KIOXIA

KIOXIA Iwate Corporation
Environmental Report2022

KIOXIA Iwate

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Company Profile

Company name:	KIOXIA Iwate Corporation
Current address:	6-6, Kitakogyodanchi, Kitakami City, Iwate
Established on:	December 25, 2017
President:	Koichiro Shibayama
Business contents:	The manufacturing of flash memories

Reporting Period

This report focuses on efforts undertaken during fiscal 2021 (April 1, 2021 to March 31, 2022). This report also includes some other efforts outside that time frame.

Message from Our President

KIOXIA Iwate Corporation
President and Chief Executive Officer
Chief of environmental conservation

Koichiro Shibayama

KIOXIA Iwate was established in 2017 as a production base for flash memories.

Flash memories are essential to our everyday lives as parts that ‘store’ information such as in smartphones, automobiles, and data centers. Due to factors such as the shift to IoT compatibility for home appliances, the scaling of the metaverse, and the dawning of the ‘with Corona’ era, the market of flash memories is expected to continue to grow.

To support the lifestyles of our customers, we will continue to give our all every day efforts to ensure stable manufacturing and grow our business.

Our business is only possible thanks to the vast water and land resources of Kitakami City. We are actively engaged in environmental conservation efforts to protect the local area blessed with an abundance of greenery and pass it on to the next generation. We must also meet the growing social and customer expectations surrounding the global environment. For example, we are engaged in efforts to survey and measure our environmental impact on the region, as well as save energy by reducing the amount of greenhouse gases we produce. This report provides a summary of these efforts. I hope you enjoy reading this report.

Lastly, I would like to take this opportunity to say thank you for your continued support and understanding.

Environmental Policy

The KIOXIA Group established the “KIOXIA Group Environmental Policy” to demonstrate its fundamental philosophy regarding the environment, and shares the contents of this policy throughout the entire group.

- KIOXIA Group’s Environmental Policy -

Mission

KIOXIA Group’s Environmental Policy ensures we conduct business in a way that enhances and preserves the environment. Through purposeful, sustainable actions, we’re prioritizing being responsible stewards of the environment to do our part in maintaining our planet’s health for years to come.

Policy

In addition to complying with environmental laws and regulations in the regions in which it operates, KIOXIA Group considers environmental stewardship to be one of our primary responsibilities. We take actions to limit our environmental impact throughout our supply chain of memory, applied, and related software products that support information infrastructure. From taking systematic and globally accredited steps to reduce our pollution and greenhouse gas emissions from our manufacturing processes, to regularly auditing and reviewing our activities to constantly improve our environmental management system, KIOXIA Group takes deliberate action to ensure efficient and effective operations.

Implementation

1. We strive to make sustainable memory, applied, and related software products by using high-capacity, miniaturized and power-saving technologies. We also perform ongoing environmental assessments of our products and manufacturing processes, as well as a targeted effort to reduce our overall raw material usage.
2. We are doing our part to help prevent global warming through initiatives that directly reduce greenhouse gas emissions. This includes the development of energy-saving technologies – especially within power systems and manufacturing machinery – productivity improvements, and introducing clean energies.
3. We purposefully take actions aligned with the “three Rs” – reduce, reuse, recycle. Specifically, we focus on developing resource-saving technologies and implementing productivity efficiencies, as well as limiting the use of water resources around our plant sites and returning water used in production to the environment after effective purification treatment.
4. We limit environmental risk in our operations by being conscious of the chemicals we use in production and developing technologies that reduce our use of certain chemicals. Through responsible handling and management of production-related chemicals, we also strive to prevent associated pollution.

5 .We strive to reduce the impact of our business activities on biodiversity, and pursue activities that aim to preserve biodiversity in order to help conserve the environment.
6 .We regularly disclose information and updates on our sustainability efforts – including new energy-saving technologies – through environmental advertising, exhibitions, media, and collaboration with various stakeholders including the local communities in which we operate.
7 .We underscore the importance of environmental stewardship with our employees, who promise to keep sustainability top-of-mind in all business activities.

This Environmental Policy is core to KIOXIA Group's operations – it is available internally to global employees of KIOXIA Group and externally to customers, media, and the general public. We are committed to pursuing corporate activities that are in line with this

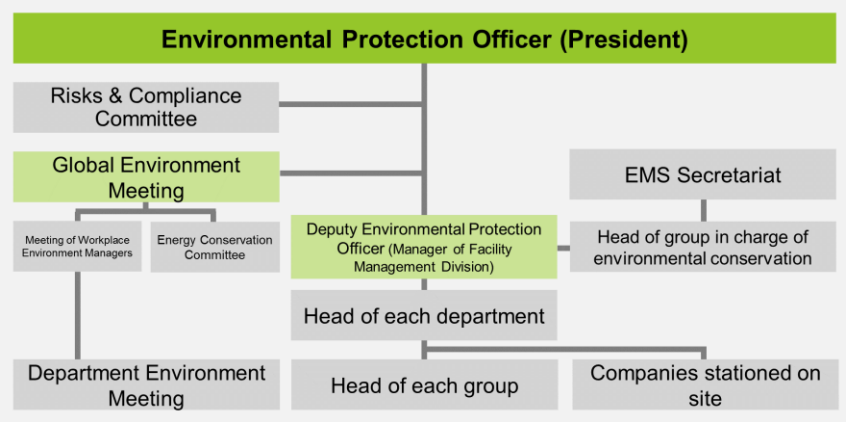
policy.February 1st, 2020
Nobuo Hayasaka
President and Chief Executive Officer
KIOXIA Holdings Corporation

Management Structure for Environmental Conservation

Environmental Conservation Team Structure

To continuously and effectively promote environmental conservation efforts, we have established an environmental conservation team structure led by the president, and have outlined responsibilities and authorities. As a forum to deliberate environmental conservation matters, we have set up the Global Environment Meeting to deliberate the achievement rate of our environmental targets, compliance with environmental laws and regulations, and our impact on the area around the plant.

Matters deliberated at the Global Environment Meeting are shared with all employees, including partner companies, to facilitate clear environmental conservation efforts.



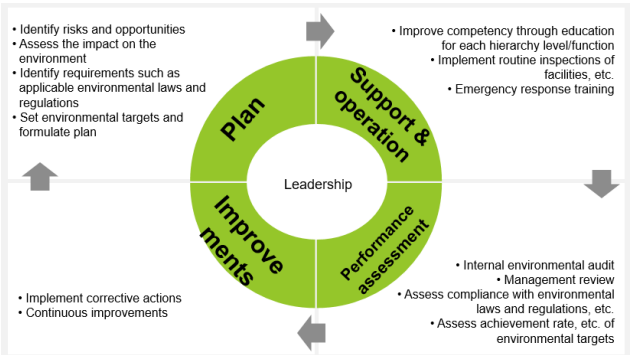
Environmental Conservation Team Structure

ISO 14001

KIOXIA is run in accordance with our environmental management system (EMS). After clarifying environmental risks, we set targets and strive to achieve them.

For environmental risks, we assess the impact on the environment brought about by our business activities involving products and services. Based on these environmental risks, we set targets such as reducing our environmental Impact and preventing pollution, and actively roll out environmental improvements.

Our EMS has acquired ISO 14001 certification, which is the international standard, and is subject to regular audits by an external organization.



Environmental Management System Operation

ISO 14001-Certification

Initiatives to Reduce Environmental Impact

Environmental Target

Every year we set high target values for environmental conservation. In fiscal 2021, while we upwardly revised the target values of some of our targets during the year and set difficult targets, ultimately, we did not achieve these targets. In other items, we were able to achieve all targets. We will analyze the results and make improvements to tie them into our efforts the following fiscal year.

Environmental Target	Target Value	Result Value	Assessment*2
Reduce energy-derived CO_2 emissions (Reduction amount from measures)	10,557 t-CO_2 or more	10,361 t-CO_2	△
Improve greenhouse gas (PFCs) emission intensity*1 (FY2021 standard)	100% or below	79%	○
Improve total waste intensity (including valuable resources)*1 (FY2021 standard)	100% or below	90%	○
Improve total waste intensity*1 (FY2021 standard)	100% or below	90%	○
Improve water consumption intensity*1 (FY2021 standard)	100% or below	92%	○
Improve reductions to chemical substance emissions*1 (FY2021 standard)	100% or below	53%	○

*1 For the intensity target, KIOXIA's production memory capacity intensity is used as an indicator to be able to assess efforts.

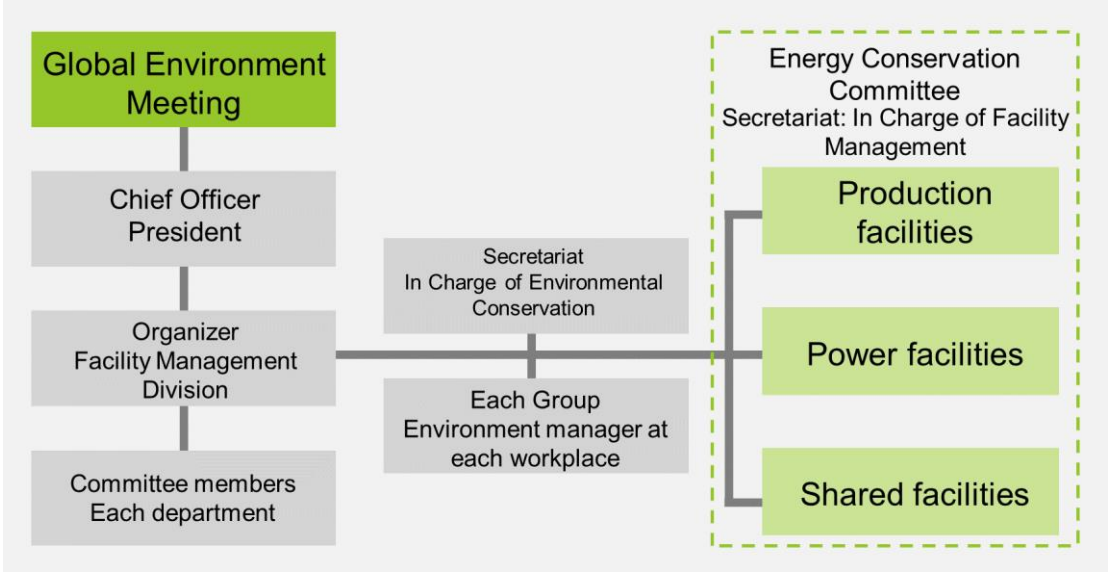
*2 Assessment criteria: ○ = Achievement rate of 100% or more, △ = Achievement rate of 90% or more, × = Achievement rate of less than 90%

Results of Environmental Targets in FY2021

Reduce energy-derived CO_2

For each department of production engineering, manufacturing, and facility management at KIOXIA to engage in intra-organization efforts to reduce energy-derived CO_2, we set up an Energy Conservation Committee to facilitate reducing energy used at our manufacturing facilities, power facilities, and shared facilities.

We set targets to reduce our annual energy-derived CO_2 emissions and plan and roll out measures to reduce CO_2. We started full-scale efforts in fiscal 2021, resulting in a reduction of energy-derived CO2 emissions of 10,361 t-CO2.



Energy Conservation Committee Structure

Classification	Main Measures
Production facilities	Throughput improvements of manufacturing equipment and adopting equipment without heaters or chillers, etc.
Power facilities	Optimizing the operation of power facilities, etc.
Shared facilities	Energy saving in offices and toilets, etc.

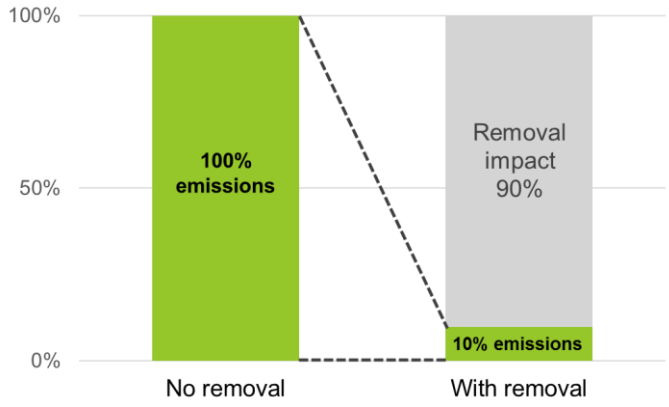
Measures to Reduce Energy-Derived CO2

Reducing Greenhouse Gases (PFCs)

In manufacturing semiconductors, we handle a wide variety of greenhouse gases (PFCs). PFCs gas is used in large volumes for wafer etching, wiring, and forming thin membranes, and thus it is an indispensable material for creating semiconductors. However, the effect of PFCs on global warming is massive, it will cause environmental destruction if emitted in this state. Therefore, at our plant, we actively reduce the emissions of PFCs as an environmental measure.

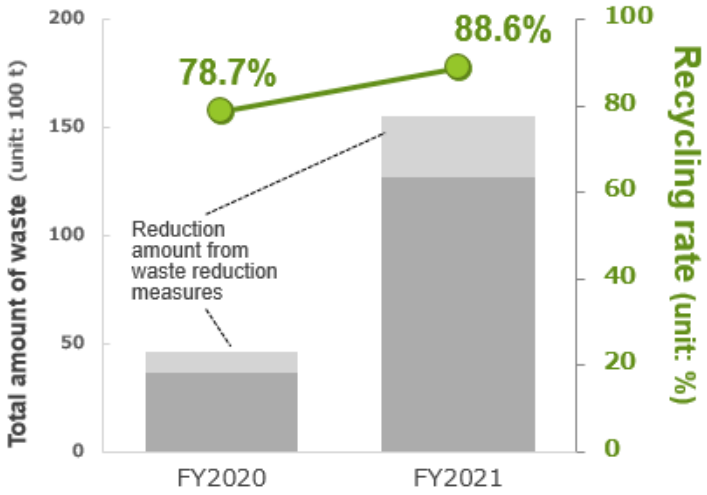
As a measure to reduce emissions, we install all equipment with systems to remove PFCs and optimize the inside of equipment prior to wafer processing. We optimize the frequency at which the inside of the chamber is cleaned and introduce high-efficiency facilities.

Installing systems to remove PFCs and processing global warming substances has contributed significantly to reducing PFCs emissions. We will reduce emissions by installing abatement systems for all equipment to be introduced in the future.



Effect of PFCs Abatement System

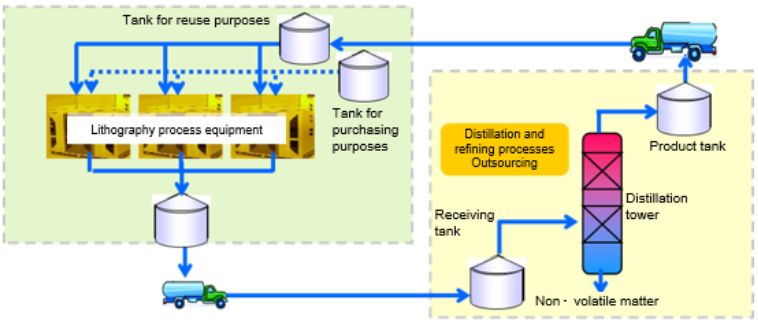
In the manufacturing of semiconductors, much waste is generated, such as sludge from processing waste liquids and waste water that is generated from chemicals used in the manufacturing process. To reduce the amount of waste generated, since starting production in 2019, we have engaged in efforts to reduce waste generation by reducing the amount of chemicals and gas we use, as well as improving our water processing process. By promoting the separation of waste, we promote further recycling and the conversion of waste into valuable resources.



Graph of Waste Amount and Recycling Rate

■ Case study of reducing waste - Reusing waste liquid -

In the process to form circuits on wafers (lithography process) during the manufacturing process, a large amount of waste solvent solution is produced when dissolving the photopolymer resin. We do not dispose of this waste liquid as waste. Instead, by outsourcing the distillation and refining operations and reusing the waste liquid in manufacturing processes, we reduce the amount of waste.



Reusing Waste Liquid

■ Recycling case study

As for sludge and waste liquid processed as industrial waste, we recycle them by turning the sludge into raw materials for cement and converting the waste liquid into a reusable resource.

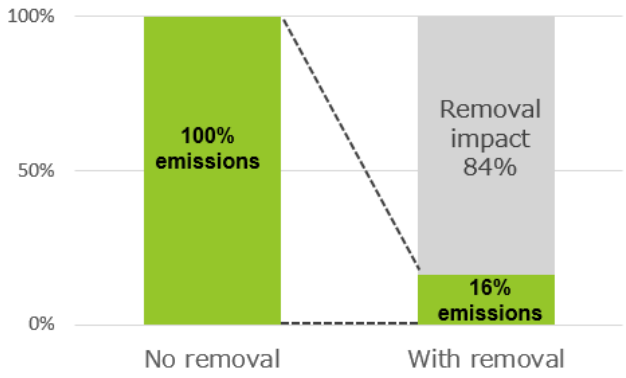
Waste		Example of Reuse through Recycling
Main category	Sub category	
Sludge	Sludge	Raw materials for cement
Waste acid	Fluorine	Acid cleaning chemicals, etc.
	Phosphoric acid	Raw materials for fertilizer, etc.
	Sulfuric acid	Raw materials for sulfuric acid, etc.
Waste alkaline	Ammonia water	Denitration agent for exhaust gas from boilers, etc.
	TMAH (Tetramethyl ammonium hydroxide)	Materials to accelerate combustion, etc.

Recycling Case Study

Reduce chemical substance emissions

We assess the existence of laws and regulations and risks in the event of leakage, identify chemical substances that should be the focus of measures to reduce their environmental Impact, and strive to reduce emissions and find replacements for such chemical substances.

As an example of reducing emissions, we install removal systems to reduce volatile organic compound (VOC) emissions, and boast an installment rate of 100% for targeted equipment. By performing combustion through a removal system, we have reduced the amount of VOC emissions by 84% and reduced the unique odor of organic compounds.



Removal Impact of VOC Combustion Removal System

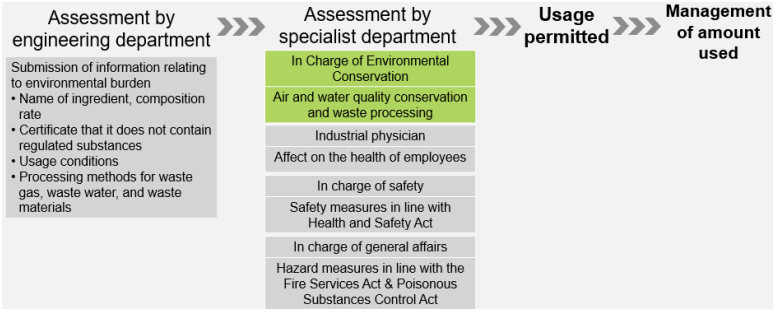
VOC Combustion Removal System

Substance Management in Product Manufacturing

Environmental Assessment of Chemical Substances (Pre-Assessment)

At the KIOXIA Group, we manage chemical substances under the fundamental thinking of “do our utmost not to use chemical substances,” “strive to find replacement chemical substances that have minimal Impact on the environment,” and “if using chemical substances, manage their use appropriately.”

Before using chemical substances, we conduct an environmental assessment to check things like the presence of substances restricted by the KIOXIA Group and the processing methods. Through these efforts, we appropriately manage chemical substances and strive to reduce our Impact on the environment. After using chemical substances, we use an aggregation system to ascertain and manage the amount of chemical substances we use every month.



Flowchart of Environmental Assessment of Chemical Substances

Management of Chemical Substances Included in Products

Regulations on product-related chemical substances are getting stricter year by year. The main regulations are the EU’s RoHS directive, the packaging and packaging waste directive, and the REACH regulation. As well as outside of the EU, laws and regulations similar to the EU’s RoHS directive are in effect all over the world. To comply with these regulations, we select “Procurement-Prohibited Substances” and “Procurement-Controlled Substances” to stipulate which substances must not be included in products and what substances included in products should be managed. At the KIOXIA Group, we strive, where possible, not to use harmful substances in our products and manufacturing processes and to select materials that pose a smaller Impact on the environment.

Classification	Definition
Procurement-Prohibited Substances	This is the group of substances whose inclusion in products procured by KIOXIA is prohibited. Apart from exceptions stipulated in the KIOXIA Group’s Green Procurement Guidelines, the intentional addition of these substances to products is strictly forbidden for all applications, and if there are regulation values, the concentration of the impurities must be less than the relevant regulation value. However, in the case of applications for which the intentional addition of these substances is not strictly prohibited in the stipulations of the regulations, the intentional adding and impurity concentration must be less than the regulation value. [Corresponding substances] 65 classes of substances identified by the KIOXIA Group such as lead and its compounds, mercury and its compounds, cadmium and its compounds, hexavalent chromium compounds, polybrominated biphenyls (PBBs), polybrominated biphenyl ethers (including PBDEs and DecaBDE).
Procurement-Controlled Substances	This is the group of substances whose inclusion in products procured by KIOXIA is subject to management. Different from substances prohibited from procurement, substances subject to procurement controls are not substances for which their intentional addition in products is restricted, but instead refers to substances that KIOXIA must know, without omission, whether they are included and in what concentration. Information on the inclusion and concentration of substances that correspond to substances subject to procurement controls must be presented by suppliers, regardless of intentional adding or impurities. [Corresponding substances] 28 classes of substances identified by the KIOXIA Group such as antimony and its compounds, arsenic and its compounds, beryllium and its compounds, bismuth and its compounds, polycyclic aromatic hydrocarbons (PAHs), bromine and its compounds, etc.

Green Procurement

The KIOXIA Group aims to realize a sustainable society based on the KIOXIA Group Environmental Policy. To achieve this, we established the KIOXIA Group's Green Procurement Guidelines that reflect things like the laws and regulations of each country and the demands of our customers. This guideline summarizes our philosophy as a company with regard to reducing our environmental Impact in resource procurement, as well as our demands with regard to managing harmful substances. We share this guideline with our suppliers. Green procurement refers to actively promoting environmental conservation at our suppliers by procuring products, parts, materials, etc. with a smaller Impact on the environment. To undertake business endeavors in consideration of reducing our environmental Impact and risks caused by harmful chemical substances, efforts across our entire supply chain are essential, and thus the cooperation of our suppliers, which are key business partners, is essential.

By promoting green procurement efforts, we strive to manage chemical substances appropriately to contribute to realizing a better global environment.

Countermeasures against Environmental Risks

Compliance with Environmental Laws and Regulations

In addition to clarifying environmental laws and regulations that apply to us as a company and other requirements, when procuring manufacturing and power facilities, we also check whether the relevant laws and regulations apply or not and take thorough efforts to prevent omissions in complying with laws and regulations.

■ Centralized management of laws and regulations

To ensure complete compliance with environmental laws and regulations that are updated every now and then, we regularly check the details of the said revisions. The details of revisions that apply to our plant are reflected and centrally managed in the "List of Laws and Regulations Registration and Assessment of Compliance."

■ Compliance assessment

Every year we assess the status of our compliance with environmental laws and regulations that apply to the plant. In fiscal 2021, there were no violations regarding all the legal requirements.

■ Checking compliance with laws when investing in and installing equipment

When making capital investments and procuring materials, we determine whether environmental laws and regulations such as the Water Pollution Prevention Act and prefectural ordinances are applicable or not, and for facilities to which they apply, we take action such as submitting notifications as necessary.

Environmental Measurements

To protect the environment around our company premises, we entered into an environmental conservation agreement with Kitakami City. We establish our own strict management standards for air, groundwater, etc. according to laws and regulations, and take measurements to monitor their status.

■ Measurement items

1. Items of environmental conservation agreement with Kitakami City
   To prevent soil pollution, we monitor groundwater measurements (fluorine), and to prevent air pollution, we monitor exhaust gas (nitrogen oxide, etc.).
2. Other items
   We regularly take samples and monitor items such as waste water, odious substances, noise, and vibrations.
   While waste water is discharged into sewers, we establish our own strict standards according to waste water standards to minimize the impact on rivers after sewage treatment.

Groundwater Measurements

Noise Measurements

■ Analysis center

We have set up an internal analysis center and established a system in which we can carry out analysis work swiftly from the samples we take.

KIOXIA Iwate Analysis Center

COD Analysis

■ Checking changes in the environment around the plant

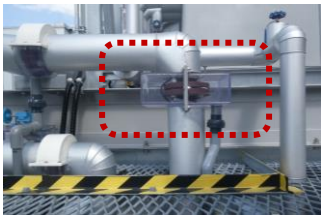
To check the changes in the surrounding environment caused by running the plant, we conducted a survey of the water quality, air quality, and wildlife before and after we opened the plant. In the results of the surveys before and afternew fabrication facility was started its operation, we observed no changes to the surrounding environment.

Environmental Facilities

Environmental facilities such as waste water and emission processing facilities are installed based on our own structural guidelines. For our structural guidelines, we established standards for preventing pollution and reducing risks stemming from chemical substances.

System for Cleaning Exhaust Gas

Dike (Waste Water Relay Tank)



Double Pipeline for Joint

Prevent Leakage Pit

Accident and Emergency Response Training

We consider environmental risks such as accidents involving the handling of chemicals and natural disasters, and implement training (accident and emergency response training) to be able to handle such incidents if they occur.

By sharing what we think together with our partner companies and setting training on assumed work and communication structure, it helps to improve communication throughout the company.

Scenario-Based Training Assuming the Leaking of Chemicals at the Time of Collection

Environmental Communication

Environmental Communication Efforts with Local Community

■ Project to protect cherry blossom trees

In Kitakami City, we are engaged in a project to protect cherry blossom trees to ensure the fantastic cherry blossoms of Tenshochi Park, a popular viewing spot, are around for the next 100 years.

We have participated in the Cherry Blossom Protection Workshop of this project since 2021, helping with the work to provide fertilizer to the young cherry blossom trees in Tenshochi Park.

Participation in Cherry Blossom Protection Workshop

■ Checking changes in the environment around the plant

As three years have passed since we opened our plant in Kitakami City and production efforts are in full gear, we conducted surveys of the water quality of the Kitakamigawa River and the status of the air quality and wildlife around the plant to check any changes to the surrounding environment caused by the opening of the plant. We have not observed any changes in the surrounding environment compared to before the plant was built.

Surveying the Water Quality of Kitakamigawa River (Heiseiohashi Bridge)

Biological Survey of Kitakamigawa River

Efforts to Increase Understanding and Widespread Adoption In-House

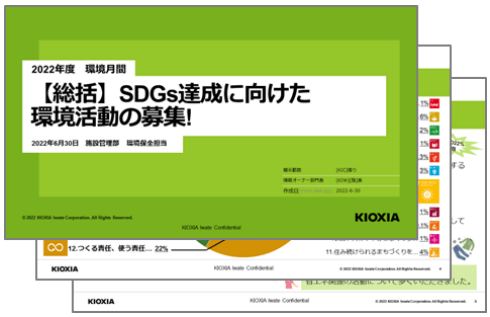
■ Monthly events

In June we carried out an Environment Month, in October a 3R Promotion Month, and in February an Energy Saving Month. We clean up around the plant and hold tours of our in-house environmental facilities to increase the environmental awareness of our employees.


Cleaning around the Plant

■ SDGs initiatives

We engage in efforts to promote the widespread adoption and understanding of SDGs among employees. As efforts in Environment Month, we invited suggestions for environmental activities related to SDGs, and distributed SDGs badges to people involved in environmental conservation operations for them to wear.



Various Data

■ Environmental measurement data

We take environmental measurements based on the environmental conservation agreement with Kitakami City.

1. Results of boiler and exhaust gas measurements

Item	Regulation Value (Environmental conservation agreement)	KIOXIA Management Value	Measured Value	Measurement Frequency
NO_X (ppm)	150	120	22	Twice a year
Dust(g/m^3)	0.1	0.08	0.002	Twice a year

2. Results of groundwater measurements

Item	Regulation Value	KIOXIA Management Value	Measured Value	Measurement Frequency
Fluorine (mg/l)	0.8	0.7	< 0.2	Twice a year

* The measured value is mean value in fiscal 2021

■ PRTR (Ascertain the Emission and Transfer Amounts of Chemical Substances)

PRTR* is a system to ascertain, aggregate, and publish what chemical substances were emitted into the environment (air, public water supplies, soil, etc.) from where and in what volume, and whether they were transferred (transfer amount) as waste, etc.

In the “Act on the Assessment of Releases of Specified Chemical Substances in the Environment and the Promotion of Management Improvement” (PRTR Act), it is obligatory to report the emission amount and transfer amount if the annual handling amount of class I designated chemical substances is 1 t or more (0.5 t or more in the case of a specified class I chemical substance). At our plant, in addition to our emission amounts and transfer amounts, we also disclose information on our handling amounts, consumption amounts, removal processing amounts, and recycling amounts.

PRTR* Pollutant Release and Transfer Register (Unit: tons/year)

Substance No.	Chemical Substance Name	Amount Handled	Emission Amount					Transfer Amount			Consumption Amount	Removal Processing	Recycling
			Air	Public water	Soil	Landfill on business premises	Total	Waste	Sewers	Total			
374	Hydrogen fluoride and its water-soluble salts	1,832.43	0.29	0.00	0.00	0.00	0.29	22.46	0.00	22.46	0.00	1,678.92	130.75
395	Water-soluble salts of peroxydisulfuric acid	5.14	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	5.13	0.00

■ Material Balance

1. Usage amount

Usage			
Item / Fiscal year	2019	2020	2021
Chemical substance (t/year)	875	2,593	8,350
Public water (1,000 m^3/year)	3.3	1.3	1.3
Industrial water (1,000 m^3/year)	1,037	1,688	2,904

2. Emission amount

Emissions			
Item / Fiscal year	2019	2020	2021
Greenhouse gas (1,000 t-CO_2/year)	45	151	376
Chemical substances (t/year)	15	53	63
Waste*1 (t/year)	1,004	3,657	11,909
Waste water (1,000 m^3/year)	912	1,416	2,213
NO_X (t/year)	1.9	3.7	3.3

*1 Total amount of waste

Contact information
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