks and making them more efficient, we are able to conduct activities properly.

Kirei Lifestyle Plan—Kao's ESG Strategy > ESG governance structure Air & water pollution prevention Product In

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Appendix

Business impacts	
It will be necessary	to raise productivity in order to
curtail the amount c	of waste and the like generated
from business activi	ties. If productivity is raised,

term targets

from business activities. If productivity is raised, manufacturing costs can be reduced. In addition, promoting recycling can also be expected to reduce waste processing costs.

Anticipated benefits from achieving mid- to long-

By using innovative film packaging both internally and externally and meeting our targets for reducing plastic consumption, we can boost sales in new markets and earn revenue from licensing our patents.

By increasing consumption of recycled and recyclable plastics, we can also avoid new taxes on the use of fossil-based plastic.

Social impacts

By curtailing waste and the like generated from business activities, promoting recycling to achieve zero waste, and developing a society where innovative film packaging that can drastically reduce the amount of plastic used (to around one-sixth of the former level) is widespread both internally and externally, we will contribute to enhancing resource productivity throughout society as a whole. Doing this will contribute to realizing a resource-circulating society and make it possible to offer consumers clean products in a future society with limited resource availability. These are important approaches for carrying out the Kirei Lifestyle and achieving One Planet Living vision.

Zero waste 306-2 (Waste 2020)

Mid- to long-term targets and performance

We are aiming to realize net zero waste for plastic packaging by 2040, and negative waste for plastic packaging by 2050. We will also be maximizing our contribution toward helping society as a whole to reduce plastic packaging usage.

Targets for 2025

ltem	Scope	Target for 2025	
% of recycled plastic used in PET containers	Kao Group in Japan (consumer products)	100%	

2030 long-term targets

Item	Scope	Target for 2030	
Amount of fossil-based plastics	Kao Group	Peaking out	
Amount of innovative film-based packaging penetration	Kao Group and other companies	300 million *1	
Recycling plastics usage	Kao Group	Scheduled to be set in 2022	
Amount of waste generated*2	Kao Group production sites*3	Zero (less than 1%)	
Reduction rate of discarded products and discarded sales promotion materials	Kao Group in Japan	95%	

We are aiming to have the reduction in the amount of plastic packaging used by Kao and by society as a whole^{*4} reach 200 thousand tons.

We are also aiming to have the amount of plastic packaging that we use at Kao reach a peak by 2030.

*2 Amount of waste not recycled from business sites

*4 Amount of reduction achieved through the use of innovative film-based packaging, refill and replacement products, and development of more concentrated products

2040 long-term targets

We are aiming to reduce plastic packaging waste to zero*⁵.

- *5 This is the state in which the amount of plastic packaging used by Kao is roughly equivalent to the amount of plastic for which resource recovery is implemented by Kao*⁶.
- *6 This is the amount of plastic that is upcycled, plus the amount recycled plastic used by Kao in packaging, plus the amount of plastic that is recovered, recycled and / or transformed into pellets by Kao working together with society as a whole.

2050 Long-term targets

We are aiming to reduce the amount of fossil-derived

plastic used to zero.

We are also aiming to achieve negative plastic

packaging waste*7.

*7 This is the state in which the amount of plastic for which Kao implements resource recovery*⁶ is more than the amount of plastic packaging used by Kao.

^{*1} Annual penetration amount

^{*3} Beginning with production sites

Waste reused or recycled* came to 194 thousand tons \checkmark , a recycling rate of 92%. We maintained our target of a 0.1% or lower final

disposal ratio for waste. We have achieved our target of zero emissions for the 17th consecutive year since the target was set (final disposal ratio to generated waste for all Kao Group worksites in Japan).

Amount of hazardous waste generated

hazardous waste. No hazardous waste was

Recycling

Of the generated waste, 37 thousand tons constituted

transported internationally under the Basel Convention.

We are promoting the reuse of waste, such as

offcuts generated in the production of diapers, etc., for example by turning such waste into pellets

or using it to make paper products.

Starting from 2021, as a new zero waste indicator, we have begun to calculate a combined landfill disposal and incineration rate, which was 9.1% for all production sites combined in 2021. We are aiming to reduce this rate to under 1% (i.e., to more or less zero) by 2030.

The combined landfill disposal and incineration rate is the share of industrial waste (as defined in Japan) generated by production sites that is disposed of either by landfill disposal (direct disposal by landfill without intermediate processing) or incineration (incineration without heat recovery). Waste that individual countries' laws require be disposed of by landfill or incineration, and waste in countries where there are no facilities for disposal otherwise than by landfill or incineration, is excluded. * Boundary: All Kao Group sites including company cars in Japan * Assurance provided for the amount of material recycled

Reduction rate of discarded products and discarded sales promotion materials

The target for this activity was set in 2021. The performance achieved in 2021 was a 14% reduction rate.

Food waste

Since 2018, we have been implementing activities to reduce food waste. For Kao, food waste is generated when products are returned because of damage to packaging or because they are past the expiry date. In 2021, the amount of food waste disposed of by the Kao Group as a whole totaled 723 tons, of which 43 tons were utilized effectively for methane fermentation or composting*. We have also been working together with our customers to revise the rules relating to the return of products that are approaching their expiry date.

* Besides methane fermentation or composting, this figure also includes the effective utilization of packaging (such as cans or cartons).

Zero waste 301-2, 306-1, 306-2, 306-3, 306-4 (Waste 2020)

Performance in 2021

Performance

Amount of generated waste and other unwanted materials (all sites)



- * Boundary: For 2005, all Kao Group production sites, and all non-production sites in Japan. From 2015, some non-production
- sites outside Japan are also included. * Assurance provided for amount of generated waste and other
- unwanted materials.
- * Per unit of sales was calculated based on Japanese GAAP in FY2005, and based on International Financial Reporting Standards (IFRS) from FY2017 onwards.

Amount of generated waste and other unwanted materials

In 2021, the amount of waste generated totaled 212 thousand tons, representing an increase of 2 thousand tons compared to the previous year. As there was an increase in sales, the reduction rate (per unit of sales) was 27%, representing a slight improvement.

Zero waste 301-2, 306-1, 306-2, 306-3, 306-4 (Waste 2020)

nvironmental accounting

Changes in amount of food waste ✓ (in tons)*1

Item	2017	2018	2019	2020	2021
Amount of food waste generated	4,031	1,081	251	592	723
Amount of food waste utilized effectively*2	664	54	20	27	43
In-house disposal	3,366	1,027	230	565	680

*1 Third-party assurance was obtained for these data from 2021 onwards. Scope of total given: Kao's food businesses

*2 Contracted disposal: Contracted disposal includes methane fermentation or compositing, and also effective utilization of packaging (such as cans or cartons)

Inspection of waste treatment facilities

In 2021, as in 2020, due to the impact of the COVID-19 pandemic, the number of waste treatment facilities at which on-site inspection could be performed was lower than in normal years. However, by using documentary review, etc. we still managed to evaluate a total of 104 facilities (in Japan), thanks to collaboration from 87 waste treatment companies. The evaluation results showed that there were no waste treatment companies that did not meet Kao's evaluation criteria.

Amount of packaging materials used, by material type

In 2021, paper and paper pulp usage came to 166 thousand tons, with certified paper and paper pulp products accounting for 96% of the total. The amount of metal used in packaging was 4.1 thousand tons, and the amount of glass used was 0.7 thousand tons.

Horizontal recycling of film packaging

Since June 2021, we have been developing and verifying recycling technology at our pilot plant for film packaging recycling set up at Wakayama Research Laboratories. Since October 2021, we have also been participating in Kobe Plastic Next: Joining Forces to Recycle Refill Packs. In this project, retailers, consumer products manufacturers and recyclers (resource recycling business operators) collaborate with the city of Kobe to recycle used refill packs of household and personal care items, aiming to achieve circularity in society.

We are examining easier-to-recycle packaging designs with the aim of raising recycling rates and realizing horizontal recycling.

Shift to 100% recyclable, reusable packaging

Plastic packaging used for household products in Japan is required by the Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging to have a framework in place for recycling. Our plastic packaging is thus already 100% recyclable.

Outside Japan, definitions of what constitutes recyclable packaging vary depending on the country or region, and recyclability also depends on the recycling systems that exist in each country or region. We are therefore working to confirm not only packaging specifications but also the sales areas for each type of packaging.

Amount of plastic packaging used

Plastic packaging usage in 2021 was 106 thousand tons. Of this, fossil-derived plastic usage amounted to 104 thousand tons.

Kao Corporation now offers 380 refill and replacement products (as of December 2021), with a penetration rate of 83% and slightly more than 80% recently. The refill ratio for fabric bleach in particular now stands at approximately 90% (unit basis).

Plastic consumption has been reduced by 77.0 thousand tons through the use of refill and replacement products. If the impact of making products more concentrated is also factored in, then the overall amount of reduction was 139.8 thousand tons, and the reduction rate (compared to if the products had been packaged in the original plastic packaging) was 78.4%. * Corrugated board, paper, plastic, metal and glass

Changes in amount of plastic packaging used (in thousand tons)

Item	2018	2019	2020	2021
Amount of plastic packaging used	62.5	65.6	116.6	106.0
Recycled material usage rate	0.07%	0.07%	0.37%	1.26%

Zero waste 301-2, 306-1, 306-2, 306-3, 306-4 (Waste 2020)

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Quantity of innovative film packaging penetration

In 2021, the total number of products manufactured using innovative film packaging, calculated as a combined total for products that included *Raku-raku Eco Pack Refill* and *Air-in Film Bottle,* was approximately 11 million items.

Amount of recycled plastic used

Recycled plastic made from used plastic is utilized for shampoo, conditioner and body wash products by Kao (Taiwan) Corporation, and it is also used by the salon-oriented *Kerasilk* brand in Europe and by the *Oribe* brand in the U.S., as well as by brands such as *Attack ZERO* and *CuCute* in Japan. The total amount of recycled plastic used in 2021 was 1,339 tons (3.1 times as much as in 2020).

Recycled plastic usage rate in PET packaging

In an initiative targeting household products sold in Japan, we have begun using recycled plastic in the manufacturing of PET packaging, starting with the packaging of *Attack ZERO* and *CuCute Clear Foam Spray*. In 2021, 19% of the plastic used in this PET packaging was recycled plastic.

Amount of bio-based plastics used

Bio-based plastics are used for *Merit* shampoo and conditioner, *Segreta* shampoo and conditioner, *CuCute* 1,380ml containers, *Raku-raku Eco Pack Refill, and and* shampoo and treatment, and other products, and the total amount used has reached 483 tons (0.9 times the amount in 2020).

Eye-catching stickers

The use of eye-catching plastic stickers was reduced by 100%.



Usage and reduction volume of plastic in refill and replacement categories

Environmental accou

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Zero waste 102-43, 301-2, 301-3, 306-2 (Waste 2020)

Zero waste

Our initiatives

Initiatives taken in relation to our products

Reducing the amount of product materials used

We continue to reduce the materials used in making products that become waste after product use by consumers. For example, we reduced the product weight of medium-sized *Merries* disposable taped diapers by 37% while improving product function compared to its 1990 version.

Paper hot water pipes

Paper hot water pipes handled by Chemical Business combine molding technologies with high-temperature material technologies and are made from waste paper. Compared to general ceramic hot water pipes, the amount of raw materials used is reduced to onetenth and post-use waste to one-sixteenth.

Healthya Green Tea

Healthya Green Tea, which can help to reduce visceral fat, utilizes a drip method to effectively extract tea catechins, which are the active ingredient, from the tea leaves. In this way, the amount of tea leaves that need to be disposed of by the contract manufacturer as food waste after use is reduced by 37%.

Products that use recycled materials

We use recycled materials for some of our products. We have been using recycled paper in the carton boxes and instructional inserts of many products since the 1960s, including powder-type clothing detergents. We use recycled polypropylene (PP) in the measuring spoon for *Attack* powder type laundry detergent, which was first put on the market in 1987, and recycled polyethylene terephthalate (PET) in the fibers of *Quickle Wiper* floor dry cleaning sheets, which first appeared on the market in 1994.

Using waste PET to make *NEWTLAC 5000* asphalt modifier

The Chemical Business has used our proprietary modification and compounding techniques on discarded PET materials (waste PET) to develop *NEWTLAC 5000*, a new type of asphalt modifier, through upcycling. The full-scale commercial launch of the new product took place in late 2020.

Besides improving the durability of road surfaces in the same way as conventional asphalt modifiers, because *NEWTLAC 5000* uses waste PET, the disposal of which has become a problem for society, it makes it possible to create asphalt road surfaces that are not only durable but also environmentally friendly. (Approximately 1,430 PET bottles are used in surfacing an area of road of 100m²)

Recycling of used disposable diapers

Field testing of technology to convert used disposable diapers into carbon material began in January 2021, in collaboration with Saijo City, Ehime Prefecture, where Kao Sanitary Products Ehime is located. We have developed carbonization technology that reduces the amount of CO₂ emitted during recycling, while also sterilizing and eliminating odor, and reducing the volume occupied by the recycled material. We are proceeding with activities to develop applications for the carbon material obtained through recycling, including industrial uses, air and aquatic environment purification, and plant cultivation.

The recycling system development has been undertaken through joint research with Kyoto University Open Innovation Institute, with the aim of realizing social implementation by 2025. Zero waste

Zero waste 301-2, 301-3, 306-2 (Waste 2020)

Initiatives targeting packaging

Initiatives to reduce

Smart Holder and Raku-raku Eco Pack Refill

In 2017, we proposed Raku-raku Eco Pack Refill, which can be used with our Smart Holder, improving usability and allowing the product to be completely consumed, thus reducing environmental impact. This eliminates the need for an original plastic bottle.

Until now, these were sold only on our online site, but we implemented a full-scale rollout to stores in April 2020. We believe this will make them accessible to more consumers and will encourage use.



Smart Holder and Raku-raku Eco Pack Refill

Launch of the Raku-raku Switch for dispensing a fixed amount from film packaging with one light push

Bioré u The Body-Body Lotion for Wet Skin, which was launched in September 2020, uses a Raku-raku Switch that, when attached to a Raku-raku Eco Pack, makes it possible to extract a fixed amount of liquid with just a light touch. Compared to bottles with pumps, Raku-raku Switch-equipped products reduce the amount of plastic used by around 50%. From a universal design perspective, these products have the outstanding feature of being easy to use even for people who do not have much strength.



Making thoughtful choices for society > Sustainable lifestyle promotion > Solving problems through Yoki-P64 Monozukuri manufacturing and through products: Addressing the environmental challenges presented by containers

Air-in Film Bottle technology adopted for use in MyKirei by KAO products sold in the U.S.A.

In April 2020, Kao-developed Air-in Film Bottle film packaging began to be used for the first time for MyKirei by KAO products sold in the U.S.A. The film is the same kind of soft material used in refill packaging. The bottles gain their rigidity through an air fill, allowing them to stand upright, and compared to conventional pump bottles, they use approximately 50% less plastic. Additionally, compared to conventional bottles there is less liquid left in the bottles when they are disposed of.



MyKirei by KAO



Making thoughtful choices for society > Purpose driven brands > Brands that epitomize the Kirei Lifestyle

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Making my everyday more beautiful

Zero waste 301-2, 301-3, 306-2 (Waste 2020)

Zero waste

Total elimination of eye-catching plastic stickers

Eye-catching plastic stickers attached to products provide consumers with information on product advantages and correct usage at the time of purchase, but they increase the amount of plastic used, and the increase in plastic waste and CO₂ emissions at the time of disposal is an issue.

We therefore terminated the manufacturing of products with eye-catching plastic stickers in late 2021.

Thin-film packaging

Film packaging already uses less plastic than regular containers, but we are proceeding with efforts to further improve it by making it even thinner. *Bioré* products sold in Indonesia use film packaging that realizes a 14% reduction in weight.



Elimination of measuring scoops

Powder-type laundry detergent is sold packaged with a plastic scoop for measuring out the right amount of powder. Some *Attack* products sold in China are now sold without a plastic scoop.

Use of bio-based plastics

We are actively developing technologies for using

bio-based plastics for bottles and refills. Since we began this initiative in 2012, our consumption of bio-based plastics and the range of products for which they are used have continued to expand.

For example, *Raku-raku Eco Pack Refills* are made from 15% bio-based plastic on a weight basis.

Initiatives to Reuse (promoting the adoption of refill and replacement products)

We continue to provide refill and replacement products and expand sales of *Smart Holder*.

Hakariuri-do

In September 2021, we launched Hakariuri-do retail counters in two branches of the Welcia Yakkyoku drugstore chain, where customers can purchase refills of the desired quantity of *Attack ZERO* and *EMAL*

り売り堂

laundry detergent, *Flair Fragrance IROKA* softener and *CuCute* dishwashing detergent. By bringing their own bottles to get refills at the store, customers are helping to reduce plastic waste.



At Molton Brown, following on from the packaging reduction initiative implemented in 2020 (specifically,

in-store refill for hand wash products), starting from 2021, reusable bottles and *Aroma Reed Diffuser* refills have been on sale both in-store and online in Europe and in the Americas. Utilizing refills makes it possible to reduce the amount of single-use plastic and plastic that is disposed of as waste by 82%.



Aroma Reed Diffuser refill

Take back system creation

Chemical Business is conducting a program to reuse sold product packaging (take back system) to reduce their environmental impact. In 2021, a total of 20,132 1-ton containers (IBC containers) used for corporate customers were collected for reuse.

Initiatives to recycle RecyCreation activities

We have been engaged in research toward creating a new resource recycling system. We have proposed the RecyCreation approach, which generates new value by adding technology and the knowledge and ideas of various people to used items. To date, we have continuously conducted verification in five areas with members of the community.

Making my everyday more beautiful

Zero waste 301-2, 301-3, 306-2 (Waste 2020)

Zero waste

In a trial, we collected used refill packs for laundry detergent, shampoo and other products from members of the community and recycled them to create a block of recycled plastic that symbolizes "creation" of various objects and values that will be useful for community development and lifestyle development. In September 2020, we made the decision to collaborate with Lion Corporation on RecyCreation, and began field testing at the Ito-Yokado Hikifune store in Sumida-ku, Tokyo of a program to implement in-store collection and recycling of used refill packaging. Over a period of approximately one year from October 30, 2020 to the end of October 2021, we collected approximately 9,500 pieces of film packaging*. Going forward, we will be aiming to realize horizontal material recycling that makes it possible for film packaging to be recycled for use in the production of film packaging.

* Calculated by dividing the total weight of collected film packaging— 170.2kg—by the average weight per piece of packaging, which was 18.0g (in the 2021 report, the calculation was based on an estimated average weight of 14.4g).

RecyCreation on Facebook www.facebook.com/RecyCreation.jp/ (Japanese) The RecyCreation Concept





Commencement of the verification process for a resource-circulating model project involving horizontal material recycling* of single-use plastics

Since October 2021, we have been participating in Kobe Plastic Next: Joining Forces to Recycle Refill Packs. In this project, retailers, consumer products manufacturers and recyclers (resource recycling business operators) collaborate with the city of Kobe to recycle used refill packs of household and personal care items, aiming to achieve circularity in society.

The city of Kobe encourages every resident of Kobe to recycle used refill packs from detergents and shampoo products, etc. by dropping them off in collection boxes placed in 75 locations at retail outlets throughout the city. By leveraging "return trip operations" from retail outlets and cooperation of existing waste collection operators, used refill packs can be collected effectively with minimum environmental impact. Recyclers and manufacturers are working together to achieve horizontal recycling to film packaging from the collected refill packs, as well as turn them into recycled products that are useful in daily life. Kobe and 16 companies and organizations are collaborating to realize circularity of resources. The project aims to set an example to help promote similar activities across Japan.



* Recycling of materials into products with the same application

Use of recycled materials

Kao (Taiwan) has been using recycled plastic for regular containers since 2016. In 2021, Kao (Taiwan) also started recycling polyethylene, which is more challenging to recycle, for use in this way.



technology

Zero waste 301-2, 301-3, 306-2 (Waste 2020), 404-2

Development of film packaging recycling

Refill packs can significantly reduce the amount of

plastic used compared to rigid containers and are

made from composite materials with many layers

in order to protect its contents from heat, moisture

and ultraviolet rays with a thin film. In doing so, the

inhomogeneous plastic, which is difficult to reuse in

We aim to improve the rate of recycling and achieve horizontal recycling by developing and

verifying recycling technology at our pilot plant for

Research Laboratories in June 2021. The plant will

different varieties of recycled ingredients make

film packaging under present circumstances.

film packaging recycling set up at Wakayama

examine effective processes for separation and

collection from consumers and easier-to-recycle

rather than a single raw material, such as PET bottles,

Appendix

by the manu be turned into of this system from researce the strength: By 2020, weate into a

Inflation molding machine

packaging designs.

Screw extruder

Initiatives adopted at our business sites

Reducing the amount of waste produced

We handle a large number of liquid products, and reducing the sludge produced from treating concentrated wastewater generated in the process of cleaning tanks and switching products is a major issue.

Kao Industrial (Thailand) treats wastewater using separate wastewater treatment facilities according to the COD concentration of the wastewater, which has successfully reduced the amount of sludge produced and contributes to reducing waste. Fatty Chemical (Malaysia) has also reduced waste through the adoption of sludge dewatering equipment.

Also, to contribute to reducing the amount of generated waste at retailers, we are working with the understanding and cooperation of retailers to reduce the number of boxes used in the delivery of products.

Enhancing waste recycling Waste recycling in manufacturing

One example of this is recycling the waste generated by the manufacture of diaper and feminine products to be turned into plastic pallets. We began test operation of this system at our plants in 2016, with cooperation from research laboratories and related divisions using the strengths of our matrix management.

By 2020, we were able to recycle 772 tons of waste into approximately 49,620 plastic pallets. This project has now been put on hold, as the required number of plastic pallets had already been secured.

Spreading internal awareness of zero waste

Global RC Meeting

As a part of our Responsible Care (RC) measures, RC managers in Japan, and RC managers of overseas subsidiaries with manufacturing plants, hold an annual meeting. The aims are to invigorate RC activities and raise their level including reducing waste produced by subsidiaries.

Unfortunately, in 2021 this activity had to be held through the exchange of documents, because of the COVID-19 pandemic.

RC Environment Committee of the SCM Division

The RC Environment Committee of the SCM Division meets twice annually to gain an understanding of conditions at each plant and share information on best practices with the objectives of curtailing the production of waste from plants in Japan and promoting recycling.

A packaging review meeting

To promote activities and understanding internally, Packaging Technology Research holds packaging review meetings when new and improved products are launched. Members from the relevant divisions, including business units, the SCM Division and the Consumer Communication Center, evaluate the environmental performance of the packaging.

In 2021, a total of 47 meetings were held in Japan, and 9 elsewhere in Asia. All of these meetings were held online.

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Collaboration with stakeholders based on "eco together"

"eco together" with consumers / customers Awareness-raising activities at the Kao Eco-Lab Museum

To encourage more consumers to choose refill and replacement products that greatly reduce plastic consumption, overviews of our packaging initiatives have been presented at the Kao Eco-Lab Museum and at the EcoPro exhibition.



Display enabling visitors to get a real feel for how much plastic is used in packaging

Ways to look after and wash eco-friendly reusable shopping bags to keep them clean

With the rise in awareness and concern for the environment, as well as the fact that consumers are increasingly having to pay for plastic shopping bags, 88% of people reported taking an eco-friendly reusable shopping bag with them when they go shopping (according to a survey conducted by Kao in

December 2019).

In relation to new legislation in Japan that came into effect in July 2020, requiring consumers to pay for plastic shopping bags in shops, the Kao Consumer Research Center has posted hints on ways to look after eco-friendly reusable shopping bags, which are now being used more frequently, and to keep them clean, on the life information website (Japanese).

"eco together" with partners

Recognizing that it is essential to collaborate with manufacturers producing materials, recycled plastics and packaging when developing and launching new packaging, we work together with a wide range of business partners.

"eco together" with society Clean Ocean Material Alliance

We are participating in the Clean Ocean Material Alliance, which was established to encourage global initiatives for solving the ocean plastic pollution problem. The Kao Corporation Director and Chair is chairman of the alliance, and Kao is taking a leading role among Japanese businesses.

Clean Ocean Material Alliance cloma.net/english/

Japan Partnership for Circular Economy (J4CE)

The trend toward development of the circular economy is picking up speed throughout the world, and we are participating in the Japan Partnership for Circular Economy, which was established to strengthen collaboration between government and the private sector, with the aim of promoting an enhanced understanding of the circular economy among a wide range of stakeholders, including Japanese companies, and of promoting related initiatives. We provided case studies for inclusion in a collection of case studies, and our representatives were included in the panelists for a panel discussion held to accompany the official ceremony that marked the publication of the collection of case studies and the launching of the related website.

Japan Partnership for Circular Economy (J4CE) j4ce.env.go.jp/en

Package collection measures

Together with outside organizations, we are involved in recovering packaging, etc. discharged into the natural environment.

In October 2020, we signed a cooperation agreement with Wakayama City. To protect the ocean from pollution, including marine plastic waste, arising from land-based activities, we have undertaken surveys and collection of marine plastic waste that has accumulated at Tomogashima, Kataonami and

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Hamanomiya Beach. We are promoting research on reusing recovered marine plastic to make tables and chairs for oceanside facilities, and using it as a road strengthening agent on the oceanside cycling path. We are also engaging in unique clean-up activities for river and ocean waste and in the community.

Introducing cases at seminars on waste

In Japan, it has been reported that many incidents occur at waste treatment companies, which are caused by not providing sufficient information on the chemical substances to the contractor when contracting the waste treatment.

Therefore, we present cases at various seminars

regarding waste with the aims of spreading our knowledge about past successful cases of improving communication with waste treatment companies, and identifying points of improvement in how we communicate information.

Thanks to these activities, there were again no incidents involving waste contracted for disposal from us in 2021.

Recycling Science Research Center initiatives

Tomokazu Iseki Recycling System Project, Packaging Technology Research Laboratories

In May 2020, Kao established the Recycling Science Research Center, with the aim of realizing zero plastic waste, underscoring our commitment to dedicating plastic resource recovery and recycling. The coupling of the word "science" with "recycling" in the name of the Recycling Science Research Center embodies our passion for developing technology based on Essential Research, which forms part of Kao's corporate philosophy Yoki-Monozukuri. The center has four main research projects: packaging recycling, ocean plastic waste recycling, used-diapers recycling, and RecyCreation. Regarding packaging recycling, in 2020, we demonstrated a resource circulation model project as the main operator for material recycling of single-use plastics, in which the New Business Model for Sustainable Use of Plastics initiative was organized by the Tokyo Metropolitan Government. In this field testing,

Employees' voice

besides developing easily-recyclable plastic packaging, we conducted material recycling of post-consumer used packaging (in this case, recycling from used refill packs to bottles) under a cross-industry collaborative framework. The packaging development involved the design and manufacturing of refill packs composed of mono-materials, while the packaging recycling part of the project involved testing recycling technology using used refill packs collected from approximately 90 elementary and junior high schools and public facilities. In parallel with the field testing, we also conducted a monitoring survey of a group of approximately 90 consumers regarding their attitude toward using refill packs. The collaborative project with other enterprises and local government authorities enabled us to carry out the field testing within the short period of around one year, and get a window of opportunity to find the following two new insights.

First, the monitoring survey disclosed that consumers have high environmental awareness. Based on the results, we found that "environmental and resource issues" constituted one of the things that consumers had been worrying about most recently, with 85% of consumers being worried about this, and that much of this was concerned with "the issue of plastic, and waste sorting." It also revealed preferences in terms of the way to collect used packaging; many consumers liked the idea of being able to drop it off at stores or public facilities. Through the monitoring test, we perceived that it is important to develop solutions that fit our lifestyle without imposing a burden on users.

Second, the implementation of the recycling test suggested the importance of process management in recycling. The types of regular recycling materials and installed recycling machines depend on the geographical region and the recycling plant. For example, a lack of initial cleaning of the recycling facility creates a risk that other, previously processed materials carry over to subsequent recycling, resulting in unexpectedly degrading the quality of the recycled materials. In order to conduct recycling with minimal variation in quality, it is vitally important to implement detailed checks regarding the risk of contamination and the quality of washing water in the recycling process.

Although our project is at the field testing stage, we aim to contribute to the growth of a resource-circulating society by dedicating ourselves to the transformation of social infrastructure in cooperation with other companies, local government authorities, associations, and central government agencies, who have the same vision as us.



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Stakeholder engagement

Masanobu Ishikawa Specially Appointed Professor, Eikei University of Hiroshima Professor Emeritus, Kobe University President, NPO Gomi-Japan



Kao's response to the views expressed last year

Regarding the issues on which we received advice last year, we have been working in collaboration with retailers and logistics companies to increase the number of locations at which in-store collection points have been established, and also to take on new challenges, such as implementing field testing for more efficient collection methods that make use of delivery trucks' return trips to transport collected material. With regard to refill pack material, in addition to undertaking development of horizontal recycling technology, we have also been proceeding with the sharing of information regarding specifications and materials, as issues with these can constitute an obstacle to improving the recycling process. In 2022, we are continuing to work together with our stakeholders with the aim of further expanding the scope of recycling, and further enhancing its efficiency.

Hopes and suggestions regarding Kao's further intensification and expansion of its activities as it aims to realize zero waste

Kao continued to make significant forward progress in its activities in 2021, as it had done in 2020. The company announced ambitious targets, and made steady progress with demonstration-level projects to achieve these targets.

The most important of Kao's initiatives has been the announcement that the company would seek to achieve net zero carbon emissions by 2040, and become carbon negative by 2050. To achieve these goals, Kao has set concrete, individual targets, and is taking steps to meet them throughout the company. Of these measures, one crucial step forward is the refill pouch collection and recycling initiative, which aims to recover 10,000 tons of refill packaging by 2025.

In October 2021, in Kobe City, the city government, ten consumer products manufacturers, four distribution firms, two waste disposal firms and various NPOs joined forces to install refill pouch collection points in retail stores. Kao is also participating in similar projects in Kitakyushu City, Fukuoka Prefecture and in Higashi-Yamato City, Tokyo.

In the Kobe City project, a collaboration between manufacturers that between them account for over 80% of recovered material (by weight) has made it possible to achieve very high-quality recovered material, only around 3% of which is foreign matter, and most of which has been washed. Data for the first three months of project implementation indicates that the quantity of recovered material has been increasing steadily, so it is anticipated that this project will be very successful.

There are three main obstacles to the achievement of Kao's targets. Firstly, there is the question of consumer cooperation. In order to get more consumers collaborating with recycling initiatives, it is essential to develop a more in-depth understanding of consumers' resource (waste) generation activity, and to implement effective communication based on this understanding. To achieve this, it would be beneficial to execute an analysis of the results achieved and conduct surveys of the project to collect waste from retail stores in Kobe City, the community drop-off project that was launched in Kobe City at around the same time, and similar projects that have been implemented in other cities. By using resource recovery to develop a more in-depth understanding of consumer behavior, it should be possible for retailers to identify new value. This will also help clarify retail stores' role in the resource-circulating society.

Secondly, there is the issue of realizing high-level recycling of recovered material. Currently, while it is already possible to use recovered refill pouches to make thin film for use in producing *Air-in Film Bottles* (on a trial basis), if Kao is to achieve its goal of realizing net zero carbon emissions, then it will need raise the recycled resource utilization rate to nearly 100%.

A third obstacle is the need to achieve the right balance between originality and standardization regarding product design. In order to realize high-level recycling, it is vital that product design takes the recovery stage into account. Thinking about consumers' understanding of recycling, and in terms of the economics of collection logistics, it would seem reasonable for products to be produced to enable consumers to recognize them as being in the same product category at the recovery stage. However, in the linear economy that has characterized society to date, each company has been working assiduously, and undertaking technical innovation, to ensure that its products are differentiated from those of other companies. In the resource-circulating society, we will need to maintain this dynamism while also establishing a standard framework for product design.

Although space restrictions prevent me from discussing it here, given how ambitious Kao's targets are, it would also be beneficial for Kao to undertake wide-ranging exploration of the potential for selling products by weight, chemical recycling, etc.