

KURITA GROUP

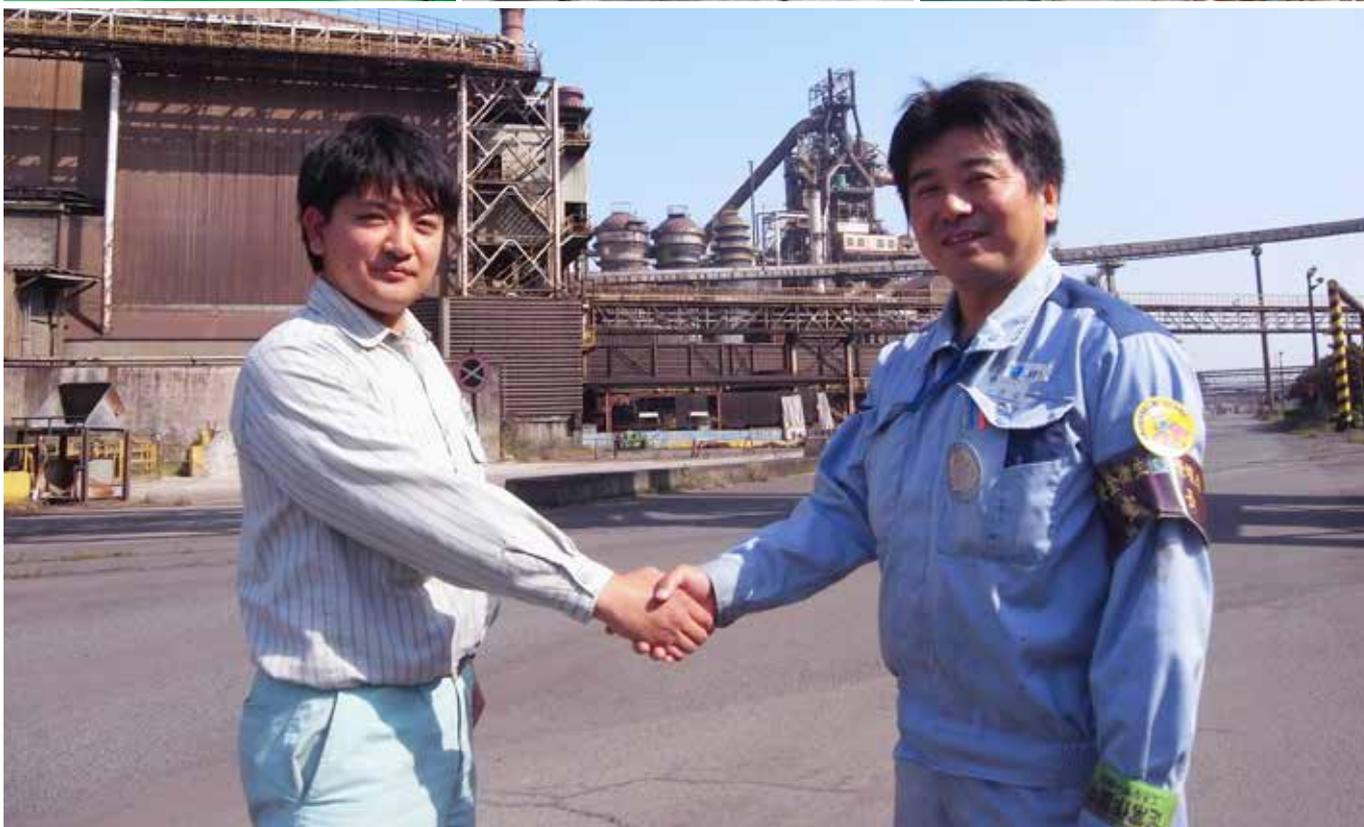
# ENVIRONMENTAL REPORT 2014

For the Year Ended March 31, 2014



# Environmental benefits for customers attained for FY2014 in partnership with them

The Kurita Group identifies the reductions in environmental impact attained with the improvements proposed to and adopted by customers as its original indicator under the name *environmental benefits for customers*. For orders received in the one-year period from April 2013 to March 2014, environmental benefits for customers for FY2014 are quantified by estimating the environmental reductions before and after the introduction of the improvement presented in the written specifications and proposals to customers at the time of receiving orders.



## ■ Corporate Data

Company name: Kurita Water Industries Ltd.  
Address: Nakano Central Park East, 10-1, Nakano 4-chome, Nakano-ku, Tokyo 164-0001, Japan  
Paid-in capital: ¥13,450,751,434  
Representative (President): Toshiyuki Nakai  
Date of establishment: July 13, 1949  
Fiscal year-end: March 31  
Number of employees: 1,529 (parent company)  
4,635 (on a consolidated basis)  
(As of March 31, 2014)

## ■ Profile

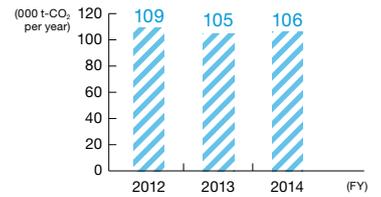
The Kurita Group comprises of the parent company, Kurita Water Industries Ltd., its 40 subsidiaries and one affiliate. The Group's business is divided into two main categories: the water treatment chemicals business, in which we manufacture and sell water treatment chemicals, and the water treatment facilities business, in which we manufacture and sell water treatment facilities and provide related maintenance services. We have long been contributing to the development of industry and society as a leading company in the field of water treatment based on our corporate philosophy, "Study the properties of water, master them, and we will create an environment in which nature and man are in harmony." In the 21st century, which is sometimes called the "century for the environment," we are committed to making contributions to society by achieving advanced water management with our latest products, technologies and services to ensure that water of appropriate quality and quantity will always be available, whenever and wherever it is needed.

# Environmental Benefits for Customers

Fuel and electric power consumption cuts with the use of water treatment chemicals for boilers and cooling facilities, and water conservation with the use of wastewater reclamation systems

**105,744**<sup>\*1</sup> t-CO<sub>2</sub> per year

On average, a single household emits about 4,760 kg<sup>2</sup> of CO<sub>2</sub> per year. The emissions reduction of 105,744 tons is therefore equivalent to the total amount of CO<sub>2</sub> emitted by about 22,200 households in one year.

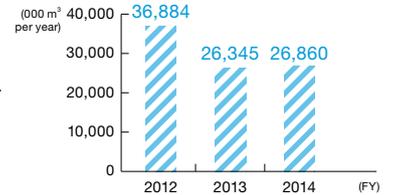


CO<sub>2</sub> emissions reduction

Water savings

**26,860,000** m<sup>3</sup> per year

On average, a single household consumes about 300 m<sup>3</sup> of water per year. A 26,860,000 m<sup>3</sup> saving of water is therefore equivalent to the total amount of water consumed by about 89,500 households in one year.

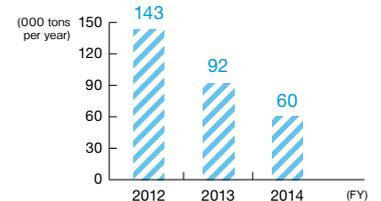


Waste reduction

Reduction of sludge with the use of dehydration agents and anaerobic wastewater treatment facilities, and waste reduction with the introduction of drying machines

**59,695** tons per year

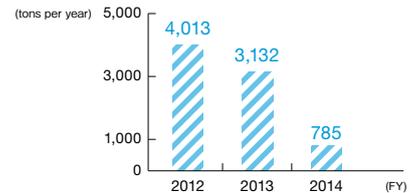
On average, a single household generates about 1,424 kg of waste<sup>4</sup> per year. The waste reduction of 59,695 tons is therefore equivalent to the total amount of waste generated by about 42,000 households in one year.



Reduction of environmentally harmful substances

Removal of hazardous substances by the use of heavy metal stabilizers, and reduction in the use of chemicals through replacement with a regeneration-type demineralizer

**785** tons per year

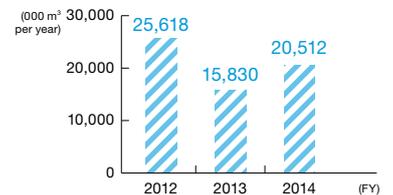


Wastewater treatment

Reduction in the amount of wastewater treated by wastewater treatment systems

**20,512,000** m<sup>3</sup> per year

The standard size of a swimming pool is 50 m long, 20 m wide, and 1.7 m deep, and its volume is 1,700 m<sup>3</sup>. The 20,512,000 m<sup>3</sup> of wastewater treated is therefore equivalent to the volume of water from about 12,000 swimming pools.

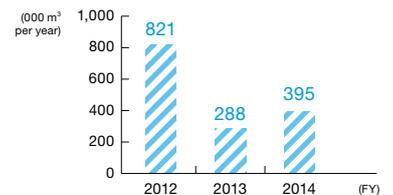


Remediation of contaminated soil

Reduction in the volume of contaminated soil and groundwater removed by excavation or treated by in-situ purification

**395,000** m<sup>3</sup> per year

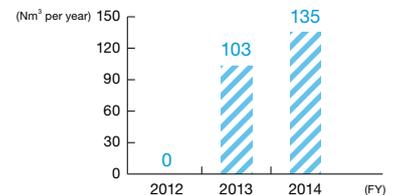
The remediation of 395,000 m<sup>3</sup> of contaminated soil (1 m<sup>3</sup> of soil weighs 1.8 tons) is equivalent to about 71,100 10-ton truckloads.



Air pollutant treatment

Amount of exhaust air containing odor components treated with catalytic decomposition systems

**135** Nm<sup>3</sup> per year



\*1. CO<sub>2</sub> emission factors used for the calculations: electricity: (0.476 kg-CO<sub>2</sub>/kWh for domestic customers, 0.766 kg-CO<sub>2</sub>/kWh for Chinese customers), gas: 2.23 kg-CO<sub>2</sub>/m<sup>3</sup>, Class-A heavy oil: 2.71 kg-CO<sub>2</sub>/l, tap water and sewage water: 0.65 kg-CO<sub>2</sub>/m<sup>3</sup>. The conversion factor used for electricity is the one in the "Environmental Action Plan of Electric Power Companies" that was announced by the Federation of Electric Power Companies of Japan in September 2012. Reduced CO<sub>2</sub> emissions attributable to water conservation is also included.

\*2. According to data on CO<sub>2</sub> emissions from households provided by the Japan Center for Climate Change Actions

\*3. Calculated based on the average water consumption per month at four-person households, which is shown in a document on tips to save water from the Bureau of Waterworks, Tokyo Metropolitan Government

\*4. Amount of waste generated by a household of four members, which is calculated based on per-capita waste generation shown in the Annual Report on the Environment, the Sound Material-Cycle Society and the Biodiversity in Japan 2013 (released by the Japanese Ministry of the Environment in June 2013)

## Editorial Policy

We have published this report to help our stakeholders have a deeper understanding of the Kurita Group's environmental improvement activities. In the report, we disclose examples and results of our activities in line with the three aspects of *technological innovation*, *customer needs* and *internal change* and based on our Basic Environmental Improvement Policy. In creating this report, we referred to the Environmental Reporting Guidelines 2012 of the Japanese Ministry of the Environment. All of the product names listed in this report are registered trademarks or trademarks of the Kurita Group or other companies.

Organizations covered: Kurita Water Industries Ltd. and other domestic Kurita Group companies

Period covered: Fiscal 2014 (April 1, 2013 to March 31, 2014). The report also mentions some policies and targets set for April 2014 onwards

# The proactive efforts of our employees to improve the environment leads to growth of the Kurita Group

The Kurita Group is active in improving the environment in a global effort to reduce the environmental impacts of customers and society. Professor Katsuhiko Kokubu, an expert in environmental management, interviews Kurita Water Industries president Toshiyuki Nakai on the positioning of these activities as well as initiatives to stimulate them.

## The Kurita Group's environmental improvement activities are important, as they embody its corporate philosophy.

**Kokubu:** Environmental efforts by businesses and organizations have been gathering momentum over the past two decades as activities not only for statutory compliance but for proactively reducing the environmental impacts of their business activities and attaining ongoing improvements. Today, a major change is taking place in this trend: a shift of objectives of environmental improvement activities from fulfilling their corporate responsibility to creating value for society in connection with their business or achieving harmony between profitability and social value in the context of their corporate strategies.

**Nakai:** I believe that the creation of social value through environmental improvement activities is true of our Group's business activities. We help build a sustainable society and enable our customers to improve their environmental performance by developing new products and technologies that contribute to the environment and offering our products, technologies and services. This is a key activity that embodies our corporate philosophy and we will continue with it as our policy. Next year, we will embark on environmental improvement activities at our overseas operating companies to extend our activities across the entire Kurita Group. To make our activities global, it will be vital that we proceed on the basis of our corporate philosophy.

**Kokubu:** I think that is a good idea. If I could add to that, one thing that Japanese firms with effective overseas environmental efforts share is a focus on the motivation of local staff in accordance with the circumstances in each country and region on the assumption that overseas standards differ.

**Nakai:** I agree. Environmental improvement activities in different countries and regions can be diversified on the basis of respect for differences in systems, cultures and customs. However, as we aim for global expansion, the Kurita Group shares a common approach of serving society extensively through environmental improvement activities based on our

corporate philosophy. I hope that our employees in Japan and abroad will have deeper insight into that.

**Kokubu:** I very much hope to see your group's environmental activities expanded on a global scale. What about the aspect of new product and technology development as a basis of the activities?

**Nakai:** Again last year we created new products, technologies and services that help reduce environmental impacts and we have begun proposing them to customers in Japan and overseas. One of them is a system for real time monitoring of the coagulation process in the factory wastewater treatment. That enables the addition of inorganic coagulants in accordance with the wastewater quality and changes in water volume. In contributing to customers' environmental efforts, it helps them reduce the volume of sludge generated from inorganic coagulants along with the consumption of inorganic coagulants and other chemicals.

Another is a new contract for the maintenance of water treatment facilities. Unlike conventional maintenance, it is not confined to the replacement of resins, membranes and other expendable supplies. It also gives proposals to customers from the perspective of visualizing the operation status and reducing utility costs. With respect to environmental benefits for customers, it will help reduce power consumption, water consumption and CO<sub>2</sub> emissions.

Going forward, we will continue with intensive development efforts to upgrade our technologies and proposals. We will propose solutions to the various challenges customers face in water and the environment in a bid to create new value.

## The Kurita Group's environmental improvement activities consist of the proactive actions of individual employees.

**Kokubu:** The Kurita Group has been regularly publishing its environmental reports for 10 years. I was consulted about



**Katsuhiko Kokubu**

Professor, Graduate School of Business Administration, Kobe University

developing an indicator of environmental benefits at the stage of preparing for the initial publication. Since then, I have been working with you for more than ten years. Meanwhile, you have been continuously working on environmental improvement activities, creating systems and recording a number of achievements. Are there any new areas that you plan to focus on in the

Katsuhiko Kokubu ● Professor, Graduate School of Business Administration, Kobe University  
 Earned a Ph.D. in business administration with the completion of the doctorate course at the Graduate School of Business of Osaka City University in 1990. He has served on many different committees, including chair of the Committee for Research on Promotion of Development of Environmental Business and for Environmental Accounting appointed by the Ministry of Economy, and member of the Working Group for the Revision of the Environmental Accounting Guidelines for the Ministry of the Environment. Also serving as an expert member in the Expert Working Group Meeting on Improving Governments' Role in Promoting Environmental Management Accounting under the United Nations Division for Sustainable Development, he is a world leader in environmental management and accounting and in CSR management.



## Toshiyuki Nakai

President, Kurita Water Industries Ltd.

future?

**Nakai:** We appreciate your strong technical guidance. We began our environment activities in earnest at Kurita Water Industries in 2004 and later expanded to Group companies in Japan. Next year, the activities will go beyond national borders and will begin at overseas Kurita Group companies as well. I think that our PDCA

system for monitoring the performance of activities has just been improved. To stimulate the activities further, I think that we need to step up those activities that involve our employees. We will introduce new initiatives for this purpose in FY2015.

The first initiative will be to create slogans that will familiarize all our employees with environmental improvement activities. For example, a slogan of *100% environmental independence!* is based on a comparison of reductions in annual CO<sub>2</sub> emissions attained by customers with our proposed solutions and our internal annual CO<sub>2</sub> emissions. If the first figure is higher than the second, the Kurita Group may be deemed independent in CO<sub>2</sub> emissions. We are thus working to raise our independence from the current level of below 60% to 100%. Another slogan of *reducing waste by an amount equivalent to the full capacity of one domed baseball stadium!* expresses a target for customers' cumulative total waste reduction with our proposed solutions using one domed baseball stadium. In the past ten years, the cumulative total waste reduction is equivalent to half the capacity of the stadium. We are working to increase the pace of the efforts so that we can double it to reach the full capacity of the stadium in six years, or in 2020. Our employees' duties are related to at least one of these slogans without exception. I hope that they will have a good awareness of the issues and carry out the activities.

**Kokubu:** The trend towards integrated reporting is gathering attention. It combines corporate sustainability with financial factors to deliver a concise report. Amid this trend, it is vital to give a plain and objective report on environmental improvement activities and other areas with the use of indicators.

In this sense, slogans are easy for stakeholders to understand in terms of the corporate orientation and the yardstick of activities.

**Nakai:** We also thought that our employees' awareness would be raised through their environmental improvement activities not only in their workplaces but also at home

### Slogan 1 for Environmental Improvement Activities

What is "100% environmental independence!"?

Environmental independence

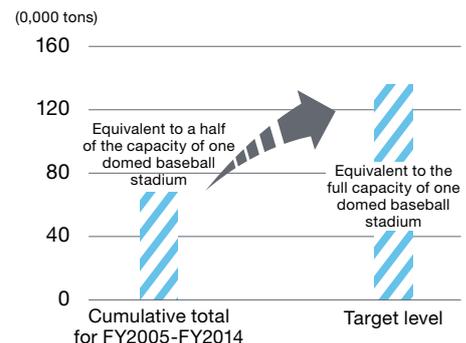
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$$\frac{\text{Environmental benefits (in CO}_2\text{) for customers in a single fiscal year}}{\text{Internal environmental impact (in CO}_2\text{) in a single fiscal year}}$$

For FY2014, our environmental independence stood at 58%. We are striving to reduce our own CO<sub>2</sub> emissions and increase our customers' CO<sub>2</sub> emissions reduction with a view to swiftly exceeding 100%.

### Slogan 2 for Environmental Improvement Activities

What is "reducing waste by the amount equivalent to the full capacity of one domed baseball stadium!"?



During the decade-long period from FY2005 to FY2014, cumulative total waste reduction was equivalent to half capacity of one domed baseball stadium. We are aiming to double waste reduction to the full capacity of the stadium in the seven years to FY2021.

and in their local communities. We have therefore decided to launch an event that encourages more extensive activities. We will invite stories about experiences, photos, pictures and other aspects related to the environment from employees in Japan and abroad as well as from their family members.

**Kokubu:** I have long recognized the Kurita Group's emphasis on involving and motivating employees.

I hope that you will take advantage of your new initiatives to step up environmental improvement activities.

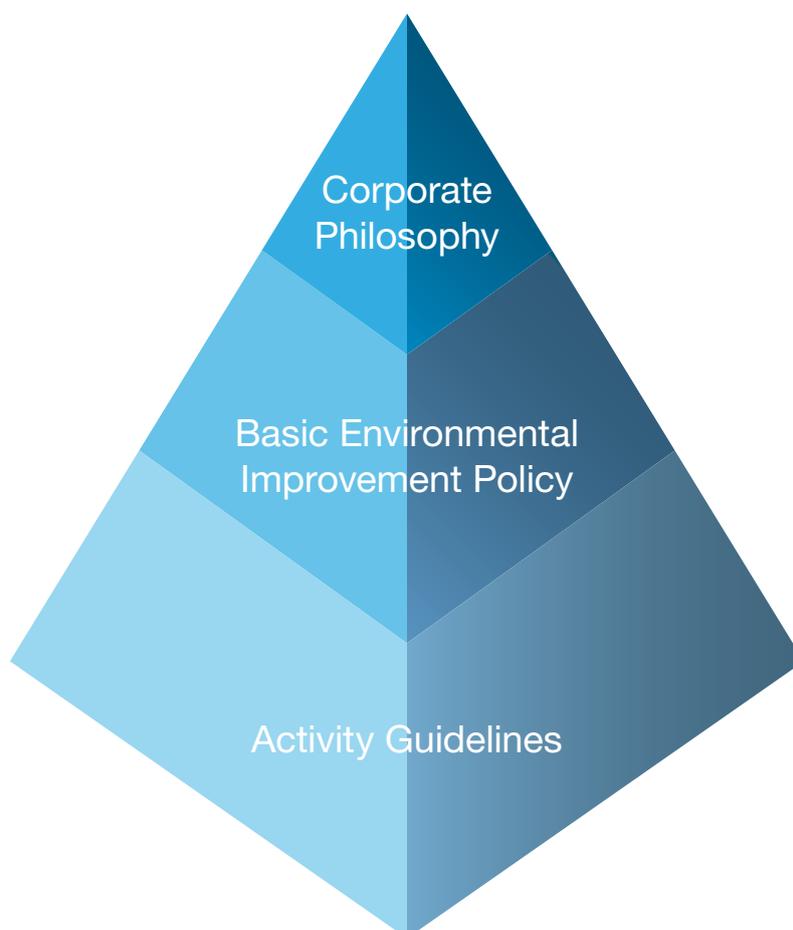
**Nakai:** Thank you. I believe that our employees' more proactive participation in environmental improvement activities will lead to the corporate growth of the Kurita Group and will enable us to make a greater contribution to creation of a sustainable society.

## Approach to Environmental Improvement Activities

The Kurita Group has adopted the Basic Environmental Improvement Policy and Activity Guidelines based on its Corporate Philosophy.

### Corporate Philosophy

**Study the properties of water, master them,  
and we will create an environment in which  
nature and man are in harmony.**



### Basic Environmental Improvement Policy

The Kurita Group will conduct business activities based on its corporate philosophy and will endeavor to solve water and environmental issues with the aim of making broad contributions to society.

### Activity Guidelines

1. We will contribute to the realization of a sustainable society by developing new products and technologies conducive to environmental improvement.
2. We will work with customers to improve the environment by providing products, technologies, and services that boost productivity, reduce environmental impact and offer innovative energy solutions.
3. In conducting daily business activities, we will reduce environmental impact through operational improvement and innovation.

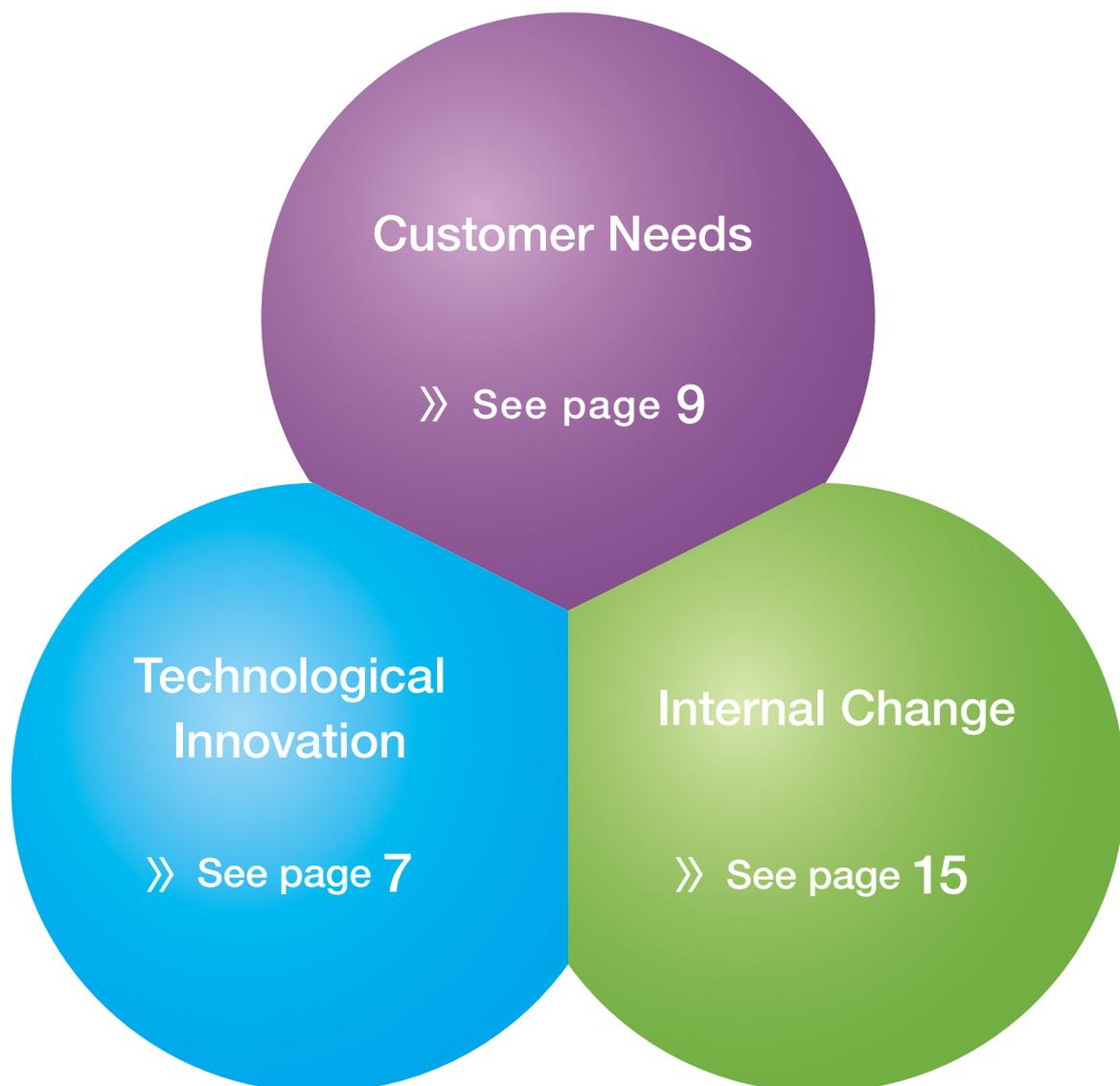
We pursue environmental improvement activities  
in three aspects:

*technological innovation, customer needs  
and internal change.*

*Technological innovation* are environmental contributions to the building of a sustainable society through the development of new products and technologies that improve the environment.

*Customer needs* refer to contributions to the environment by responding to the current needs of customers for environmental improvement with products, technologies and services.

*Internal change* is an environmental contribution aimed at constantly reducing our impact on the environment by improving and introducing new ideas to internal operations.



# We are committed to creating new products and technologies that help solve problems related to water and the environment.

The Kurita Group is working to develop new products and technologies helpful to environmental efforts as a contribution to creating a sustainable society.

The following showcases some of these new products and technologies.

## New products and technologies developed to contribute to environmental improvement

Improvement targets	New products and technologies
CO <sub>2</sub>	<ul style="list-style-type: none"> <li>● Chemicals that improve fuel consumption by maintaining a clean heat transfer surface in low-pressure boilers</li> <li>● Chemicals that reduce the occurrence of defects by preventing dirt from adhering to paper in the papermaking process</li> </ul>
Waste and water pollutants	<ul style="list-style-type: none"> <li>● Suspended solids coagulation monitor for the reduction of sludge generation in wastewater treatment</li> <li>● Space-saving coagulation and high-speed sedimentation device for the formation of pellets from suspended solids in wastewater</li> <li>● Wastewater Fenton (oxidation decomposition) treatment system that generates little sludge</li> <li>● Anaerobic wastewater treatment device for low-concentration organic wastewater using a carrier-supported anaerobic microorganism</li> <li>● Aerobic wastewater treatment device that suppresses the generation of excess sludge using animalcules that feed on sludge</li> </ul>
Environmentally harmful substances	<ul style="list-style-type: none"> <li>● Twin-bed one-tower ion-exchange equipment using a small amount of regenerating chemicals (acid/alkali)</li> </ul>
Soil and groundwater pollutants	<ul style="list-style-type: none"> <li>● Permeable reactive barrier technology to purify groundwater polluted by heavy metals (fluorine, arsenic, hexavalent chromium)</li> </ul>



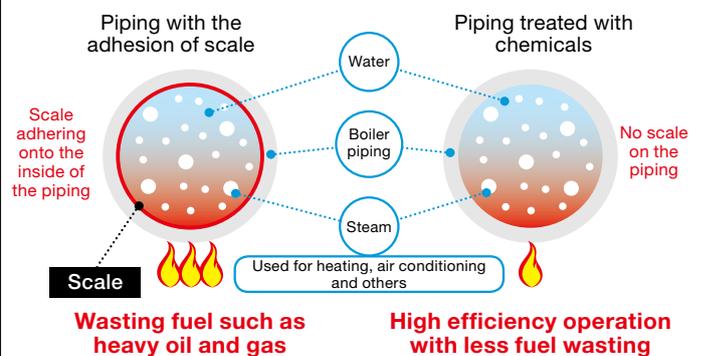
The Kurita Group's Research and Development Base  
Kurita Global Technology Center (Nogi-machi, Shimotsuga-gun, Tochigi Prefecture)

## 1 Chemicals for keeping clean the heat transfer surfaces of low pressure boilers to enhance fuel efficiency

A boiler had a problem with scales adhering internally. A scale remover has been required in addition to conventional chemical for boiler water treatment, but if excessive remover is added, the steel material in the boiler pipe may be damaged.

Kurita Water Industries has invented a multi-purpose chemical preventing scale and corrosion in boilers and removing scales. It has low in corrosivity against steel materials. It also comprises products approved by the United States Food and Drug Administration (FDA). It may be proposed to customers seeking safer and more reassuring boiler water treatment chemicals, such as hospitals and food and beverage factories.

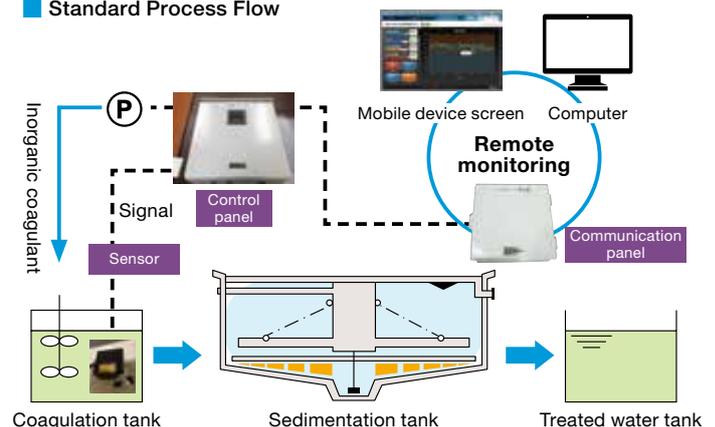
### Cross-Section View of Piping in Boiler



## 2 Suspended solids coagulation monitor for the reduction of sludge generation in wastewater treatment

Kurita Water Industries has developed a unique sensor that monitors the state of coagulation of suspended solids in the coagulation tank before the discharge process and that controls the amount of inorganic coagulant to be added. This facilitates quicker detection of changes in the treatment status compared with the previous technology as well as stable wastewater treatment based on optimal control of inorganic coagulant addition. It will be proposed to customers facing issues of reducing chemicals consumption and reducing sludge generated by inorganic coagulant.

### Standard Process Flow



### 3 Cooling water treatment chemicals made solely from food additives in consideration of safety

In recent years, there have been growing needs among customers running hospitals, food and beverage factories and the equivalent for safety and reassurance of boiler water treatment chemicals and cooling water treatment chemicals, to ensure compliance with the Food Safety System Certification (FSSC) 22000 international standards for food safety management systems and the Hazard Analysis and Critical Control Point (HACCP) monitoring systems.

Kurita Water Industries has already developed boiler water treatment chemicals produced solely from food additives and adopted containers and sealing for new products to achieve a high level of quality control comparable with that of food factories. Applying these technologies to cooling water treatment chemicals, Kurita Water Industries has been the first to develop two different cooling water treatment chemicals, one for open cooling water systems and the other for closed cooling water systems.

With boiler water treatment chemicals and cooling water treatment chemicals made from food additives, Kurita Water Industries will offer comprehensive proposals for water treatment with enhanced safety and reassurance.

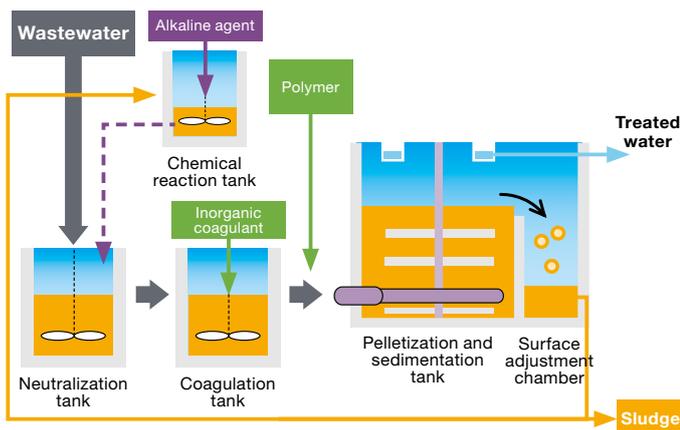


The manufacturing process is under strict quality control.

### 4 Space-saving coagulation and high-speed sedimentation device for the formation of pellets from suspended solids in wastewater

Kurita Water Industries has developed an inorganic wastewater treatment system. Requiring less space and reducing sludge generation, it incorporates the high density solids (HDS) method, which circulates inorganic sludge in a state in which it is in contact with alkali to reduce its volume by increasing its density, in combination with technology for quick sedimentation by preparing sludge flocs in a pellet form characterized by high sedimentation velocity. It will be proposed to steel manufacturers and other customers handling large quantities of inorganic wastewater.

#### Outline of Process Flow

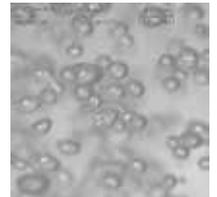


### 5 Ultrafine bubbles aeration systems that reduce power consumption for aeration tanks

Kurita Water Industries has developed a membrane aeration system that generates ultrafine bubbles with an approximate diameter of 1 mm to increase the oxygen dissolution efficiency for supplying the oxygen necessary for microorganisms in the aeration tank in the wastewater treatment process.

With oxygen readily dissolved, it helps downsize and decrease blowers, which are heavy consumers of electric power for the aeration tank.

The system will be proposed to customers facing a challenge of reducing power consumption in the wastewater treatment.



Ultrafine bubbles with an approximate diameter of 1 mm



Ultrafine bubble aeration system

## Topics

### Carrier-type anaerobic water treatment system was recognized with a prize from the Minister of Economy, Trade and Industry.

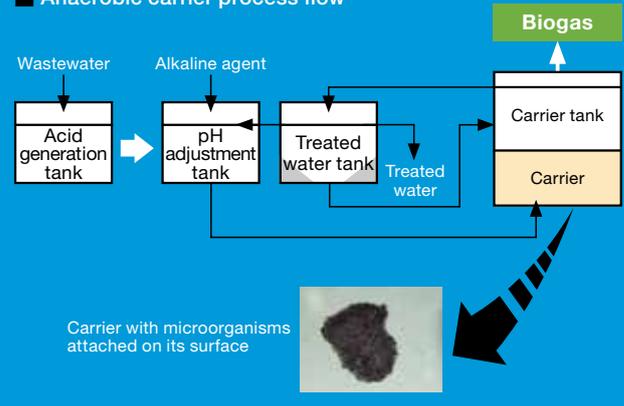
Kurita Water Industries won a Minister of Economy, Trade and Industry prize at the 40th Japan Society of Industrial Machinery Manufacturers (JSIM) Annual Excellent Environmental System Award for this system it created with a newly developed resin fluidized bed carrier. This is a wastewater treatment facility that processes organic substances in wastewater with the use of the functions of anaerobic microorganisms. To maintain the microorganisms necessary for the treatment on the carrier surface, the conventional anaerobic system had a problem with dissolution and outflow of sludge attached with microorganisms. However, the new system removes concerns about the dissolution and outflow and performs anaerobic treatment in broader applications, including low concentration wastewater and wastewater with significant load fluctuations.

Kurita Water Industries has proposed it to a wide range of customers in Japan and overseas, including food, beverage, liquid crystal and chemical factories.



The plaque for the prize of the Minister of Economy, Trade and Industry

#### Anaerobic carrier process flow



# Kurita Water Industries helps customers achieve environmental improvements by offering them products, technologies and services.

With a focus on higher productivity, lower environmental impacts and energy creation, Kurita Water Industries is proactive in offering its products, technologies and services. The following demonstrates examples of different solutions involving water and the environment achieved in partnership with customers.

## The Kurita Group's Business

With water treatment chemicals and water treatment facilities as two pillars, Kurita Water Industries operates a business of offering solutions for water and the environment.

### Water treatment chemicals business

#### Manufacture and sale of water treatment chemicals

- Boiler water treatment chemicals
- Cooling water treatment chemicals
- Process treatment chemicals (for the petrochemical, pulp and paper, and steel industries)
- Wastewater treatment chemicals
- Reverse osmosis membrane treatment chemicals
- Equipment and systems for water treatment chemicals (chemical dosing systems, remote water quality management systems, etc.)
- Water treatment effect monitoring/diagnosis services



#### Sale of boiler systems and related maintenance services

#### Water treatment management for boiler and cooling water systems

- Contract-based services (Water treatment and management contract, comprehensive wastewater treatment contract, etc.)

#### Water and environmental analysis

### Water treatment facilities business

#### Manufacture and sale of water treatment facilities

- Ultrapure water production systems
- Water treatment systems
- Wastewater treatment systems
- Wastewater reclamation and reuse systems



#### Maintenance services

#### Ultrapure water supply business

#### Operation and maintenance services

#### Chemical cleaning / Plant facilities flushing services

#### Tool cleaning services

#### Soil and groundwater remediation

#### Manufacture and sale of general household products

- Water purifiers



### Example 1

CO<sub>2</sub> emissions reduced by **3,000 tons**

Wakayama Plant, Air Water Inc.

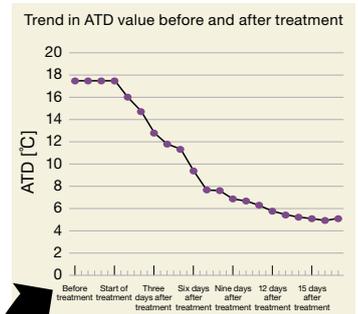
### Solution offered

Improvement in cooling water treatment on the basis of ATD value analysis to reduce power consumption of the raw material air compressor

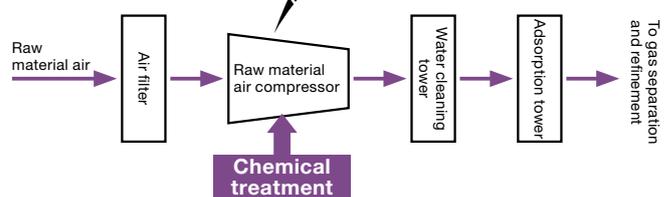
Air Water Inc. is working to reduce resource and energy consumption in all its corporate activities in accordance with its group's environmental basic policy.

Engaging mainly in the production of industrial gas for steelworks, its Wakayama Plant has a process of compressing and expanding the raw material air for the separation and refinement of products. As this process consumed the most energy, the Plant had a challenge of taking a new step. Kurita Water Industries' Chemicals Division proposed cleaning the compressor to remove internal fouling as well as cooling water treatment to keep the compressor clean after cleaning on the basis of measurement of the ATD value in the compressor together with the customer for visualization of the energy loss.

After adopting the proposed solution, no rise in ATD value was observed. In comparison with the past process, it achieved a reduction in CO<sub>2</sub> emissions of 3,000 tons per year, equivalent to 1% of its annual power consumption.



### Process flow before and after the compressor



### Customer's Voice

We appreciate Kurita's data-based proposal and its close support after adoption. In the future, we hope to receive a proposal that leads to long-term stable operation of the facility and to rationalization of the maintenance work.



Left: Mr. Hirotohi Endo, Manufacturing Department  
Right: Mr. Tsuneyuki Shiraishi, General Manager

**Example 2**

Heavy oil consumption reduced by **1.2%**

Tomioka Mill, Oji Paper Co., Ltd.

**Solution offered**

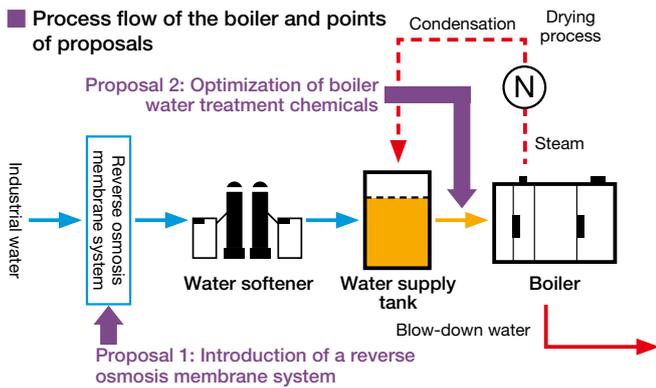
Introduction of a reverse osmosis membrane treatment system and optimization of boiler water treatment chemicals to reduce boiler blow-down water

Oji Paper Co., Ltd. is a manufacturer of newsprint and printing and publication paper. In accordance with the Oji Group Environmental Charter, it engages proactively in energy conservation in an effort to combat global warming.

Its Tomioka Mill uses boiler steam for drying paper for household use. Used in the boiler, industrial water contains calcium and other minerals. If these minerals get inside the boiler, they attach to the heat transfer surface in the form of scales to deteriorate thermal efficiency. In the past, the Mill used a water softening process and increased the boiler blow-down water to prevent concentration in the boiler. The blow-down water gave rise to the problem of heat loss.

At Kurita Water Industries, the Facilities Division and the Chemicals Division proposed improvements to industrial water quality with the use of a reverse osmosis membrane system and optimization of boiler water treatment chemicals.

After adopting the proposed solution, the customer is now able to reduce blow-down water and the consumption of heavy oil as boiler fuel by 1.2%.



**Customer's Voice**

We appreciate the reduction of heavy oil consumption resulting from the proposal as well as the replacement of industrial water with membrane-treated water for showering the desulfurization tower to eliminate the clogging of shower nozzles.

Going forward, we expect to hear proposals about the papermaking process, which involves tremendous water consumption.



Mr. Tetsuya Kita, Facility Department

**Example 3**

Chemicals consumption reduced by **38%**

West Japan Works (Fukuyama), JFE Steel Corporation

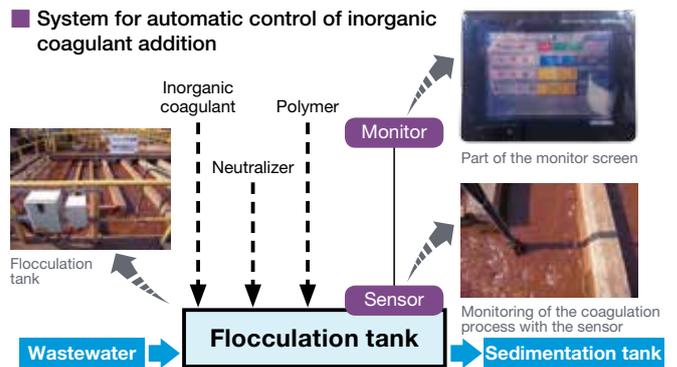
**Solution offered**

Reduced chemicals consumption with the use of a system that monitors the status of the coagulation process and that automatically controls the inorganic coagulant addition

JFE Steel Corporation is working to reduce environmental impacts in all its business activities in accordance with its group's environmental policy. Producing different kinds of steel products, its West Japan Works (Fukuyama) properly treat wastewater generated from the cold rolling and cold-rolled surface finish processes in the wastewater treatment process. To remove suspended solids from the wastewater, it adds inorganic coagulant and other chemicals. To prevent defective coagulation results, the addition of inorganic coagulant was constantly set at a high level and consequently an excessive quantity was added.

Kurita Water Industries' Chemicals Division proposed a system that performs sensor-based real-time monitoring of the coagulation status to automatically control the inorganic coagulant addition.

Its adoption of the solution proposed resulted in a 38% reduction in consumption of inorganic coagulant and other chemicals compared with the conventional process.



**Customer's Voice**

In the past, we monitored wastewater quality at a point close to the discharge outlet. Now, we monitor the coagulation status on a real-time basis in the floc formation tank, which is at a more upstream position. That allows us to swiftly detect changes in the coagulation status and to take quick action. I appreciate it. As wastewater standards and other environmental regulations are likely to be toughened, we hope to receive proposals for improvement that leads to energy and resource consumption reductions in other processes in the works.



Mr. Kiyofumi Shibuya, Manager of Energy Section, Energy Department

**Example 4**

Electric power consumption reduced by **30%**

Mobara Plant, Manufacturing Division, Japan Display Inc.

**Solution offered**

Power loss reduction through optimization of cooling water treatment based on the LTD value analysis

Japan Display Inc. is making ongoing efforts to prevent global warming and to reduce energy consumption in accordance with its environmental policy.

Manufacturing flat-panel displays for smartphones, its Mobara Plant had a challenge of cutting energy consumption while the Environmental Management Department and the Facilities Control Department worked together on environmental conservation.

Kurita Chemicals Kanto analyzed the LTD value for nine months on the basis of chiller operation data to learn that fouling on the chillers resulted in unnecessary power consumption. It proposed cleaning to remove fouling from the chillers, cooling water treatment for keeping the chillers clean afterwards, and a management approach using the LTD value.

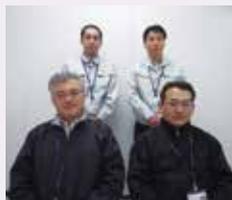
Adopting these solutions enabled a 30% power consumption reduction from the level in the conventional process.



A high efficiency turbo chiller for air conditioning of clean rooms

**Customer's Voice**

We appreciate long-term data collection, the proposal based on the data analysis, and achievement of power consumption cuts. As our plant increases its production, it will be more important to secure the water used in it. We have greater hope for proposals from the Kurita Group on the reclamation and reuse of plant wastewater.



Front row left: **Mr. Jun Sakuma**, Associate Technical Specialist, Facilities Control Section 1, Facilities Control Department  
 Front row right: **Mr. Yoshinori Komoda**, Manager of Facilities Control Section 1, Facilities Control Department  
 Back row left: **Mr. Kenichi Watanabe**, Facilities Control Section 1, Facilities Control Department  
 Back row right: **Mr. Kazuyuki Matsumoto**, Professional in the Mobara Factory Environment Team, Factory Environment Section, Environmental Management Department

**Example 5**

CO<sub>2</sub> emissions reduced by **547 tons**

Kumamoto Technology Center, Sony Semiconductor Corporation

**Solution offered**

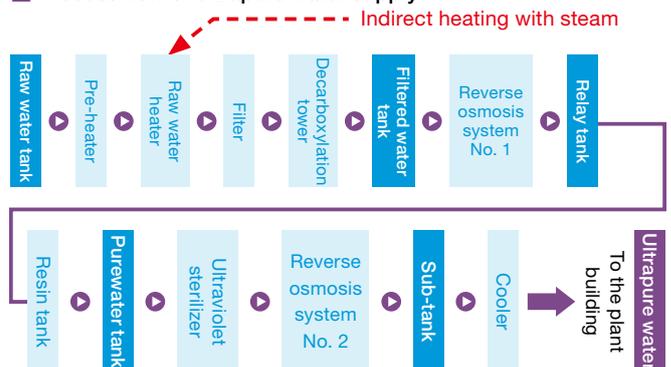
Reducing heating steam with the optimal method of operating the ultrapure water supply line

Manufacturing CMOS image sensors, Kumamoto Technology Center of Sony Semiconductor Corporation is constantly working to cut energy consumption and to minimize the environmental impacts throughout its business activities in accordance with the Sony Group's environmental plan, Road to Zero. Its manufacturing process uses ultrapure water, which is produced with water treatment facilities such as those with reverse osmosis membranes. Raw water needs to be heated before it comes into the reverse osmosis membrane system. The center was seeking to reduce the steam used for heating.

Kurita Water Industries' Facilities Division collected data on temperature trends and the heat radiation loss of different water treatment facilities and conducted studies using simulation software to propose an optimal method of operation that minimizes heating.

Adopting the solution proposed achieved a reduction of heating steam, reducing consumption of heavy oil for preparing steam. As a consequence, CO<sub>2</sub> emissions were reduced by 547 tons per year from the past level.

**Process flow of ultrapure water supply**



**Customer's Voice**

As we confirmed that no problem occurred after changing part of the operation conditions according to the proposal, we decided to adopt the solution proposed. Going forward, we hope to receive proposals not only for utility but for energy conservation and automated control from the perspective of water procurement for the entire plant.



Right: **Mr. Akihiko Nitta**, Senior Manager of the Kumamoto Facility Management Section, Kumamoto Facility Department  
 Center: **Mr. Shinji Nakanosono**, Chief Assistant Manager, Kumamoto Facility Management Section, Kumamoto Facility Department  
 Left: **Mr. Yoshiaki Takamoto**, Assistant Manager, Kumamoto Facility Management Section, Kumamoto Facility Department

Example 6

Helping **maintain Class S performance** under CASBEE assessment

Nakano Central Park East, Tokyo Tatemono Co., Ltd.

Solution offered

Maintenance of design specification performance of the air conditioning cooling water system with optimal cooling water treatment chemicals and LTD value management

Tokyo Tatemono's Nakano Central Park East is an office building at the heart of the redevelopment area around Nakano Station in Tokyo. It has proactively introduced energy saving technologies to attain the highest Class S performance according to the assessment under the Comprehensive Assessment System for Built Environment Efficiency (CASBEE), designed for overall assessment of environmental impacts of buildings at the time of completion.

To maintain Class S performance by means of future operation and management, it is imperative to keep clean the inside of the cooling water system for maintaining the design specification performance of energy-consuming air conditioning cooling water facilities.

Kurita Buil-Tech proposed an annual water treatment program that incorporated management of the LTD value, as an indicator of the fouling level inside the cooling water system, in addition to cooling water treatment chemicals.

Adopting the proposed solution resulted in no surge in LTD level after two years, keeping the performance of the air conditioning cooling water facilities at a high level. In combination with other steps taken by the customer, Class S performance was confirmed in the CASBEE assessment.



Cooling tower and chemical injection system

Customer's Voice

We give high marks to the proposal for the water treatment program, confirming its effect, and to the solution that maintained the design specification performance of the cooling water system two years after it was introduced. We look forward to proposals on the latest technologies for energy conservation.



Mr. Kentaro Miyaguchi, Deputy Manager of Team 1, Management Group, Building Engineering Department

Example 7

Water discharge volume reduced by **89%**

Chemicals consumption reduced by **93%**

Waste generation reduced by **88%**

Toyo Pack (Changshu) Co., Ltd.

Solution offered

Solving a wastewater treatment issue with water reclamation and recycling facilities and an anaerobic carrier treatment system

The Toyo Seikan Group is striving to reduce the environmental impacts of its production activities in accordance with its basic policy for the environment.

Toyo Pack (Changshu) Co., Ltd. is a Toyo Seikan Group company based in the Chinese province of Jiangsu and manufactures beverages in PET plastic bottles with its sterilized packing system. As its production volume has increased, it faced issues such as cutting the water discharge volume, chemicals consumption in the wastewater treatment process, and sludge generation and adaptation to wastewater load fluctuations.

Kurita Water Industries (Suzhou) proposed a rinsing water reclamation system for reclaiming water for cleaning bottles to reuse it as supply water for the cooling water system in the factory and as cleaning water in different production processes in order to address the top priority issue of reducing water discharge volume. Next, it proposed an anaerobic carrier treatment system characterized with resistance to wastewater load changes and limited sludge generation.

After adoption of the solutions proposed, the water discharge volume was reduced by 89%, chemicals consumption was cut by 93%, and waste generation was reduced by 88% in comparison with the conventional treatment.



Water treatment facilities proposed and their functions

- ① Rinsing water reclamation system: reclamation and treatment of rinsing water for reuse
- ② Fluid activated carbon: decomposition of chemicals
- ③ Anaerobic carrier treatment system: adaptation to load changes and reduction of sludge
- ④ Wastewater reducer and concentrator: waste reduction

Customer's Voice

We are grateful for your proposal of multiple solutions with latest technologies from a comprehensive point of view, instead of giving a single proposal. In particular, the rinsing water reclamation was so helpful to us that it allowed us to comply with the water discharge restrictions. We expect to receive proposals for further reduction in water consumption throughout the factory.



Left: Mr. Yang Hainian, Manager of the Work Department  
Right: Mr. Wang Dong, Deputy Manager of the Work Section

### Example 8

Chemicals consumption reduced by **30%**  
Waste generation reduced by **29%**

Fukui Murata Manufacturing Co., Ltd.

### Solution offered

Reduction of inorganic coagulant consumption and sludge generation with the use of organic coagulant

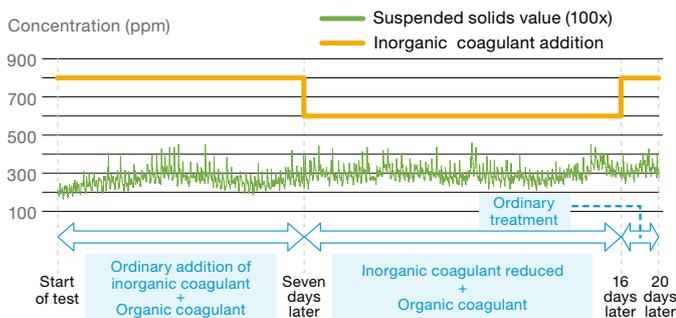
Manufacturing electronic components, Fukui Murata Manufacturing is working on waste reduction in accordance with the Murata Group Environmental Policy.

It added inorganic coagulant in the wastewater treatment process for the purpose of removing suspended solids from the wastewater. However, it faced an issue of reducing the sludge derived from the inorganic coagulant.

Kurita Meiki and Kurita Chemicals Hokuriku proposed an organic coagulant that would help reduce inorganic coagulant consumption and a demonstration test of the reduction effect using a real machine for about one year.

Adopting the solutions proposed has enabled a reduction in inorganic coagulant and sludge generation while keeping the quality of treated water stable. It reduced chemicals consumption by 30% and waste generation by 29% in comparison with the conventional treatment.

### Part of the test data using real machines



### Customer's Voice

We appreciate the chemical consumption reduction results and sludge generation reduction results as expected without affecting the stability of treated water quality.

We hope to receive proposals for improvements in other facilities in the plant that lead to energy and resource consumption cuts and that facilitate decision making on investment.

Left: **Mr. Manabu Seki**, Chief staff member, Environment Maintenance Section, Administration Department  
Right: **Mr. Naoto Horie**, Environment Maintenance Section, Administration Department



### Example 9

Waste generation reduced by **150 tons**  
Chemicals consumption reduced by **70 tons**

Bang Pa-in Plant (Thailand), Minebea Co., Ltd.

### Solution offered

Reduction of chemicals consumption with the introduction of a system that automatically controls inorganic coagulant addition

The Minebea Group engages in environmentally friendly production activities including 3R (reduce, reuse and recycle) waste reduction under its environmental policy in an effort to achieve continued improvements. Located in Thailand and chiefly manufacturing ball bearings, its Bang Pa-in Plant had an issue of reducing chemicals (i.e. inorganic coagulant) used for removing suspended solids in wastewater for reducing sludge generated from the wastewater treatment process in accordance with the policy. The inorganic coagulant was one of the causes of sludge generation. Kurita-GK Chemical proposed a system that would constantly monitor the state of coagulation in the coagulator in the wastewater treatment process with the use of a sensor to control optimal chemicals additions according to changes in wastewater load.

Adopting the solution reduced waste generation by 150 tons per year and cut chemicals consumption by 70 tons per year in comparison with the past treatment.



The coagulator in which the state of coagulation is monitored with the system

### Customer's Voice

Visualizing the effect with the sensor, the system has enabled real-time monitoring. That is a significant help in management. As we need to improve environmentally friendly production activities, we hope to hear proposals for new products and technologies from Kurita as our partner in environmental impact reduction.

Left: **Mr. Yu Yoda**, Assistant Manager of the Plant Maintenance Division  
Right: **Ms. Yuparat Kanthasak**, Assistant Manager of the Plant Maintenance Division



## Example 10

CO<sub>2</sub> emissions reduced by **2,719 tons**

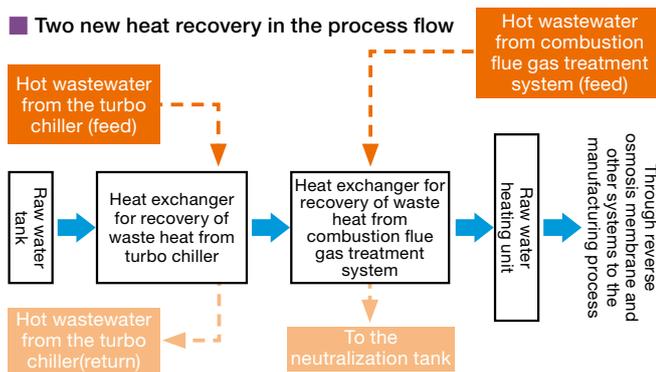
Naka Factory, Renesas Semiconductor Manufacturing Co., Ltd.

### Solution offered

Reduction of energy for heating raw water of the reverse osmosis membrane system by multi-waste heat recovery

Manufacturing microcomputers, system LSIs and other semiconductor chips, Renesas Semiconductor Manufacturing's Naka Factory is working to slash the environmental impacts of its semiconductor manufacturing with a priority focus on preventing global warming in accordance with its environmental policy. Consumed in the semiconductor manufacturing process, ultrapure water is produced with a reverse osmosis membrane system and other water treatment facilities. Steam is used for heating raw water supplied to the reverse osmosis membrane system. It was an issue to replace the energy for steam generation with another heat source. Kurita Water Industries' Facilities Division collected and analyzed data on facilities in the plant to propose the recovery of waste heat from the turbo chiller and the combustion flue gas treatment system. Adopting the solution proposed enabled replacement of energy for steam generation with a new heat recovery and reduced CO<sub>2</sub> emissions by 2,719 tons per year compared to the past operations.

### ■ Two new heat recovery in the process flow



### Customer's Voice

We have long sought to continuously reduce environmental impacts and energy consumption. We appreciate positive results from the new solution. Going forward, as we will actively seek to cut power consumption, we hope to receive proposals on energy conservation.



Left: Mr. Hideki Shoji, Section Manager, Facility Engineering Section, 2nd Naka Water Process Manufacturing Technology Department  
Right: Mr. Yoshitaka Isaka, Engineer, Facility Engineering Section, 2nd Naka Water Process Manufacturing Technology Department

### Other Examples of Environmental Benefits for Customers

- Food factory** CO<sub>2</sub> emissions reduced by **113 tons**  
Reduction of CO<sub>2</sub> emissions derived from heavy oil used as fuel by optimizing boiler water treatment chemicals to achieve high concentration operations and by removing scale from the boiler
- A paperboard factory** CO<sub>2</sub> emissions reduced by **1,914 tons**  
Reduction of gas consumption for combustion treatment by optimizing dehydrating agents to achieve an improvement in the water content in dewatered dredge
- A semiconductor material factory** CO<sub>2</sub> emissions reduced by **116 tons**  
Reduction of CO<sub>2</sub> emissions associated with electric power for driving pumps by increasing the efficiency of water pumps in the ultrapure water facilities and by controlling inverters and the number of inverters
- Multiple factories** CO<sub>2</sub> emissions reduced by **1,407 tons**  
The factories promoted use of returnable containers for water treatment chemicals, thereby reducing CO<sub>2</sub> emissions from the incineration of containers.
- LCD plant** CO<sub>2</sub> emissions reduced by **5,142 tons**  
The plant removed fouling attached to certain parts of the LCD manufacturing equipment, such as chemical substances, to make the parts reusable and prolong their lives. It has thus reduced CO<sub>2</sub> emissions related to manufacturing of new parts.
- General households** CO<sub>2</sub> emissions reduced by **45,475 tons**  
Reduction of consumption of clean water and fuel for heating and of CO<sub>2</sub> emissions after purchasing and installing water saving showers for faucets
- A thermal power station** Air pollutants reduced by **80 Nm<sup>3</sup>**  
Reduction achieved by detoxifying ammonia gas that remains in the tank with the use of a portable device at the time of regular inspection of the ammonia tank

### Glossary of Terms

- Scale** / Separated and solidified calcium, magnesium, silica and other minerals that are dissolved in water
- Reverse osmosis membrane system** / A system that filters water with a reverse osmosis membrane, which blocks ions, germs and other impurities while passing water
- Water softener** / A device that removes calcium, magnesium and other minerals contained in water that may turn into scale
- Condensation** / A process of transforming steam into water
- Blow-down water** / Water discharged for maintaining water quality at a predetermined level
- ATD** / Difference between the temperature at the gas emitted from the compressor and the temperature at the cooling water inlet. This value is used to monitor the status of fouling on the heat exchange tube in the compressor. The larger this value, the more fouling there is on the surface.
- Cold rolling** / Metal rolling process without heating of the metal
- Cold-rolled surface finish** / A plating process for protecting rolled thin plates from rusting
- Suspended solids** / Insoluble substances in water particles of which have a diameter of 2 mm or less
- Inorganic coagulant** / A chemical that collects and coagulates suspended solids in water, thereby separating it from water efficiently.
- Poly-electrolyte** / A chemical which is made from polyacrylamide, a chemical substance, and collects and coagulates suspended solids in water, thereby separating it from water efficiently
- Floc** / A cotton-like mass of solids in water formed by the effect of the coagulant
- LTD / LTD** (Leaving Temperature Difference) means the difference between the condensing temperature of refrigerant used in a refrigerator and the cooling water temperature at the outlet. It is used to understand how many stains are attached to the heating surface of a copper tube, for example. The more stains are attached to the surface, the greater the LTD value is.
- CMOS image sensor** / An element produced from complementary metal oxide semiconductor (CMOS), which is introduced to devices for capturing images in the form of digital data, such as cell phones and cameras
- Utility** / Ancillary facilities for utilities of a factory or building, such as electricity, steam, gas, air conditioners, water and wastewater
- CASBEE assessment** / A method of assessing and rating buildings by various aspects of environmental performance
- Sludge** / A muddy substance that is generated by sedimentation or floating of suspended solids contained in wastewater
- Anaerobic carrier treatment system** / A wastewater treatment system using carriers attached with microorganisms that decompose organic substances in wastewater under conditions with no or little oxygen
- Ultrapure water** / Water with the purity level close to 100% after removing ions, organic substances, air, fine particles, microorganisms and other impurities in water to the fullest degree
- Organic coagulant** / A chemical agent that coagulates suspended solids in water. The level of its function is between that of poly-electrolyte and that of inorganic coagulant.

## We are working to reduce our own environmental impact by enhancing our operations and introducing new approaches.

The following reviews the results for FY2014 and the target for FY2015.

### Results in Fiscal Year Ended March 2014

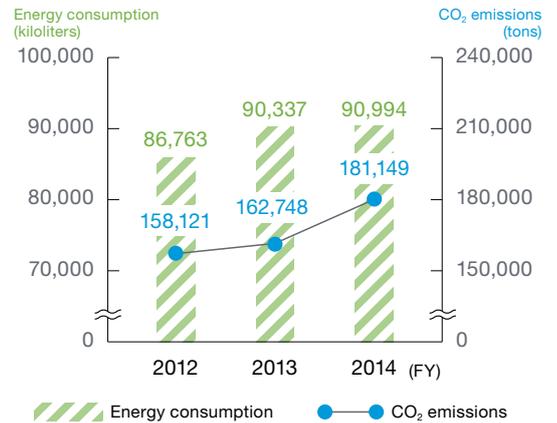
#### Energy use reduction

Item	Target	Result
Energy use (A production sites <sup>*1</sup> )	Below <b>94,233</b> kℓ	<b>90,994</b> kℓ

<sup>\*1</sup> Kurita Group companies which are specified business operators and designated energy management factories of Kurita Water Industries

To ensure compliance with the Act on Rational Use of Energy of Japan (Energy Saving Act), the Kurita Group made efforts to reduce its per-unit energy consumption at its sites as “specified business operators” and “designated energy

management factories” under the law. Mercury lamps in laboratories at the research and development base and on sites were replaced with LED lamps to meet the target in energy consumption in crude oil equivalent.



Item	Result	
CO <sub>2</sub> emissions <sup>*2</sup>	<b>181,149</b> tons	
Breakdown	A production sites	<b>175,610</b> tons
	B Production sites <sup>*3</sup>	<b>3,890</b> tons
	Non-production sites <sup>*4</sup>	<b>1,649</b> tons

To reduce CO<sub>2</sub> emissions, the Kurita Group implemented energy-saving initiatives such as the promotion of Cool Biz and introduction of high-efficiency lighting and air conditioning equipment. However, CO<sub>2</sub> emissions of the entire Kurita Group

increased from the previous fiscal year because energy consumption increased at some ultrapure water supply sites due to changes in customers' production situations and that the CO<sub>2</sub> emission factors rose.

<sup>\*2</sup> Starting from the fiscal year ended March 2013, the subjects of CO<sub>2</sub> emissions have been those under the Energy Saving Act. Accordingly, the subjects exclude gas, tap water and sewage water, and copying paper, which used to be included. For electricity, the actual emission factor in the “CO<sub>2</sub> Emission Factors of Each Electricity Utility” published by the Ministry of the Environment of Japan in November 2012 was used and calculation was made for each site of the Kurita Group.

<sup>\*3</sup> B production sites: Kurita Group companies and sites that manufacture water treatment chemicals and facilities

<sup>\*4</sup> Non-production sites: Kurita Group companies and sites other than those listed above

#### Waste Reduction and Increase of Recycling Rate

Item	Target	Result
Waste generation	Below <b>41,561</b> tons	<b>47,859</b> tons
Breakdown	C production sites <sup>*5</sup>	Below <b>39,767</b> tons
	D production sites <sup>*6</sup>	Below <b>1,388</b> tons
	Non-production sites <sup>*7</sup>	Below <b>407</b> tons
Recycling rate	<b>61.3%</b> or more	<b>76.7%</b>
Breakdown	C production sites	<b>61.2%</b> or more
	D production sites	<b>65.7%</b> or more
	Non-production sites	<b>44.1%</b> or more



<sup>\*5</sup> C production sites: Kurita Group companies and sites where the amount of waste generated is influenced by the production activities of specific customers

<sup>\*6</sup> D production sites: Kurita Group companies and sites engaged in R&D and the manufacture of water treatment chemicals and facilities

<sup>\*7</sup> Non-production sites: Kurita Group companies and sites other than those listed above

To reduce waste generation, the Kurita Group worked to collect valuables at the research and development base and to cut sludge generation in the wastewater treatment process in the tool cleaning services. However, waste generation surged after a growth in operations on some ultrapure water

supply sites and a rise in wastewater load. On a group-wide basis, the target could not be attained. Meanwhile, the Kurita Group achieved its target for the recycling rate by introducing waste sorting and collection to individual sites.

## Improvement Examples

### Kurita Global Technology Center handles waste plastics as valuables.

Under the control of Kurita Water Industries, Kurita Global Technology Center (located at Nogi-machi, Shimotsuga-gun, Tochigi Prefecture) is the Kurita Group's research and development base with cutting-edge equipment for research and development purposes. This center formerly disposed of plastic containers used for sending test samples as industrial waste. Now it deals with them as valuables in a bid to reduce waste generation.



Plastic containers collected

### Sorting of waste and handling some waste as valuables on work sites

Kurita Water Industries sorts waste generated from work sites and prepares storage spaces and containers for cardboards and scrap metal to handle them as valuables in a bid to reduce waste generation.



Above: Storage containers / Below: Storage space

Targets for Fiscal Year Ending March 2015		Approach
Energy use	Reduce per-unit energy consumption* by 1% or more annually in fiscal 2011 onwards	<p><b>A production sites</b> Each of the specified business operators and designated energy management factories within the Group will set a per-unit energy consumption target and an absolute quantity reduction target in a crude oil equivalent and implement measures to achieve the target.</p> <p><b>B production sites and non-production sites</b> Each site will set a reduction target for one or two items (electricity and/or gas) according to its features and implement measures to achieve the target.</p>
Waste generation	Below the previous fiscal year level	Individual sites will set their own targets to continuously endeavor to reduce waste generation and to increase the recycling rate.
Recycling rate	Above the previous fiscal year level	

\* The value calculated by dividing energy consumption by a value closely linked with it, such as production quantity and building floor area

## Targets of Activities

The Kurita Group will adopt the following slogans with the aim of reducing its internal environmental impact and boosting environmental benefits for customers.

Subject	Slogan	Recent Trend and Target										
<p><b>CO<sub>2</sub> ①</b></p> <p>Environmental benefits (in CO<sub>2</sub>) for customers in a single fiscal year</p> <p>Internal environmental impact (in CO<sub>2</sub>) in a single fiscal year</p> <p>(%)</p>	<p><b>100%</b> environmental independence!</p>	<p>(%)</p> <table border="1"> <tr><th>Fiscal Year</th><td>2012</td><td>2013</td><td>2014</td><td>2021 (FY)</td></tr> <tr><th>Value (%)</th><td>69</td><td>65</td><td>58</td><td>100</td></tr> </table>	Fiscal Year	2012	2013	2014	2021 (FY)	Value (%)	69	65	58	100
Fiscal Year	2012	2013	2014	2021 (FY)								
Value (%)	69	65	58	100								
<p><b>CO<sub>2</sub> ②</b></p> <p>Environmental benefits (in CO<sub>2</sub>) for customers (cumulative total)</p>	<p>Reducing CO<sub>2</sub> emissions by <b>600</b> times the capacity of one domed baseball stadium!<sup>*1, *2</sup></p>	<p>(0,000 t-CO<sub>2</sub>)</p> <table border="1"> <tr><th>Fiscal Year</th><td>2012</td><td>2013</td><td>2014</td><td>2021 (FY)</td></tr> <tr><th>Cumulative Total (0,000 t-CO<sub>2</sub>)</th><td>61</td><td>72</td><td>82</td><td>150</td></tr> </table> <p>Equivalent to 340 times the capacity of one domed baseball stadium (2014 total). Equivalent to 600 times the capacity of one domed baseball stadium (2021 target).</p>	Fiscal Year	2012	2013	2014	2021 (FY)	Cumulative Total (0,000 t-CO <sub>2</sub> )	61	72	82	150
Fiscal Year	2012	2013	2014	2021 (FY)								
Cumulative Total (0,000 t-CO <sub>2</sub> )	61	72	82	150								
<p><b>Waste ①</b></p> <p>Environmental benefits (in waste) for customers in a single fiscal year</p> <p>Internal environmental impact (in waste) in a single fiscal year</p> <p>(%)</p>	<p>Attaining a waste reduction factor of <b>5!</b></p>	<p>(Factor)</p> <table border="1"> <tr><th>Fiscal Year</th><td>2012</td><td>2013</td><td>2014</td><td>2021 (FY)</td></tr> <tr><th>Factor</th><td>3.0</td><td>2.2</td><td>1.3</td><td>5.0</td></tr> </table>	Fiscal Year	2012	2013	2014	2021 (FY)	Factor	3.0	2.2	1.3	5.0
Fiscal Year	2012	2013	2014	2021 (FY)								
Factor	3.0	2.2	1.3	5.0								
<p><b>Waste ②</b></p> <p>Environmental benefits for customers in waste (cumulative total)</p>	<p>Reducing waste by the amount equivalent to the full capacity of <b>1</b> domed baseball stadium!<sup>*3</sup></p>	<p>(0,000 tons)</p> <table border="1"> <tr><th>Fiscal Year</th><td>2012</td><td>2013</td><td>2014</td><td>2021 (FY)</td></tr> <tr><th>Cumulative Total (0,000 tons)</th><td>53</td><td>62</td><td>68</td><td>136</td></tr> </table> <p>Equivalent to half of the capacity of one domed baseball stadium (2014 total). Equivalent to the full capacity of one domed baseball stadium (2021 target).</p>	Fiscal Year	2012	2013	2014	2021 (FY)	Cumulative Total (0,000 tons)	53	62	68	136
Fiscal Year	2012	2013	2014	2021 (FY)								
Cumulative Total (0,000 tons)	53	62	68	136								

\*1. A non-specific domed baseball stadium is envisioned. \*2. On the assumption that one domed baseball stadium has capacity of 1.24 million cubic meters, 600 times the capacity of one domed baseball stadium is equivalent to 2,430 t-CO<sub>2</sub>, given that one cubic meter of CO<sub>2</sub> weighs 1.96 kg. \*3. On the assumption that the specific gravity of waste is 1.1, 1.36 million tons of waste is equivalent to the full capacity of one domed baseball stadium.

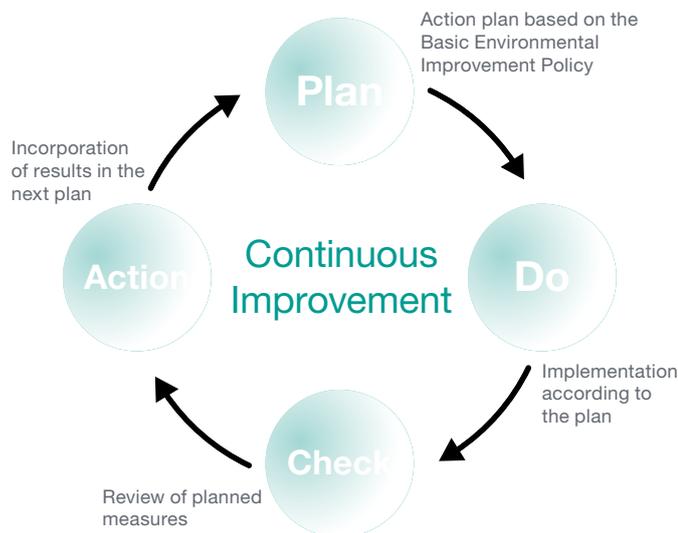
# Environmental Management

In order to execute a PDCA cycle for environmental improvement activities more effectively, we have built up an organizational system to promote the activities across the Group.

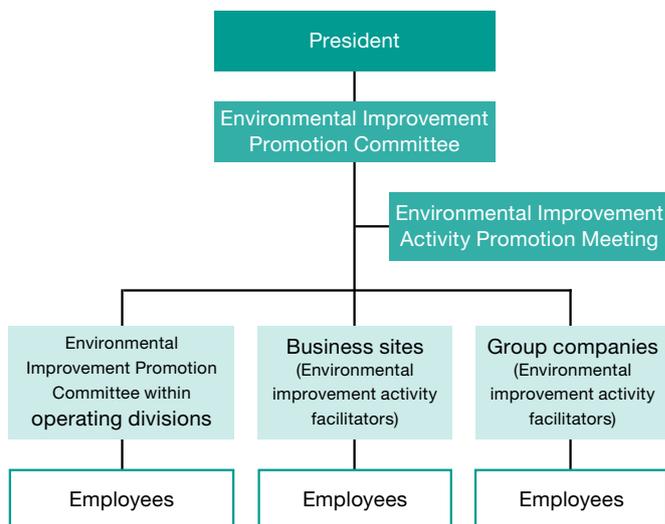
## Environmental Management System

We have established the Kurita Group's Environmental Improvement Promotion Committee chaired by the Kurita director responsible for environmental improvement activities. This committee discusses and sets the Group's policies on environmental improvement activities and related issues.

### PDCA Cycle for Environmental Improvement Activities



### Organizational System for Promoting Environmental Improvement Activities



### Introduction of Environmental Management Systems

Kurita Water Industries has been fostering the establishment and operation of ISO 14001-certified environmental management systems as part of its environmental improvement activities.

[Acquisition of ISO 14001 Certification by the Kurita Group]

Company name	Site	Acquired date
Kurita Water Industries Ltd.	Shizuoka, Tsuruga, Toyoura, and Yamaguchi	July 1998
Kurita Buil-Tech Co., Ltd.	Head office	March 2002
Kurita Chemical Manufacturing Ltd.	Head office and Ako	March 1997
Kuritaz Co., Ltd.		February 2000
Kuritec Service Co., Ltd.	Head office and Tobu, Mie, Iga, Harima, and Oita	February 2003

### Compliance with Environmental Laws and Regulations

In the fiscal year ended March 2014, we received no administrative punishments for noncompliance with laws, regulations, or ordinances nor did we cause any large accidents that had an impact outside the company.

[Major Environmental Laws That Govern the Business Activities of the Kurita Group]

- Water Pollution Control Act
- Act on the Rational Use of Energy
- Act on Promotion of Global Warming Countermeasures
- Sewerage Act
- Noise Regulation Act
- Waste Management and Public Cleansing Act
- Vibration Regulation Act
- Poisonous and Deleterious Substances Control Act
- Air Pollution Control Act
- Fire Service Act
- Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof
- Soil Contamination Countermeasures Act

### Supporting Surveys, Research and International Exchanges in the Fields of Water and the Environment

In 1997, the Kurita Group established the Kurita Water and Environment Foundation, a public interest incorporated foundation, in order to help create and conserve a rich water environment by promoting science and technology.

Through this Foundation, we provide subsidies for surveys, research projects, and international exchange programs in the scientific field concerning water and the environment. In fiscal 2014, the Foundation selected 46 research projects from among 362 applicants and awarded subsidies to selected applicants. Moreover, the Foundation granted prizes of excellence to researchers selected from among those who had received research grants from the Foundation in the past, in recognition of their outstanding research results and social contributions. In addition, the Foundation is supporting the commendation program (Kurita Award) implemented by the Japan Society on Water Environment to motivate young researchers and foster international exchange activities to contribute to the solution of water- and environment-related problems in Asia.



Subsidy granting ceremony held for fiscal 2014

To ensure the disclosure of highly reliable information on a continual basis and to improve the quality of our environmental management, we ask the Institute for Environmental Management and Accounting (IEMA), as a third party, to give us their opinion concerning our environmental activities.



### Environmental Management Evaluation Report

To: Kurita Water Industries Ltd.

#### Outline of the purpose of this report and implemented procedures

As a third party, independent of Kurita Water Industries Ltd., we herein state our opinions with the aim of enhancing the credibility of Kurita Group Environmental Report 2014, through an evaluation of the environmental management efforts described in the report.

To examine how the Kurita Group's environmental management activities were planned and executed, and how environmental performance data resulting from these activities (which serve as a basis for publicly disclosed information) were evaluated and utilized, we interviewed Toshiyuki Nakai, president of Kurita Water Industries, questioned key persons at the company's head office and visited one of its corporate customers. We have also visited Kurita Water Industries' Kameyama Sub-Branch to check related documents, ask questions to persons in charge, and check whether the source documentation for publicly disclosed data is being handled systematically in a predefined manner.

#### Evaluation and comments

Since 2004, the Kurita Group has been conducting environmental improvement activities aimed at creating three different kinds of value: *social needs*, *customer needs* and *internal change*. Ten years have passed since these activities began. In Japan, they have already reached a certain level and the Kurita Group began expanding them to its overseas operating companies in 2013. In the fiscal year under review, the aspect of *social needs* was renamed *technological innovation*. In addition, the Kurita Group defined slogans in 2014 and clearly set out in numerical form its direction in the past 10 years and its direction in the next seven years. It is significant that every single employee was proactive with the activities and the slogans that serve this purpose are widely seen as excellent. Going forward, they should serve as key performance indicators (KPIs) in integrated reporting.

The Kurita Group proposes new solutions for water treatment with a focus on maintenance. The Group deals with both water treatment chemicals and water treatment facilities and this seems to enable the Group to make proposals from a very broad perspective. In addition, we hear that the Kurita Group proposes solutions based on highly accurate numerical data on the basis of its accumulation of environmental benefits to customers over the past ten years. We hope that the Kurita Group will capitalize on its strengths to make proposals that address issues that have yet to be identified and to reduce the environmental impacts of society in collaboration with its corporate clients.

Within the scope of our basic examination, we found no serious discrepancies with the calculation of environmental performance data.

#### Contributing to reducing the environmental impacts of customers

We visited a corporate customer of the Kurita Group to interview the company about the Group's business activities. It performed the coagulation process with the use of inorganic coagulant and other chemicals for the purpose of suspended solids in wastewater in the wastewater treatment process. It always injected such chemicals in quantities suited to the water quality with the highest load. The Kurita Group proposed a system designed to perform monitoring with the use of a sensor to inject a volume of chemicals that adapted to load changes. The proposed system was adopted. It ultimately enabled a massive reduction in the volume of chemicals consumed and earned high marks from the customer. With this example, we realized that Kurita Water Industries has earned great confidence from customers for its ability to propose solutions that produce results that exceed those initially expected by customers and for attaining a high level of customer satisfaction. Kurita Water Industries excels in making proposals that surpass customers' needs in consideration of the unique prevailing circumstances. We hope that it will continue to carry out environmental improvement activities together with its customers.

#### The Kurita Group's environmental improvement activities

In fiscal 2014, we visited the Kameyama Sub-Branch, where we interviewed employees about their environmental improvement activities and looked at the results of the activities. This is a cutting-edge plant equipped with a closed system to control all phases from water inlet to outlet. In the interviews, we learned that facilities for water treatment and supplies are not under time-based management, according to which they would be replaced after their service for predetermined periods. Rather, they are under close management with an emphasis on their life cycles, tailored to actual conditions in an effort to further reduce the environmental impacts of the plant. We thus confirmed that they understood detailed data and that a sound management system was in place.

June 20, 2014

Institute for Environmental Management Accounting

Katsuhiko Kokubu (Director/ Professor at Graduate School of Business Administration, Kobe University)

Eriko Nashioka (Representative Director/ CPA & Certified Public Tax Accountant)



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For details of the Kurita Group's environmental initiatives, please visit our website:

<http://www.kurita.co.jp/english/>