Air & Water Pollution Prevention GRI 303-2

We will protect human health and the natural environment by preventing pollution of water and air through the manufacture and use of our products.

Social issues

It goes without saying that air pollution, water pollution and soil contamination can have a significant negative impact on human health, on agricultural crops and other plants, and on ecosystems. In order to create a sustainable Kirei life for all, besides conducting our business activities in a way that does not impose negative impacts, we also aim to work together with stakeholders to address pollution that has already had a negative impact, and to restore things to a sustainable state.

Atmospheric pollutants such as nitrogen oxides (NOx), sulfur oxides (SOx), particulate matter (PM) and volatile organic compounds (VOCs) are known to increase the prevalence of pulmonary diseases such as asthma. Most atmospheric pollutants derive from the burning of fossil fuels or usage of organic solvents. Worldwide, around 8.8 million people die prematurely each year because of atmospheric pollution. In Europe alone, the figure is believed to be over 790,000 (according to a study by the University of Mainz in Germany). At the same time, in recent years there has been a trend for indoor spaces to be made as airtight as possible in an effort to make homes more energy-efficient. As a result, chemical substances in indoor spaces remain in those spaces for long periods of time, and their concentration levels rise. A report (by Yokohama National University in Japan) suggests that this can have a negative impact on human health.

The vast majority of living organisms, including human beings, cannot live without water. Humans also need access to sanitary water in order to maintain Kirei Lifestyles. The main cause of water pollution is various substances contained in wastewater from plants and household sewage.

Negative impacts on human health resulting from soil contamination include the effects of both direct contacts with polluted soil by touching it or eating it and indirect contacts by using groundwater that has been polluted with harmful substances that have leached out from polluted soil. Significant characteristics of soil contamination include the fact that, once soil contamination starts to occur, harmful substances can accumulate in the soil over a long period, and the fact that people are less likely to be aware of soil contamination than they are of air pollution and water pollution.

We need to speed up the initiatives we are taking, and expand their scope in order to realize the SDGs by 2030. In January 2020, the United Nations started the Decade of Action in relation to the achievement of the SDGs.

Policies

We utilize a wide range of chemical substances in our products, from home-use products to industrial products, and we continue to implement activities to minimize the negative impacts of chemical substances at every stage from development to post-use disposal.

In our Basic Principle and Basic Policies on Environment and Safety, we undertake to "assess environment and safety aspects throughout the entire lifecycle of the products, from manufacture through disposal, when developing products and technologies" and to "offer products with a lower environmental burden." Furthermore, the Kao Group Responsible Care Policy contains the following declarations: "We will strive to develop technologies for products that consumers and customers can use with peace of mind, as well as striving to provide products that have a low environmental impact" and "We shall strive to continue to reduce the environmental impact of our business activities by disposing of wastewater and waste gas appropriately."

We will also promote "eco together" activities in line with the Kao Environmental Statement, which 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 raw materials procurement and manufacturing, to distribution, sales, usage and final disposal, we want to engage in 'eco together' with stakeholders, including consumers, throughout the product lifecycle."

Web
Basic Principle and Basic Policies on Environment and Safety
https://www.kao.com/content/dam/sites/kao/www-kao-com/global/en/sustainability/pdf/environment-safety-principle-policies.pdf

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

Kao Environmental Statement
https://www.kao.com/content/dam/sites/kao/www-kao-com/global/en/sustainability/pdf/environmental-statement.pdf

Air & Water Pollution Prevention GRI 303-2

Strategy

Risks and opportunities

Risks

Item			Content
Risks	Transitional risk	**Policies, laws and regulations**	Various policies and legal restrictions on air and water will be enacted, and management costs may increase to comply with them. Investing in better facilities and developing new technologies to comply with policies and regulations will mean higher equipment and operating costs, which could negatively impact our profitability. Additionally, the delayed production schedule could negatively impact sales if national and local governments are urged to pass restrictions on operations due to the state of air pollution in areas where our plants are located and the state of water pollution from plant wastewater discharged in public water. Examples of possible policy or regulatory restrictions • Air pollutant regulations • Regulations on substances depleting the ozone layer • Plant wastewater regulation • Regulation of use of chemical substances in products • Product labeling programs for environmental performance or chemical substance
		Technology	Increasing research and development expenses to address the risks posed to air and water quality will mean higher operating costs, which could negatively impact our profitability. Furthermore, there is a risk that sales growth will not be achieved in the event of failure of technological development.
		Markets	When regulations on air pollutants are tightened on a national or regional level, demand for chemical products that contain few or no substances causing air pollution (such as organic solvents) increases, whereas sales for conventional chemical products are at risk of decline. When regulations on water pollutants are tightened on a national or regional level, demand for professional-use products that contain few or no substances causing water pollution (such as alkali) increases, whereas sales for conventional professional-use products are at risk of decline. Sales could be negatively impacted if technological capabilities for products in development are not on par with market demands.
		Reputation	Our brand owner's reputation is at risk of decline due to the so-called fragrance pollution from scents in fabric softeners and others.
	Physical risk	**Acute**	Our plants may suspend operations and be unable to continue manufacturing products due to air pollution from forest fires or water pollution from oil tanker accidents. Similar conditions at suppliers' plants could make it impossible for us to procure raw materials, leading to the risk of not being able to continue manufacturing products. There is also a risk that supply chains, from suppliers to our plants, and from our plants to our customers, could be interrupted. These risks would negatively impact sales as we would no longer be able to supply our products to the market, and if such risks actually materialized, would require special measures at additional cost, thus reducing our profits. In addition, if large-scale air and water pollution significantly restrict the lives of consumers, consumption might fall, which would negatively impact sales.
		Chronic	There is a risk that production may be unable to increase at the rate required for future growth due to our plants or supplier's plants being located in areas where air and water pollution are likely to become more severe.

Opportunities

Opportunities	**Resource efficiency**	Optimizing logistics and reducing the empty running distances for trucks will curtail emissions of air pollutants and lower transportation costs, which would lead to improved profits.
	Products, services	PM, a type of air pollutant, not only has health consequences but, in terms of beauty, it can also cause dull skin. Coal-fired power generation is expected to decline, decreasing the amount of PM in the atmosphere in the medium to long term with the objective of reducing greenhouse gas emissions. However, it is expected to take some time for PM to disappear from all regions around the world, which presents an opportunity for products that respond to PM in the Health & Beauty Care business and the Hygiene & Living Care business. In the industrial sector, there are opportunities for chemical products that reduce organic solvents and dust causing air pollution at *Genba*. Many of our products are discharged into the water environment after use. Surfactants powerful enough to reduce the usage of surfactants and alkali-free professional-use detergents offer an environmental value that improves water environments.
	Markets	The manifestation of air pollution caused by PM presents increased sales opportunities by attracting attention to consumer products that respond to PM. Strengthened regulations on organic solvents and dust at *Genba* present an opportunity to expand demand for chemical products that comply with such restrictions.
	Resilience	Ongoing measures for air pollution and wastewater pollution at plants help increase our resilience to issues with air and water quality in terms of product manufacturing. In addition, the resilience of our businesses needs to be improved with activities suggesting new products by predicting consumer trends based on consumer feedback from the last 60 years or more and a database built over more than 40 years.

Air & Water Pollution Prevention GRI 3-3, 303-2, 404-2

Strategy

We are implementing activities to prevent air and water pollution at our manufacturing sites. In the unlikely event that environmental pollution from any of our sites is detected, we may be forced to halt production activities, so environmental pollution prevention activities are essential for business continuation.

It is also important to develop products that do not lead to environmental pollution when used. Once stakeholders recognize our initiatives to prevent environmental pollution and understand their value, it will lead to product selection and contribute to increased sales.

The fact that Kao products are likely to be needed to maintain cleanliness in areas where environmental pollution and hygienic conditions are a challenge will also contribute to increased sales.

Social impact

We are working to prevent air pollution and water pollution in the areas near Kao's production plants by reducing emissions of atmospheric pollutants such as NOx, SOx and volatile organic compounds (VOC) from our plants and reducing organic matter and other substances in wastewater discharged from our plants, by complying faithfully with the relevant laws and regulations in each country and region in which we operate, and by setting reference values that are even more rigorous than those required by law to strictly manage pollutants.

We propose various products for air pollution in the Chemical Business, being considerate of maintaining the health of people working around the world.

In order to ensure the groundwater used by locals is not polluted, we periodically survey the soil conditions at each plant for water pollution.

Additionally, we propose various products to help prevent water pollution in all our business units for household, professional-use and chemical products.

We anticipate that disclosing VOC and COD emissions pertaining to our business activities and engaging in an ongoing dialogue about this will improve communication with the residents around our plants and lead to reduced reputational risks concerning these emissions throughout society.

Contributions to the SDGs

Business impact

Anticipated benefits from achieving mid- to long-term targets: business impact

Disclosing VOC and COD emissions pertaining to our business activities will improve the transparency of occupational safety measures and pollution measures. Maintaining employees' health and mitigating risks posed by pollution will contribute to lowering operational costs and improving profitability.

Governance

Framework

Under the supervision of the Board of Directors, risk management in relation to air & water pollution prevention is carried out by the Internal Control Committee and opportunity management is carried out by the ESG Managing Committee. These committees are both headed by the President & CEO.

Risk management related to air & water pollution prevention is carried out by the Internal Control Committee (which meets twice a year) and its subordinate body, the Risk & Crisis Management Committee (which meets four times a year). These committees are headed by the Executive Officer Responsible for Corporate Strategy.

The ESG Managing Committee (which meets six times a year) is responsible for managing opportunities related to air & water pollution prevention. Comprising outside experts, the ESG External Advisory Board provides advice and suggestions on issues raised by the ESG Managing Committee and offers outside viewpoints to be reflected into management, and the ESG Promotion Meeting executes the strategies.

P285 Responsible Care Activities > Governance

P18 Our ESG Vision and Strategy > Governance

Education and promotion

We recognize the importance of giving our employees who handle chemical substances a variety of opportunities to obtain knowledge about the impact our business activities and products may have on the

Air & Water Pollution Prevention GRI 3-3, 303-2, 404-2

quality of air and water, and to voluntarily and actively engage in pollution prevention activities. We have created many opportunities for employee education accordingly.

Employees are responsible for air and water pollution prevention activities at the plant, as well as research and development of low-VOC and highly biodegradable products. Strengthening employees' air and water quality awareness helps to enhance the overall level of our activities in this area. Furthermore, employees are also consumers, and in their role as consumers it is important that they take steps to prevent air and water pollution.

Specifically, we conduct environmental education including air and water pollution prevention for all employees as part of our Responsible Care (RC) activities. We also provide education encompassing the importance of legal compliance pertaining to air and water pollution to all employees working at plants and research institutes that have obtained ISO 14001 or RC 14001 certification.

Collaboration 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 substances generated by our production activities that lead to air and water pollution have an impact 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.

Emissions of substances linked to air pollution and water pollution pertaining to our business activities, are regulated by government agencies. We have established our own voluntary management criteria which are even more rigorous than the statutory requirements, and we comply with these to monitor pollutants. Additionally, we continue to conduct water quality surveys not as a single company but as an industry group.

Logistics initiatives are required to help make improvements in air pollution. We are taking part in programs established by the Cabinet Office in collaboration with other companies in this industry.

Consumer behavior needs to change in order for consumers to attain the Kirei Lifestyle. We provide opportunities for consumers to think about the Kirei Lifestyle through visits to museums or plants on the subject of the water that all of them use daily. For example, the Eco-Lab Museum has displays on household sewage and wastewater treatment.

Smart Logistics in partnership with Lion Corporation

Participating in the Strategic Innovation Promotion Program (SIP) promoted by the Cabinet Office, we started two-way transportation and retail between Kao and Lion Corporation in October 2020. This new initiative will achieve shorter empty running distances for the trucks by comparison with conventional transportation and retail methods, and is expected to result in a 45% reduction in atmospheric pollutant emissions for both companies combined.

Risk management

Regarding the process of assessing risks and opportunities, the Risk Management and RC Promotion examine risks and opportunities anticipated at Kao and conduct risk and opportunity assessments based on feedback from outside experts and staff in internal departments that are undertaking initiatives. These are approved by the Internal Control Committee and ESG Managing Committee, respectively.

Integration into corporate risks

On behalf of the Kao Group, the secretariat of the Risk & Crisis Management Committee (Risk Management & Responsible Care) conducts comprehensive and topical risk surveys on each division and subsidiary to identify key risks and adjust measures. In principle, the division in charge takes the lead in addressing these risks, but cross-organizational and common risks are addressed in collaboration with related divisions to strengthen the response and are treated as corporate risk issues as appropriate.

Metrics and targets

Mid- to long-term targets and 2022 results

2025 mid-term targets

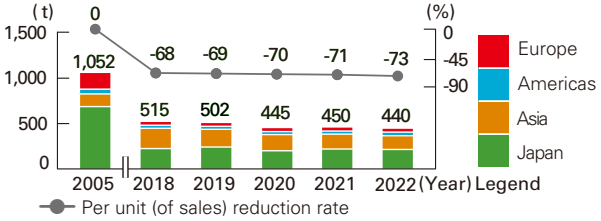
Item	Scope	Targets for 2025
% of plants which disclose VOC and COD emissions	**All Kao Group sites**	100% disclosure

Air & Water Pollution Prevention GRI 303-2, 303-4, 305-7, 307-1

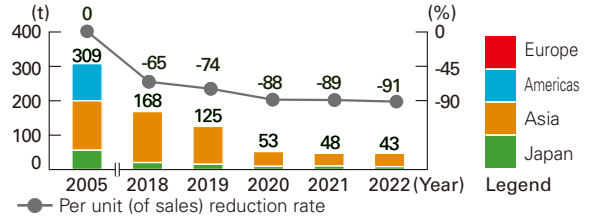
2022 results

* Per unit of sales was calculated based on Japanese GAAP in FY2005, and based on International Financial Reporting Standards (IFRS) from FY2017 onwards.

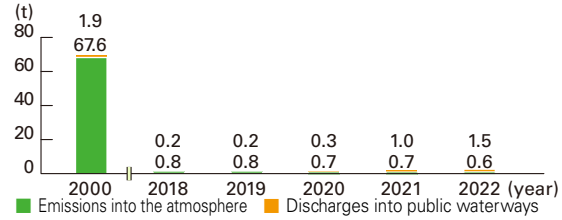
NOx emissions ☑ (all production sites)



SOx emissions (all production sites)



Total emissions of chemical substances subject to the PRTR system



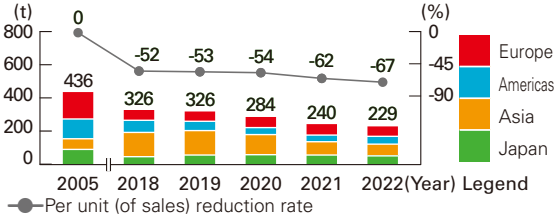
Emissions of volatile organic compounds (VOCs)

Although we have no facilities subject to the VOC emission regulations provided in the Air Pollution Control Law, we work to voluntarily cut VOC emissions.

For the 100 VOC substances defined in the notice issued by the Director General of the Environmental Management Bureau, Ministry of the Environment, we set voluntary targets on the annual atmospheric emissions from each plant for each substance (5 tons or less in 2005, 3 tons or less in 2009, 1 ton or less in 2010), conducted emission reduction activities and accomplished our targets. We are managing VOC emissions with the current target of maintaining our activities.

The group in Japan handled 32 types of VOCs in quantities over 1 ton in 2022, with total emissions into the atmosphere of 6.8 tons ☑.

COD pollution load ☑ (all production sites)



* The amount of COD pollution load for wastewater entering sewer systems takes into account the removal rate from sewer systems.
* Assurance provided for COD pollution load

Compliance with environmental legislation

In 2020, there was a failure to report minor changes to a wastewater treatment facility (sludge dewatering facility) at the Kawasaki Plant, a periodic inspection failure of the dust collector and insufficient scrubber water flow at Kao Specialties Americas LLC (fine of 146,000 yen), and a leakage of ammonia water at Quimi-Kao, S.A. de C.V. (fine of 460,000 yen).

In 2021, there was a failure to install sufficient gas detection equipment at Kao Huludao Casting Materials Co., Ltd. (fine of 542,000 yen), a failure to report the designated manager (fine of 1,444,000 yen) at the same company, and an exceedance of hydrogen sulfide limits at Kao USA Inc. (fine of 1,192,000 yen).

Compliance status with environmental laws and regulations

Classification	Unit	2020	2021	2022
Number of deviations*1	Cases	4	3	0
Of which, number of leaks	Cases	1	0	0
Total fines*2	1,000 yen	607	3,178	0
Of which, number of leaks	1,000 yen	460	0	0

*1 All incidents detected by authorities during the reporting period
*2 Fines paid during the reporting period

Reviews of 2022 results

There were no deviations from environmental laws and regulations in 2022.

Air & Water Pollution Prevention

Main initiatives

Initiatives to prevent air pollution

Efforts at plants

Compliance with laws and regulations

The volume and density of pollutants emitted into the atmosphere are regulated by government agencies. We have established our own voluntary management criteria which are even more rigorous than the statutory requirements, and we comply with these to monitor pollutants.

Using cleaner fossil fuels

As burning of fossil fuels is accompanied by emission of NOx, SOx, PM, etc., we use natural gas, which is a clean fossil fuel, at all plants outfitted with the necessary infrastructure. Our plants do not use any coal.

Reducing emissions of chemical substances subject to PRTR

We began activities in this area by setting a voluntary target for annual emissions of one ton or less for each substance from each plant in fiscal 2000. We achieved this target in fiscal 2002. Since then, we have continued to achieve this voluntary target, excluding leaks of chlorofluorocarbon and similar emissions.

The number of chemical substances subject to PRTR of which we handled over 1.0 ton in 2022 was 69, and the total discharge of such substances into the atmosphere and public water areas was 2.1 tons. In addition, we are voluntarily monitoring and controlling releases and transfers (in the same way as would be done for chemical substances subject to PRTR) of chemical substances that the Japan Chemical Industry Association has specified as being subject to voluntary surveys.

Reducing emissions of VOCs

Our production plants outside Japan include some plants where they have not been possible to monitor VOC emissions, or where the emissions are relatively high. We are working to monitor and reduce VOC emissions at these plants.

Initiatives taken in relation to logistics

Smart Logistics in partnership with Lion Corporation

Participating in the Strategic Innovation Promotion Program (SIP) promoted by the Cabinet Office, we started two-way transportation and retail between Kao and Lion Corporation in October 2020. This new initiative will achieve shorter empty running distances for the trucks by comparison with conventional transportation and retail methods, and is expected to result in a 45% reduction in atmospheric pollutants emissions for both companies combined.

Initiatives taken in relation to our products

LUNAJET water-based pigment inkjet ink

Using the pigment nano-dispersion technology that we had previously developed, we successfully developed *LUNAJET*, the world's first water-based pigment inkjet ink, featuring a VOC-free design* which ensures that only very small quantities of VOCs are emitted during printing operations, thereby helping to prevent air pollution and also making a major contribution toward improving the working environment of printing workers. We also confirmed that this water-based pigment inkjet ink technology can be applied to water-based gravure-printing ink.

* VOC-free design: "VOC-free" is defined as emitting less than 700 ppmC (in carbon conversion terms) of VOC during the printing process.
VOC: General term for organic compounds that are volatile and become gaseous in the atmosphere. In Japan, VOC emissions are regulated by the revised Air Pollution Control Law.

Visco Top UT thickener for concrete spraying construction

We developed then launched full-scale sales for *Visco Top UT* thickener which significantly decreases dust generated when spraying concrete for mountain tunnel construction. *Visco Top UT* is able to substantially reduce the amount of dust generated even when using powder accelerator, which tends to stimulate dust dispersion. With only half as much thickener as would be needed with a conventional dust reducer, the dust concentration level can be reduced to 2 mg/m^3 or less (as recommended by the new dust guidelines that came into effect in April 2021). This is registered in NETIS*, the new technology provision system (Number: KT-200035-A) and is anticipated to be utilized in the various tunnel construction commissioned by national and local governments.

* NETIS: Database system operated with the objective of the Ministry of Land, Infrastructure, Transport and Tourism sharing and providing information on new technologies

Initiatives to prevent water pollution

Initiatives taken in relation to product development

In product development, we take into consideration the impact that wastewater after product use may have on the water environment. More specifically, we have investigated the biodegradability of raw materials that may be discharged into the environment and their impacts on common aquatic organisms using river

Air & Water Pollution Prevention

water and activated sludge used at wastewater treatment plants. Through this investigation, we are actively promoting the development and use of raw materials with reduced environmental impact. We also plan to use AI and other technologies to investigate chemical substances that are highly environmentally-conscious.

Efforts at plants

Compliance with wastewater related laws and regulations

The volume and/or density of pollutants discharged into rivers, the ocean and sewage systems are regulated by government agencies. We have installed wastewater treatment facilities at many of our plants, which are maintained at a high level and properly treat plant wastewater before being discharged outside the plant. We have established our own voluntary management criteria which are even more rigorous than the statutory requirements, and we comply with these to monitor pollutants.

Surveys of groundwater and soil contamination

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

Initiatives relating to wastewater after product use

We are focusing on understanding the actual situation in relation to wastewater discharge after product use and we are conducting our own field surveys on an ongoing basis, such as environmental monitoring of river water to get an idea of the ecological risks of chemical substances.

To respond to globalization, we collaborate with experts to verify the effectiveness of mathematical models and develop new models for monitoring environments outside Japan and predictions of chemical substance concentration in rivers, aiming to ensure our business activities are environmentally conscious of the local environment. Recently in Japan, we are analyzing in detail the impact of chemical substances on the ecosystem using data gathered from ecological monitoring and the river environment.

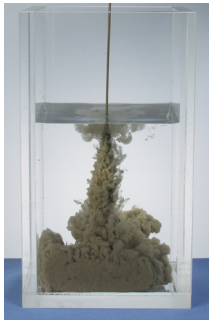
We are also participating in environmental monitoring that has been undertaken by the Japan Soap and Detergent Association (JSDA) since 1998. Currently, we assess the environmental risks posed to the ecosystem targeting four major surfactants in municipal rivers (measured four times a year at seven sites in four rivers). In the surveys conducted so far, the results show that these surfactants have consistently low risks to aquatic organisms.

Initiatives taken in relation to our products

Visco Top high-performance specialty thickener

When undertaking civil engineering work near water (for example, on riverbanks or on the coast), it is vitally important that measures are taken to protect the water from being contaminated. In the case of bridge pier construction for long bridges or suspension bridges that cross ocean straits, because the piers are actually built in the riverwater or seawater, special underwater concrete that has high viscosity and is resistant to washout is used. Furthermore, when construction is undertaken near underground watercourses, care must be taken not to contaminate the groundwater. In this kind of water-related environment, thickening agents must be added to inorganic materials such as grouting materials and concrete to enhance water-immiscible properties.

We have developed *Visco Top*, a high-performance specialty thickener that provides unprecedented viscosity for grouting materials and concrete, and makes it possible to undertake construction work without polluting the riverine or ocean environment. *Visco Top* has been also used in the removal of high-concentration contaminated water from trenches at the Fukushima Daiichi Nuclear Power Plant.



Without the addition of *Visco Top*

With the addition of *Visco Top*

Air & Water Pollution Prevention

Smash alkali-free professional-use detergent

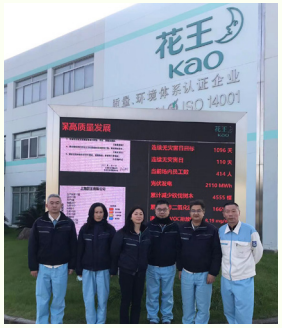
Alkali detergent used for hard-to-remove kitchen stains must adjust (neutralize) its pH when the cleaning liquid is discharged to prevent water pollution, while mild cleansers without alkali generally does not have sufficient cleaning effects.

Smash, the newly debuted kitchen oil stain detergent, works safely with a neutral formula that has the same cleaning power as an alkali detergent, and contributes to preventing water pollution with its gentle ingredients.

Smash kitchen oil stain detergent

Employees' opinions

Visualization of COD and VOC emissions at the Shanghai plant



Mao Jian Quan
Kao Corporation Shanghai

The Kao Corporation Shanghai plant is located in a residential area, making it an urban plant.

To gain the trust of visitors, neighbors, and employees, Kao Corporation Shanghai installed a large LED display screen in 2018 that can be seen from outside the premises. The message from the President and CEO, safety slogan, photovoltaic power generation, and environmental emission data (COD and VOC) are displayed on the LED screen for residents and others outside the company to view and share.

The first step in promoting air and water pollution prevention activities is to disclose and visualize emission data, with the goal of promoting energy conservation and emission reduction not only in the company but also in society as a whole.

Air & Water Pollution Prevention

Stakeholder engagement

Kenji Furukawa
Professor Emeritus, Kumamoto University

Assessments of and expectations for Kao's initiatives on prevention of air and water pollution

The CDP, an international environmental NGO, evaluated global companies' environmental disclosures and initiatives in three areas: Climate Change, Forest, and Water Security, and released the results in December. Ninety-one of the Japanese companies received the highest possible rating (A) in one of the areas. Only 12 companies worldwide have received a triple-A rating, two fewer than last year, in part because of the raising of rating levels. Kao is the only Japanese company to receive the triple-A rating. This means that Kao is recognized as a world leader in environmental information disclosure and initiatives.

The following are comments on Kao's efforts to prevent air and water pollution based on the Kao Sustainability Report 2022 and the Environmental Activity Data Book.

1. Initiatives to prevent air pollution

With respect to the CO_2, NOx, and SOx emissions generated by fuel combustion, the conversion to natural gas has resulted in a steady reduction in CO_2 and SOx emissions, but NOx emissions and the emission unit reduction rates have remained flat. Measures to reduce NOx emissions must be focused on the Wakayama Plant because NOx emissions at the Wakayama Plant are exceptionally high. Kao is to be commended for voluntarily monitoring and working to reduce VOC emissions at each of its plants, even though it does not have any facilities subject to VOC emission regulations at its domestic plants. However, VOC emissions at plants outside Japan are still in the early stages of being measured and some plants have yet to be measured at all. Our request is that VOC emissions at all plants outside Japan should be measured, that the causes of VOC emissions at plants with high VOC emissions should be clarified, and that reduction targets should be set to ensure that reductions are achieved.

2. Initiatives to prevent water pollution

It is commendable that COD emissions have been steadily declining at all Kao production sites. In the future, we would like to see efforts to reduce emissions at plants outside Japan that are emitting large amounts of COD.

3. Sludge volume reduction by tubifex worm

The amount of activated sludge attached and immobilized by carriers increases, and the load on the activated sludge (BOD-SS load) decreases, when attachment and immobilization carriers are added to the aeration tanks of wastewater treatment plants. Keeping BOD-SS load at low levels can allow for wastewater treatment without surplus sludge since tubifex worms are at the top of the activated sludge food chain. It is not easy to create a habitat for tubifex worms in industrial wastewater aeration tanks where water quality, temperature, pH, and amount fluctuate greatly. Kao is struggling to select factory wastewater that can provide a stable habitat for tubifex worms, but reducing sludge volume is possible even without providing a habitat for them. If the BOD-SS load can be reduced, rotifers and oligochaetes will be at the top of the food chain, and a reduction in the volume of sludge will be possible. If this condition can be maintained over a long period, the appearance of acclimated tubifex worms is expected to lead to further sludge reduction. If the optimal growth environment of tubifex worms

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cannot be adhered to, we suggest using attached immobilization carriers in the aeration tanks.

4. In closing

Kao's ESG-oriented corporate management is highly regarded internationally. We expect Kao to steadily promote the transformation from "manufacturing based on consumption" to "manufacturing that recycles resources," as stated in the top message of the Kao Sustainability Report 2022. By involving stakeholders, including the earth itself, in the development of Kao's business, we hope to achieve Kao's purpose of "to realize a Kirei world in which all life lives in harmony."