

KURITA GROUP

# **ENVIRONMENTAL REPORT**

**2015**

For the Year Ended March 31, 2015



# We have achieved results together with customers.

## - Environmental Benefits for Customers for FY 2015 -

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 2014 to March 2015, environmental benefits for customers for FY2015 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.

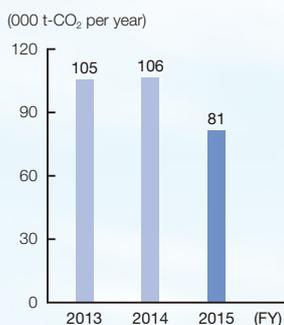
### Environmental Benefits for Customers

#### CO<sub>2</sub> emissions reduction

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

**80,647**<sup>\*1</sup> t-CO<sub>2</sub> per year

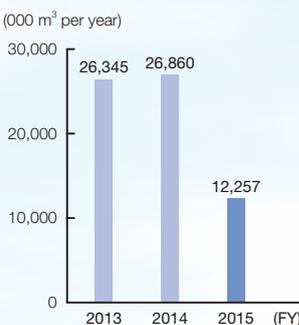
On average, a single household emits about 4,760 kg<sup>2</sup> of CO<sub>2</sub> per year. The emissions reduction of 80,647 tons is therefore equivalent to the total amount of CO<sub>2</sub> emitted by about 16,900 households in one year.



#### Water savings

**12,257**,000 m<sup>3</sup> per year

On average, a single household consumes about 300 m<sup>3</sup><sup>3</sup> of water per year. A 12,257,000 m<sup>3</sup> saving of water is therefore equivalent to the total amount of water consumed by about 40,900 households in one year.

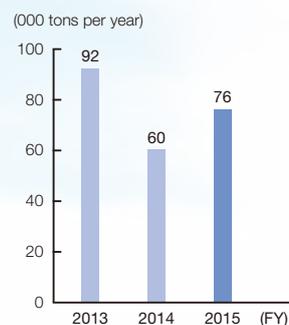


#### Waste reduction

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

**75,590** tons per year

On average, a single household generates about 1,400 kg of waste<sup>4</sup> per year. The waste reduction of 75,590 tons is therefore equivalent to the total amount of waste generated by about 54,000 households in one year.



\*1. CO<sub>2</sub> emission factors used for the calculations: electricity: 0.487 kg-CO<sub>2</sub>/kWh, city 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 2013. Reduced CO<sub>2</sub> emissions attributable to water conservation is also included.

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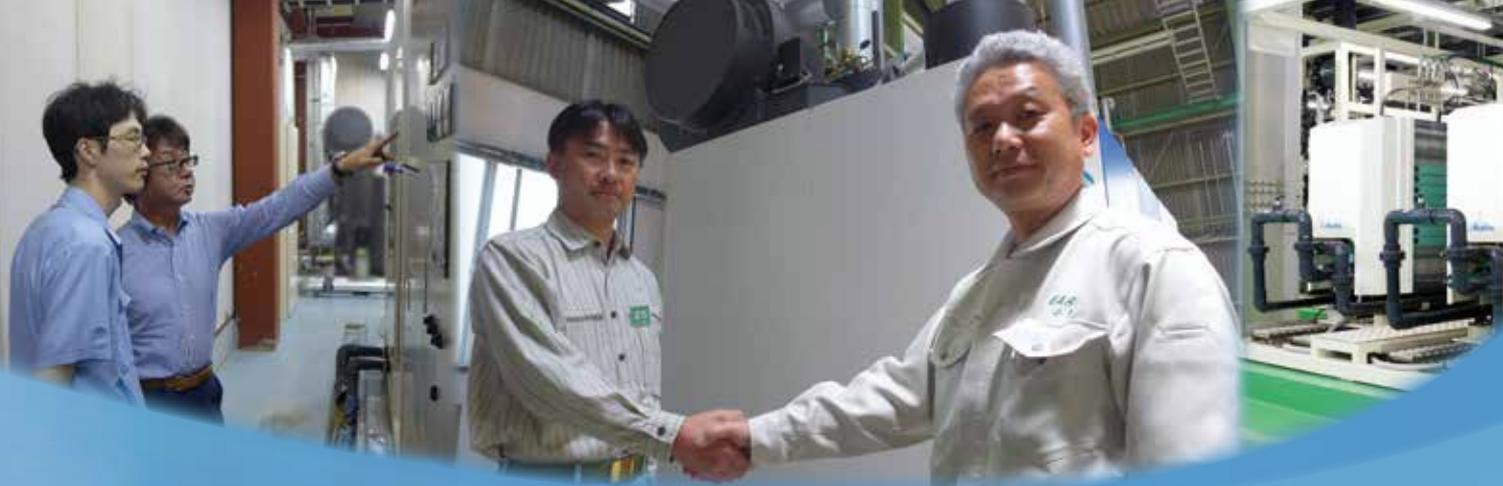
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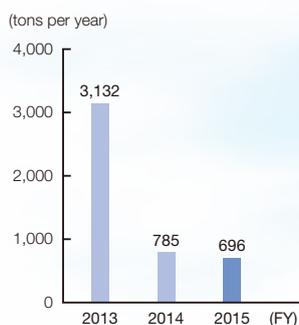




### Reduction of environmentally harmful substances

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

**696** tons per year

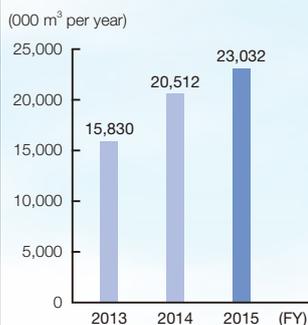


### Wastewater treatment

Reduction in the amount of wastewater treated by wastewater treatment systems

**23,032**,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 23,032,000 m<sup>3</sup> of wastewater treated is therefore equivalent to the volume of water from about 13,500 swimming pools.

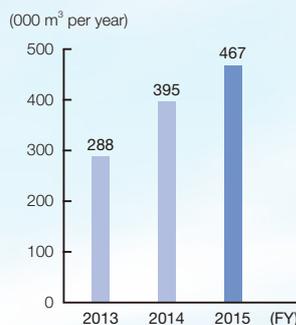


### Remediation of contaminated soil

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

**467**,000 m<sup>3</sup> per year

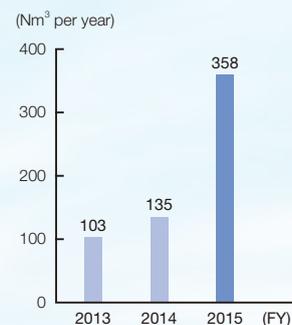
The remediation of 467,000 m<sup>3</sup> of contaminated soil (1 m<sup>3</sup> of soil weighs 1.8 tons) is equivalent to about 84,100 10-ton truckloads.



### Air pollutant treatment

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

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



\*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 2014 (released by the Japanese Ministry of the Environment)

## Editorial Policy

### Purpose of Publication

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 reregistered trademarks or trademarks of the Kurita Group or other companies.

### Organizations covered:

Kurita Water Industries Ltd. and other domestic Kurita Group companies  
Company and other names are correct as of March 31, 2015.

### Period covered:

Fiscal 2015 (April 1, 2014 to March 31, 2015). The report also mentions some policies and targets set for April 2015 onwards

### Guidelines referred to:

Environmental Reporting Guidelines 2012 (Ministry of the Environment)

For further details, visit:

<http://www.kurita.co.jp/english/environment/index.html>



**Katsuhiko Kokubu**

Professor, Graduate School of Business Administration,  
Kobe University

**Toshiyuki Nakai**

President, Kurita Water Industries Ltd.

## All employees engage in activities to improve the environment and by extension enhance the Kurita Group's competitive edge.

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.

### Environmental improvement activities for FY 2015 and their results

**Nakai:** The Kurita Group continued its environmental improvement activities in the aspect of technical innovation, in which products, technologies and services that help customers with environmental improvement are developed, and also in terms of customer needs, in which solutions are offered to customers. As a result of these activities, the figures confirm that environmental benefits for customers surpassed the previous year's level in four categories: waste reduction, water pollutants reduction, soil and groundwater pollutants reduction and air pollutants reduction. I believe that this is a result of our focus on activities for making proposals to customers from the perspective of environmental improvement and of customers' adopting our proposals after recognizing the additional value they offer.

**Kokubu:** You measure the results of activities with the use of indicators to identify the problems associated with the current status and incorporate measures against them into the plan for

the following fiscal year. The result reflects the continuation of this PDCA cycle for 10 years or longer.

**Nakai:** In technical innovation, we have developed a new material for boiler chemical. Adhesion of scale similar to fur on the inside of the boiler results in a loss of fuel. In the past, chemical was used to disperse the scale in boiler water. In addition, water was replaced to prevent the scale concentration from becoming too high. It was necessary to stop the boiler operation and to wash the scale away using chemical or to add a cleaning chemical during operation. Our new material has two effects. First, it acts powerfully to prevent scale from attaching. Second, it removes scale that has attached while the boiler remains in operation. We will broaden the array of water treatment chemicals using this material, the newly developed multi-functional polymer, to help customers reduce energy and water consumption.

**Kokubu:** Given that the steam produced from boilers in factories and large-scale facilities has a broad range of applications, I think that this development has real significance for energy and water saving. I hope you will propose this new material, to

contribute extensively to all of society.

**Nakai:** Next, we would like to talk about internal change. This is aimed at reducing the environmental impact within the Kurita Group. You worked to reduce per-unit energy consumption and successfully fulfilled for the second consecutive fiscal



year the standards stipulated in the Act on the Rational Use of Energy, under which per-unit energy consumption for the most recent five years must be reduced by at least 1%. I believe that this achievement

is due to heightened awareness of energy conservation among our employees and to their serious efforts.

**Kokubu:** I would imagine that it is not easy to cut per-unit energy consumption, even by 1%. The sincere and steady efforts of your workers towards the goal have led to this achievement. Apart from Kurita's unique activities for environmental improvement on the part of customers, it is wonderful to consistently deliver excellent results from in-house environmental improvement activities as well. I hope that you will continue to meet the standards.

**Nakai:** Thank you. As a new initiative, we organized an event called The Kurita Environment Month. This event calls for submissions of environment-related experiences, pictures, photos and catchwords from all Group employees in Japan and overseas, and from their family members. Casting a spotlight on environmental activities and awareness outside business activities, it is aimed at building extensive environmental awareness. Although it was the very first event of this kind, many Group employees and family members took part. I think it was a successful means of new communication.

**Kokubu:** I think it is a great new initiative for Kurita. The positive participation of management executives and ideas for preventing it from becoming routine will be vital to continuing activities like this.

## Environmental improvement activities for FY 2016

**Kokubu:** Recently, two trends in corporate environmental management can be observed. One is that the range of companies conducting environmental management is widening. In the past, it seemed to be limited only to the largest companies. The other is that the environment is increasingly associated with business activities. The perception among businesses is now changing. Today, focusing on short-term profits only is seen as undesirable. Corporate actions need to be aimed at sustaining profit growth over the long term. Similarly, it is important to continue environmental efforts for a very long span of time. That is why the integration of environmental and business activities is now like a requirement for business survival.

**Nakai:** I feel that more and more customers accept our proposals for environmental improvement. We will better display

our comprehensive capabilities based on a combination of chemicals, facilities and maintenance to provide customers with optimal solutions. However, I think there are two challenges in environmental improvement activities. One is the environmental benefits for customers. Quite a few of the projects we have won are not included in the statistics of environmental benefits for customers. We need to closely investigate the reality. We will make clear where lie problems and then we will revise the system and raise awareness among employees.

Next is implementation at overseas Kurita Group companies. Individual companies now set goals and priority measures both in activities for customers' environmental improvement and in those for their own environmental improvement. In addition to 27 domestic companies already conducting the activities, 10 overseas companies began environmental improvement activities during the current fiscal year. Even so, the activities are just getting underway outside Japan. We need to employ a new approach to encourage local staff to support and participate in the activities. To begin with, we are thinking of giving them plain explanations about the activities of Group companies for the purpose of information sharing.

**Kokubu:** In addressing both challenges, the key lies in raising awareness among individual employees and in changing their behaviors. If environmental awareness takes root through initiatives for environmental improvement, employees will feel more pride. The Kurita Group is characterized in that environmental improvement activities are its business activities. I hope that you will make the most of this to continue to step up environmental improvement activities both from a short-term perspective and over the medium and long terms.

**Nakai:** For the Kurita Group, environmental improvement



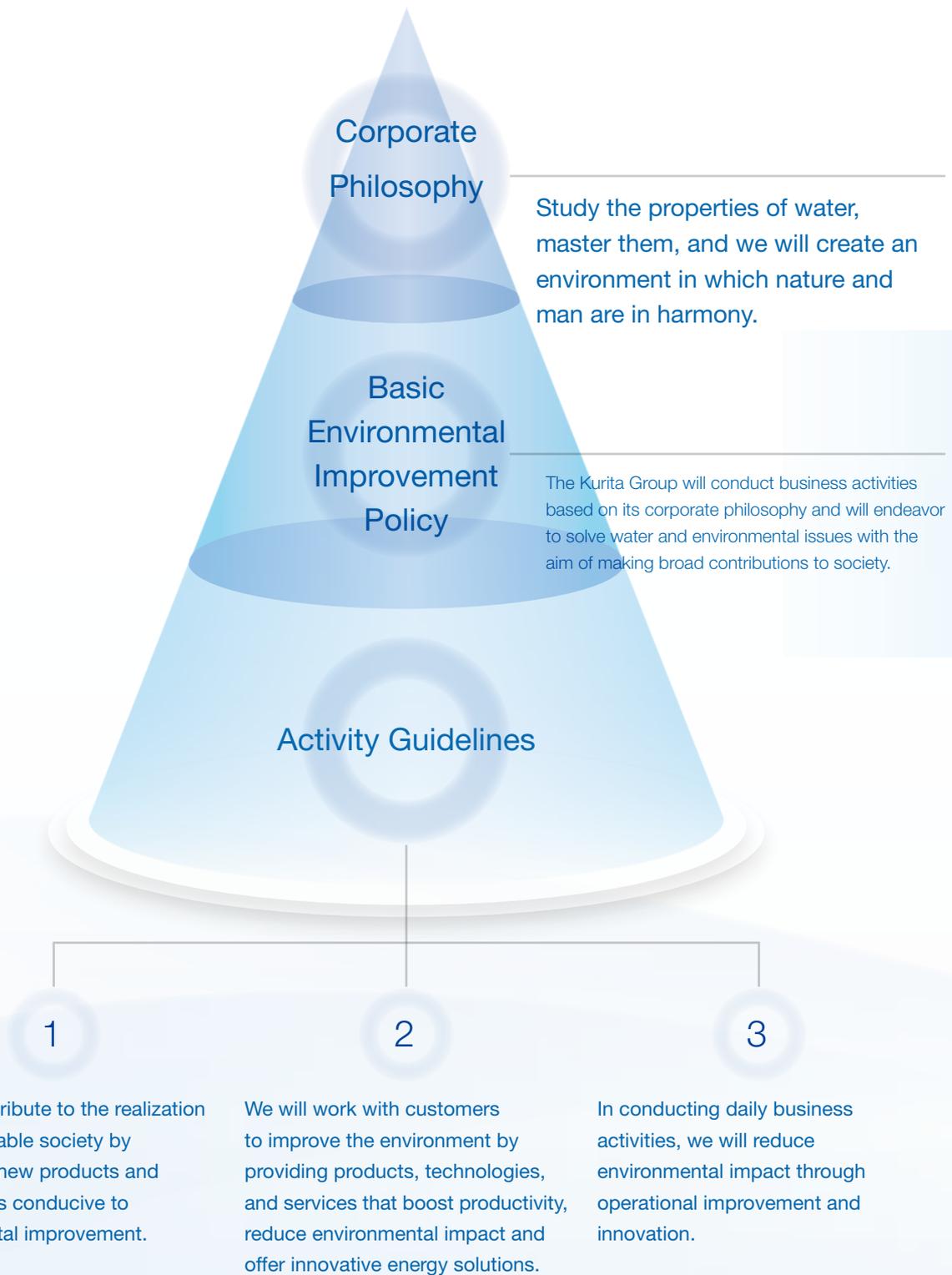
activities are so significant that they are based on our Corporate Philosophy. They are a tangible form of compatibility, one of the values that both the executives and employees of the Kurita Group are required to share and emphasize in accordance with the Code of Ethical Conduct. Therefore, to pass on a healthy global environment to future generations as an advanced water and environment management company, I believe that it is vital that every one of us work with a high level of awareness, to achieve both expansion with increased competitiveness and environmental improvement.

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Katsuhiko Kokubu  
Professor, Graduate School of Business Administration, Kobe University Appointed Dean of the Graduate School 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. He also chairs ISO/TC207/WG8. He is a leading global expert in environmental management and accounting and in CSR management.

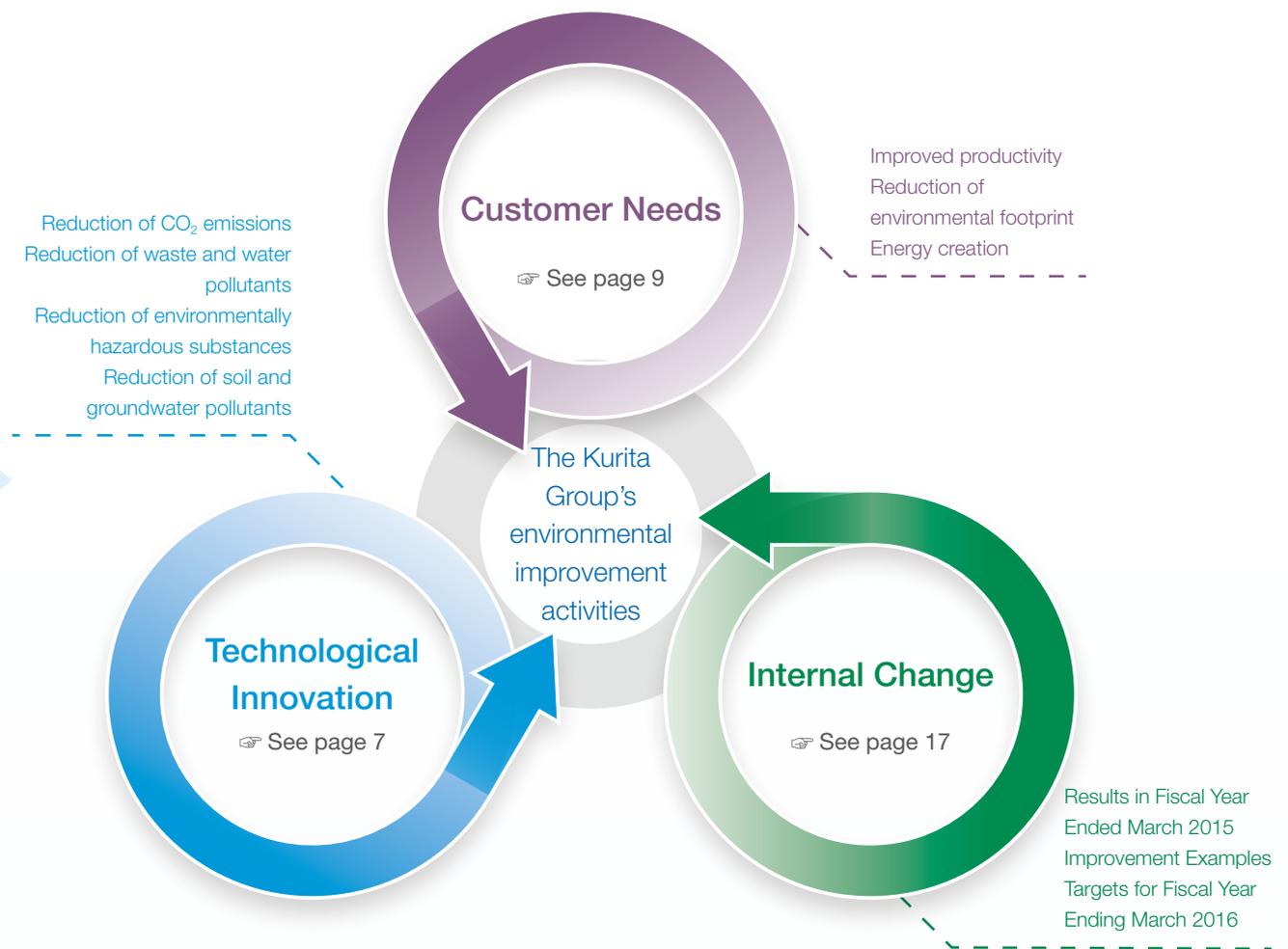


The Kurita Group has adopted the Basic Environmental Improvement Policy and Activity Guidelines based on its Corporate Philosophy.





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.

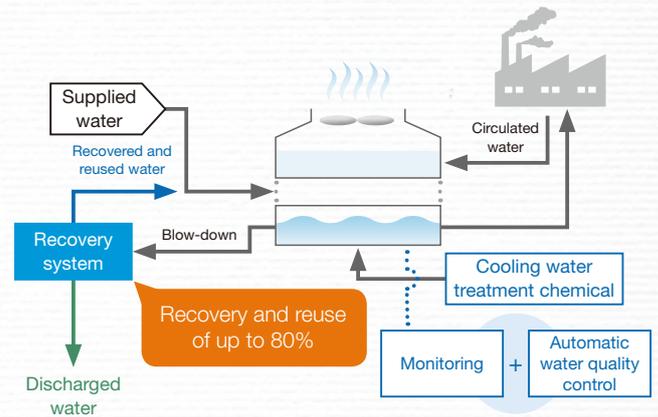
## We are committed to creating new products and technologies that help solve problems related to water and the environment.

The Kurita Group is working to develop new products and technologies that help improve the environment and contribute to creating a sustainable society.

The following are the examples our new products and technologies:

### 1 A cooling water blow-down recovery system to help reduce water consumption

China and Southeast Asia face a shortage of industrial water. Most of all, petrochemical complexes consume a huge amount of cooling water. There are growing needs for water reclamation and reutilization. Kurita has created a system that recovers cooling water blow-down (discharged water) and reuses it. Developed by combining our proprietary chemical technology for cooling water treatment with membrane equipment, this system reliably recovers a maximum of 80% of blow-down water and reuses it.



### 2 A tower-type aerobic wastewater treatment system for reduction of on-site work period, footprint and sludge

BIOPLANET™ SR, the aerobic wastewater treatment system is capable of reducing sludge generation with the use of microfauna. The conventional BIOPLANET™ SR, however, uses concrete tanks, and a massive civil engineering work therefore is required. Kurita has developed an aerobic wastewater treatment system based on tower-structured FRP tanks that are transportable by truck. The ready-made tower can reduce the on-site installation work and save footprint. In the future, we will make a proposal to our customers to newly adopt our system or replace their old plants with it, and we will help a wide range of customers make effective use of their factory sites and at the same time achieve their environmental goals.



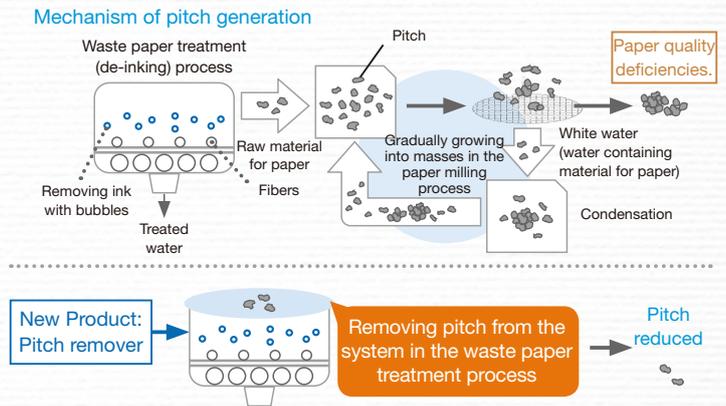
BIOPLANET™ SR (tower-type)

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

New products and technologies	Improvement targets			
	CO <sub>2</sub>	Waste	Environmentally harmful substances	Water pollutants
A cooling water blow-down recovery system for petrochemical complexes	○			
Technologies for assessing the fouling of water recycling systems and for cleaning RO membranes contaminated with both suspended solids and organic substances	○			
A chemical that coagulates surplus paints to purify the circulating water in painting booths at automobile factories				○
A chemical that reduces paper quality deficiencies and printing failure by suppressing fouling caused by waste paper in the recycled paper manufacturing process	○			
A chemical that reduces bleach consumption in the wood pulp manufacturing process			○	
An aerobic wastewater treatment system comprising a tower-type FRP tank with short delivery times, footprint saving and less sludge generation		○		○
A membrane-based anaerobic treatment system that recovers biogas by methane fermentation treatment of food, drink and other organic waste slurries	○	○		
An energy-, chemical- and space-saving system that treats nitrogen in wastewater by continuous water feeding and intermittent aeration	○	○		○

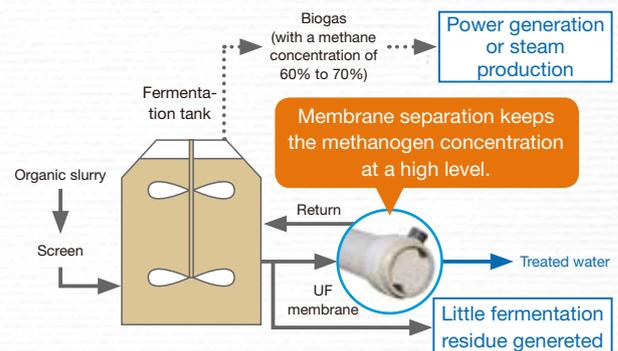
### 3 A chemical that reduces paper quality deficiencies and printing failure to help reduce CO<sub>2</sub> emissions from paper milling

In the paper milling process, a sticky substance contained in wood and waste paper, known as pitch, and paper powder which is the cause of fine powdery spots attached to a paper surface, lead to paper quality deficiencies and printing failure and prevent ink from being transferred to the paper when printing. Kurita has developed a chemical that efficiently removes these inhibitory substances. It increases the paper milling yield and lowers energy and material consumption in the milling process, and it therefore contributes to reducing CO<sub>2</sub> emission.



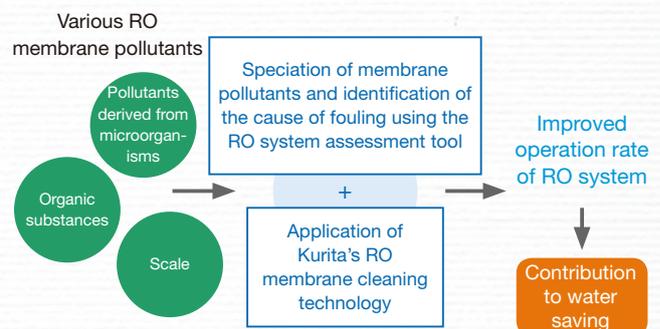
### 4 A wet-type methane fermentation system to help reduce organic waste generation and CO<sub>2</sub> emissions

Slurry (highly viscous and muddy organic waste) containing a high concentration of suspended solids and organic substances is generated from the food and drink manufacturing process. Traditionally, the organic waste was either discarded as waste after concentration or subjected to wastewater treatment after it was diluted. Kurita has developed a wet-type methane fermentation system that sends the slurry organic waste directly to the methane fermentation process without concentration or dilution. This system reduces the quantity of organic waste and makes effective use of the produced methane gas for power generation and as a heat source for boilers to help reduce CO<sub>2</sub> emissions.



### 5 Technologies for assessing the fouling of water recycling systems and for optimizing the cleaning conditions for RO membrane to improve water recovery rate

In China, where water is chronically in short supply, water recycling facilities incorporating reverse osmosis (RO) membranes are widely used for wastewater reclamation and reutilization. When reclaiming water from wastewater with a high content of suspended solids and organic substances (e.g. wastewater from dyeing factories), the RO membranes are fouled and clogged, and it often leads to a suspension of system operation. Kurita has developed a system assessment tool that can identify the cause of fouling by speciating possible membrane pollutants. It has also developed a technology for optimally cleaning RO membranes based on the assessment results. These technologies help improve the operation rate of water recycling facilities and reduce water consumption.



## Topics

### Adsorption Separation of Strontium from High Concentration Saline Waste Liquid with the Use of Layered Potassium Titanate wins a technology award at the 30th conference of the Japan Society of Ion Exchange.

A joint study by Tohoku University and Kurita titled *Adsorption Separation of Strontium from High Concentration Saline Waste Liquid with the Use of Layered Potassium Titanate* won a technology award at the 30th conference of the Japan Society of Ion Exchange. The study was recognized for leading to the development of a method of preparing a chemical for selectively adsorbing strontium to a low concentration, even from radioactive water mixed with seawater, as a solution to the radioactive water generated by the accident at the Fukushima Dai-ichi Nuclear Power Plant. It was also praised for representing collaboration between the business and academic sectors in providing evidence of effective treatment of the actual contaminated water with the use of the adsorbing chemical.

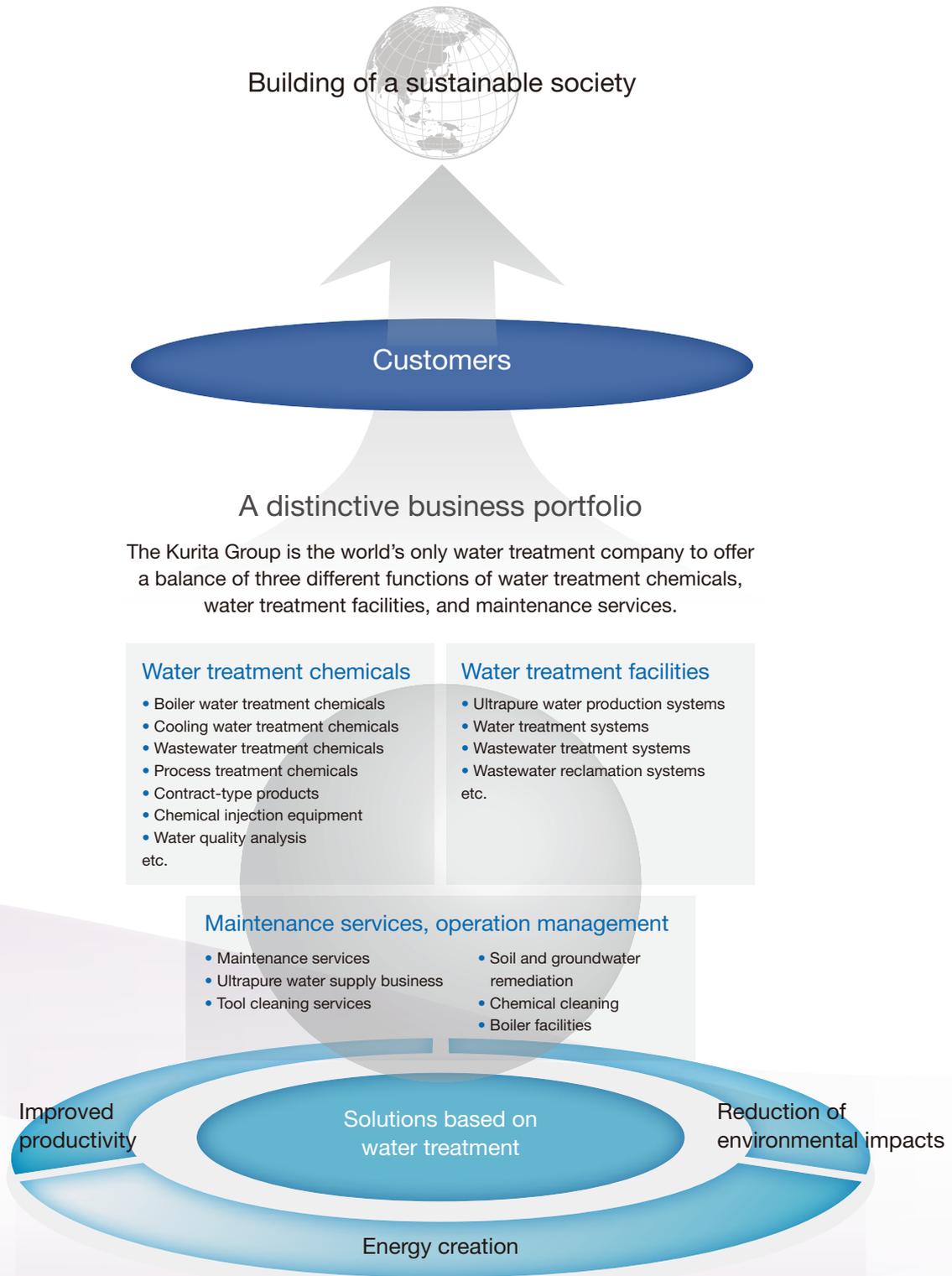


The award certificate and commemorative plaque



## 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.



## Example 1

### Sakoshi Plant, Earth Chemical Co., Ltd.

Heavy oil consumption reduced by **15%**

Customer's issues

Replacement with boiler facilities matched with operation load and continued reduction of energy consumption

Solutions

1. Clarification of advantages by means of simulation based on steam volume measurement
2. Optimization of the water treatment system with a boiler, incidental equipment and a chemical

Manufacturing insecticide and other daily necessities for home use, the Sakoshi Plant of Earth Chemical Co., Ltd. strives to reduce the environmental impact of business activities, for example, by introducing energy-efficient equipment in accordance with its environmental policy.

The customer considered replacing its boiler as its energy efficiency had declined after many years of operation. The products produced were different from those at the time of installing the existing boiler. The boiler's steam supply capacity exceeded steam demand. The customer thus faced issues with the change and further energy consumption cuts.

Kurita Water Industries' Chemicals Division made clear the energy-saving effect after replacement through simulation based on steam volume measurement and proposed an optimal water treatment system including a boiler, incidental equipment and a boiler chemical.

The adoption of this proposal opened the way to a reduction in consumption of heavy oil as boiler fuel. It achieved a 15% reduction in heavy oil consumption from the conventional level.



Left: Boiler  
Below: Boiler chemical and chemical injection equipment



### Customer's Voice

Kurita presented a simulation based on detailed boiler operation data and it allowed us to choose the optimal boiler equipment in both energy conservation and in life cycle costs. In addition, the new system has considerably reduced not only heavy oil consumption but also electric power consumption. We await future comprehensive support, including proposals on energy consumption cuts.



Mr. Yoshimasa Ono  
Manager of the Production Technology Dept.,  
Global Supply Headquarters

## Example 2

### EP Kasahara Co., Ltd.

Heavy oil consumption reduced by **13%**

Customer's issues

Recovery of high temperature steam drain containing certain minerals

Solutions

A boiler chemical with the new material that has the twin effects of removing attached scale and preventing the new attachment of scale

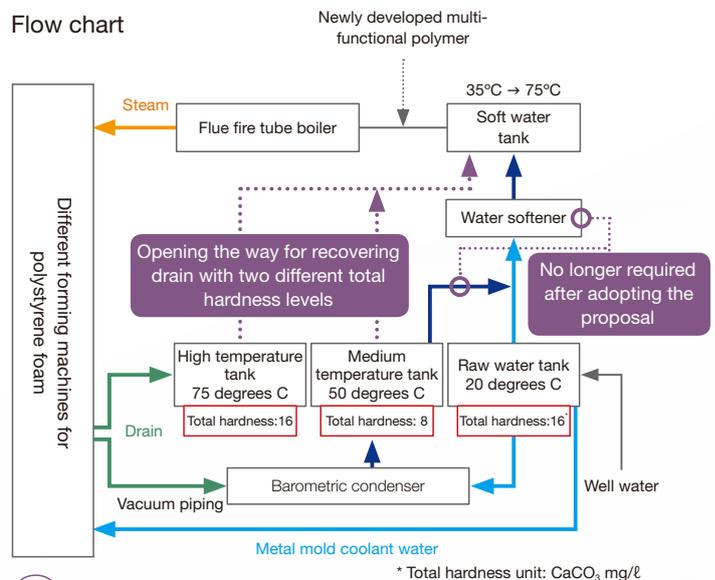
EP Kasahara Co., Ltd., a manufacturer of polystyrene foam, aims to reduce energy and other consumption in its business in accordance with its environmental policy.

In the customer's product manufacturing process, coolant water mixed directly with steam. As a result, the steam drain contained certain minerals. Using this steam drain as boiler water, heat energy was recovered to reduce energy consumption, but this induced the attachment of scale inside the boiler and generated a fuel loss.

At Kurita Water Industries, the Chemicals Division proposed a boiler chemical using the new material, which excels in removing existing scale and preventing the new attachment of scale.

Adopting the proposal opened the way for the recovery of steam drain and preventing scale attachment inside the boiler. That in turn reduced consumption of heavy oil as fuel by 13% compared to the level before the adoption.

### Flow chart



### Customer's Voice

From the beginning, your staff carried out a careful investigation on the shop floor together with our engineering staff to give a reassuring proposal that met our needs. We are also grateful for the energy saving effect. We look forward to your proposals on energy conservation being introduced to other companies in our group.



Mr. Yasumasa Kasahara, Representative Director

# Customer Needs

## Example 3

Hokkaido Refinery, Idemitsu Kosan Co., Ltd.

Waste emissions reduced by **100%**

Customer's Issues

Reduction of gas absorption amine generated in large quantities as industrial waste

Solutions

Recycling of gas absorption amine with the use of an ion exchange resin

Supplying gasoline, diesel oil and other petroleum products to the Hokkaido, Tohoku and Hokuriku regions, the Hokkaido Refinery of Idemitsu Kosan Co., Ltd. is working to cut waste emissions from its production activities in accordance with its environmental policy.

The customer recovers hydrogen sulfide generated from the crude oil refining process with the use of gas absorption amine. Amine deteriorates and its absorption capacity falls as it is used. At a certain frequency, the amine is entirely replaced with new amine. The issue was to reduce the volume of used amine, which was treated as industrial waste.

Kurita Engineering and the Chemicals Division of Kurita Water Industries proposed the original technology of recycling amine with the use of the ion exchange resin.

Adoption of the proposal opened the way for recycling and reusing amine instead of discarding it. That achieved a 100% reduction in waste generation.



A system of the same type as the system provisionally installed in this project



### Customer's Voice

We appreciate your service, which encompassed everything including amine analysis, lab testing with the use of real samples, treatment planning and on-site work as well as the effect of recycling treatment. We are grateful that you always share our issues with us and offer proposals before we ask for them. We hope to hear your presentations on success examples at other oil refineries.



Mr. Tomoaki Okegawa, Oil Manufacturing Team, Oil Manufacturing Section 2

## Example 4

Yamanashi Plant, OPC Corporation

Electric power consumption reduced by **43%**

Customer's Issues

1. Stable operation of the ultrapure water production system and rationalization of its management
2. Reduced energy consumption

Solutions

1. Proper maintenance according to the status of operation of the water treatment system
2. Shift to pumps with inverters

Manufacturing different glass substrates for precision equipment, the Yamanashi Plant of OPC Corporation is working to slash energy consumption and the environmental impact of its corporate activities in accordance with its environmental policy.

The customer uses ultrapure water for product cleaning. That poses issues for the stable operation of the ultrapure water production facilities, for rationalization of management of the ultrapure water production system, measuring instruments, pumps and many other systems and components that constitute the facilities, as well as for achieving cuts in energy consumption.

At Kurita Water Industries, the Facilities Division proposed a five-year deal including proper maintenance based on the status of operation of the facilities, instead of maintenance work conducted at a predetermined frequency. It also suggested a shift to pumps with inverters.

Adoption of the proposal resulted in stable operation, rationalized management and power consumption that was 43% smaller than the level before the adoption.



An ultrapure water production system



### Customer's Voice

We are grateful that proper maintenance gives the system a longer service life and that it also helps lower power consumption at peak time. We also feel reassured that the system is monitored so that its status is visible, as it is connected with your office online. We expect to hear more proposals for water saving, energy saving and other rationalization.



Center: Mr. Mitsuki Nakamura, Manufacturing Site Assistant General Manager  
Right: Mr. Kazutoshi Yamaki, Management Site Technical Group Subsection Chief  
Left: Mr. Kashio Iwai, Management Site Technical Group

## Example 5

### Yasu Factory, OMRON Corporation

Water consumption reduced by **4%**

Chemicals consumption reduced by **36%**



Reduction of environmental impact



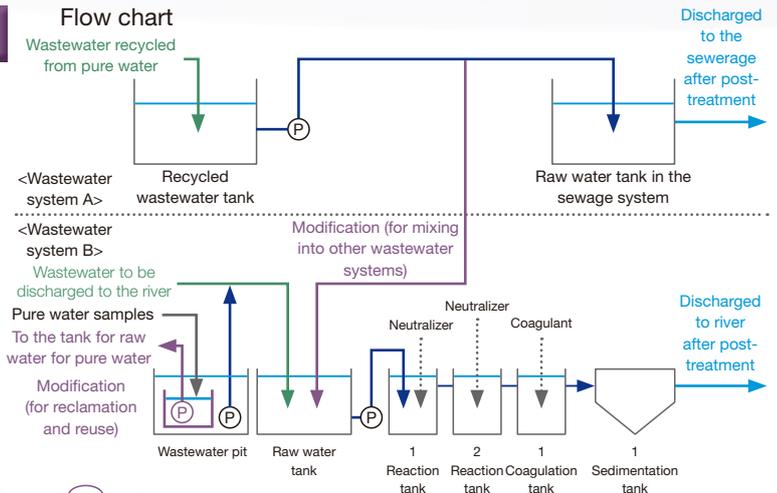
Reclamation and reuse of recycled wastewater from the pure water production facilities and mixing into other wastewater systems

Manufacturing control devices and different electronic components, the Yasu Factory of OMRON Corporation seeks to reduce the environmental impact of its business activities in accordance with Green OMRON 2020.

Equipped with systems for treating different kinds of wastewater generated from the manufacturing process, the customer is working to reduce their environmental impact.

Focusing on the discharge of pure water samples with neutral water quality and minor fouling, the Facilities Division of Kurita Water Industries proposed a modification of the wastewater treatment facilities. The proposal envisioned not only reclamation and reuse of wastewater but also mixing of wastewater recycled from pure water into other wastewater systems for use in pH level control and thereby for reducing the consumption of the water and chemicals used for neutralizing wastewater.

Adoption of the proposal resulted in a 4% reduction in water consumption and a 36% reduction in chemicals consumption in comparison with their respective levels before adoption.



### Customer's Voice

Our factory discharges water after purifying wastewater into Lake Biwa. So we pay very careful attention to wastewater management. We appreciate your consideration of a proposal aimed at total optimization on the basis of technological grounds obtained by conducting various tests from many different perspectives. We are appreciative that you worked hard towards the goal from the same standpoint as ours, to produce a result beneficial to three parties. As we work to prolong the service life of the wastewater treatment facilities, we anticipate that you will provide us with other proposals.



Left: Mr. Tatsuo Ohama, Manager of the Facility and Technology Section, Micro Device Division  
Right: Mr. Koichi Kato, Chief Investigator, Facility and Technology Section, Micro Device Division

## Example 6

### Kasumigaseki D-H-C Co., Ltd.

Electric power consumption reduced by **2%**



Maintenance of the initial performance of high-efficiency chiller facilities



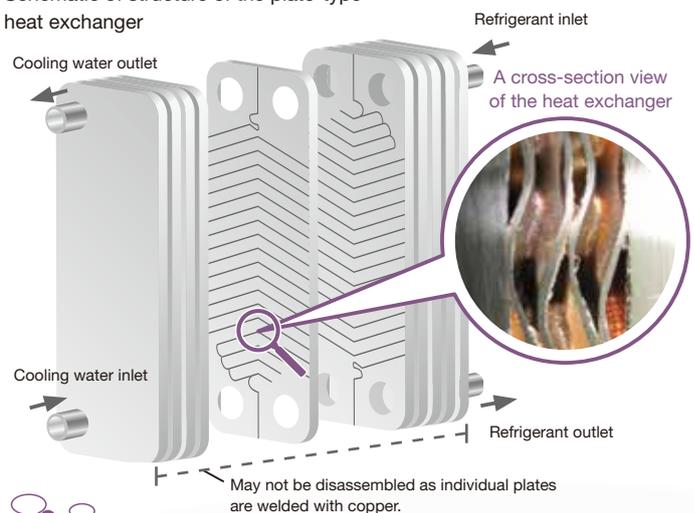
1. Cooling water treatment chemical with a powerful effect that prevents slime and scale
2. Management based on the LTD value

Operating a business supplying heat to the Kasumigaseki Building as well as numerous other buildings, Kasumigaseki D-H-C is working to conserve energy with high-efficiency equipment and stable operation of its facilities. The customer owns a plate-type heat exchanger as chiller facilities for air conditioning. These facilities operate according to the air conditioning load, but the cooling water flow is so slow that fouling is likely to accumulate and this results in unnecessary power consumption. In addition, the structure of the facilities hampers disassembly and cleaning. It was an issue to keep the interior of the system clean to maintain the initial performance.

Kurita Buil-Tech proposed a cooling water treatment chemical with a powerful effect that prevents slime and scale, as well as management based on the LTD value.

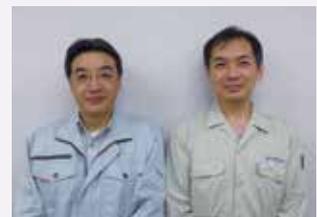
Adoption of the proposal resulted in no rise in the LTD value, kept the interior of the system clean and achieved a 2% reduction in electric power reduction from the level prior to adoption.

### Schematic of structure of the plate-type heat exchanger



### Customer's Voice

We appreciate that the effect was demonstrated through a one-year trial using a real machine and that a new management indicator has been established on the basis of the LTD value. For FY 2016, our focus is to constantly suppress legionella through water treatment. Already in June, we started the treatment on a trial basis. We look forward to your support for it and to future proposals for reducing our environmental footprint.



Left: Mr. Masami Takahashi, Acting Manager, Business Department  
Right: Mr. Takayuki Terauchi, Manager, Energy Center

# Customer Needs

## Example 7

Shiga Factory, Konishi Co., Ltd.

CO<sub>2</sub> emissions reduced by **44%**

Customer's Issues

1. Reduction of CO<sub>2</sub> emissions
2. Streamlining of boiler management

Solutions

A gas-powered boiler supporting proportional combustion control according to the changing steam load

Manufacturing different types of adhesive, sealant and other chemical products, the Shiga Factory of Konishi Co., Ltd. is endeavoring to reduce emissions (carbon dioxide) that cause global warming while minimizing other environmental impacts in its business activities, under its basic management policy on the environment and safety.

The customer formerly used a heavy oil fired boiler for supplying steam used in the manufacturing process. It faced issues of streamlining boiler management and cutting CO<sub>2</sub> emissions.

Kurita BMS proposed boiler equipment designed to perform proportional combustion control according to the changing steam load related to production as well as a shift of the boiler fuel to gas.

Adoption of the proposal helped achieve 44% reduction in CO<sub>2</sub> emissions from those from the heavy oil fired boiler.



Boiler



### Customer's Voice

Your team proposed boiler equipment that was best suited to operation at our factory. That was the point that persuaded us to decide to adopt it. We appreciate that CO<sub>2</sub> emission cuts and streamlined boiler management were both attained. In the future, we hope to receive proposals for further reductions in CO<sub>2</sub> emissions, including wastewater treatment and for energy consumption cuts.



Left: Mr. Hideyuki Oka, Leader of the Engineering Group, Shiga Production Technology Department  
Right: Mr. Toshihiro Tabata, Leader of Group 1 in the Manufacturing Department 1

## Example 8

Limeira Plant, Suzano Papel e Celulose S.A. (Suzano Pulp and Paper), Brazil

Electric power consumption reduced by **15%**

Customer's Issues

Prevention of fouling from attaching onto the RO membrane for cutting electric power consumption and for lowering the frequency of membrane cleaning

Solutions

Analysis of the elements constituting the fouling on the membrane and an optimal RO membrane treatment chemical for preventing fouling attachment

Suzano is Brazil's largest paper milling company and one of the world's leading companies in this sector. With a philosophy of valuing a sustainable society, it is working proactively to reduce electricity and other energy consumption.

Suzano's Limeira Unit uses pure water prepared with the use of an RO system as boiler water. It faced issues with surging power consumption following a decline in flow rate attributable to the attachment of fouling on the RO membrane and with a rising frequency of cleaning the membrane, each time requiring the suspension of the RO system.

Kurita do Brasil carried out an analysis of the fouling on the membrane and proposed the application of an RO membrane treatment chemical best suited to preventing fouling attachment.

Since adopting the proposal, the level of fouling attached on the RO membrane has been very low. That has enabled Suzano to extend the uninterrupted operation of the RO system, from 20 days before the adoption to 90 days, and reduced energy consumption by 15% from the level before the adoption.



RO system



### Customer's Voice

After starting to use the RO membrane treatment chemical proposed, we have recognized its effect of lowering the frequency of cleaning and replacing the RO membrane and achieving stable operation of the RO system. We hope that Kurita de Brasil will make proposals on something optimal and beneficial to the operation of the unit.



Luciano A. de Mauro, Utilidades, Recuperação e Meio Ambiente

## Example 9

### Niigata Plant, Toyo Roshi Kaisha, Ltd.

Waste generation reduced by **22%**



Reduction of sludge derived from inorganic coagulant

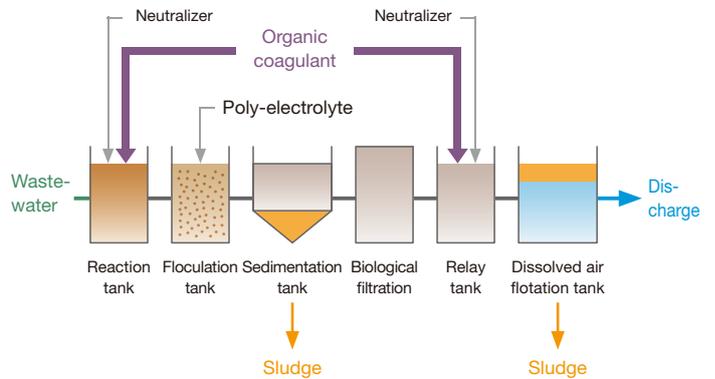


Use of an organic coagulant for reducing addition of the inorganic coagulant and neutralizer

Producing filter paper, cartridge filters and others, the Niigata Plant of Tokyo Roshi Kaisha is working to reduce waste and chemical substances in business activities in accordance with its environmental policy. The customer added an inorganic coagulant, neutralizer and other chemicals to remove suspended solids in wastewater in the wastewater treatment process. It faced an issue of reducing the volume of sludge derived from the inorganic coagulant.

At Kurita Water Industries, the Chemicals Division proposed an organic coagulant that would help reduce the inorganic coagulant and demonstrate its effect through a test with actual equipment. Adopting the proposal enabled reduced addition of inorganic coagulant and neutralizer and less sludge generation. That led to a 22% drop in waste generation compared to the level before the adoption.

### Flow chart



### Customer's Voice

We are impressed not only with your proposal but also with your planning and conduct of a test with the actual system in consideration of wastewater treatment facilities, as well as with your confirmation of the effect after introduction. We hope that you will continue to provide proposals with high cost effectiveness.



Left: Mr. Kazumasa Sugiura, Division Manager, Development Technology Division  
Right: Mr. Daichiro Nomura, Utility Personnel, Development Technology Division

## Example 10

### Miyazaki Plant, Fukui Murata Manufacturing Co., Ltd.

Waste generation reduced by **97%**



Reduction of industrial waste, which had risen in line with expanded production



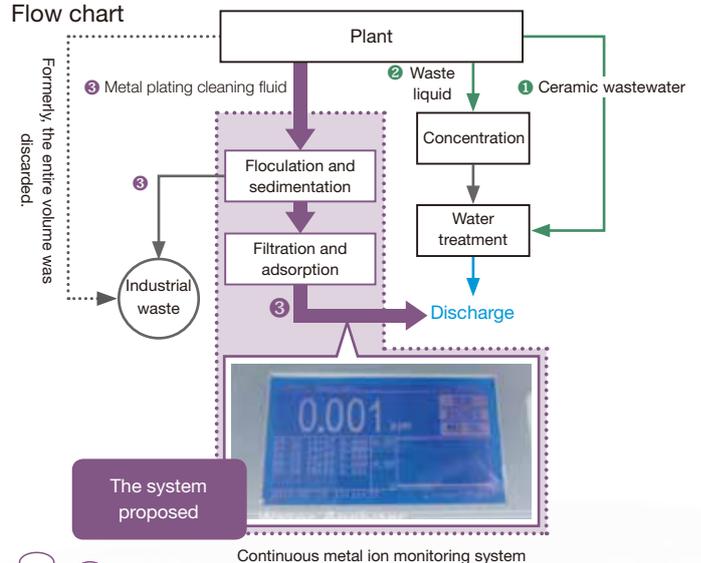
1. Flocculation and sedimentation, filtration of supernatant fluid and adsorption with the ion exchange resin
2. Continuous monitoring of the quality of treated water with the use of an ion monitor

Manufacturing noise cut filters for smartphones, the Miyazaki Plant of Fukui Murata Manufacturing Co., Ltd. is striving to reduce waste and lessen the environmental impact of its business process through strict management based on voluntary standards for quality of water discharged from plants under the Murata Group's environmental policy.

The customer struggled with the issue of cutting industrial waste, which had increased together with wastewater in line with expanded production. Kurita Meiki proposed a system of monitoring the quality of treated water in addition to a water treatment system based on flocculation and sedimentation, filtration and adsorption.

Adopting the proposal reduced industrial waste while maintaining stable treated water quality that fulfilled the voluntary standards. Eventually, waste generation fell by 97% from the level prior to the adoption.

### Flow chart



The system proposed

Continuous metal ion monitoring system



### Customer's Voice

We are grateful for your quick proposal of a solution for waste reduction, which produced the desired effect. Going forward, we will add water treatment facilities in tandem with the expansion of production facilities. We hope that you will take into consideration the ease and efficiency of maintaining the whole system.



Right: Mr. Teruki Masunaga, Environment Section, Management Department  
Left: Mr. Kazuhito Naya, Environment Section, Management Department

# Customer Needs

## Example 11

MISUZU-CO Co., Ltd.

Electric power generation of **1,649 MWh**

Customer's Issues

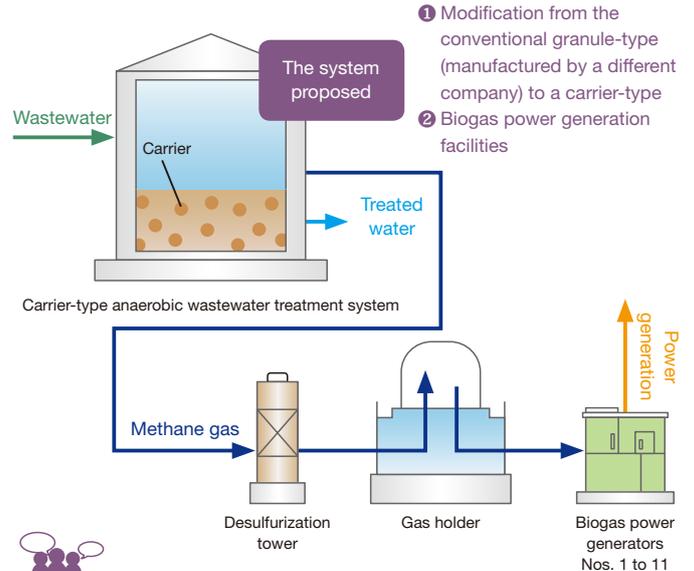
Stable operation of anaerobic wastewater treatment facilities

Solutions

1. Modification to perform carrier-type anaerobic wastewater treatment
2. Biogas power generation facilities

Manufacturing frozen bean curd, fried bean curd and other soybean processed food products, MISUZU-CO Co., Ltd. strives to establish a resource recycling factory that makes effective use of all the waste generated from the manufacturing process in accordance with its environmental policy. The customer used an anaerobic wastewater treatment system for treating wastewater from the production process. However, granular anaerobic bacteria, called granules, occasionally flowed out of the system. That posed an issue with stable operation of the system. At Kurita Water Industries, the Facilities Division proposed modifying the system to perform anaerobic treatment with the use of carriers to prevent the outflow of anaerobic bacteria as well as biogas power generation facilities to capitalize on the feed-in tariff system for the purpose of making effective use of the methane gas generated. Adoption of the proposal resulted in stable operation of the anaerobic treatment facilities and electric power generation of 1,649 MWh per year.

### Flow chart



### Customer's Voice

We value your proposed solution not only for stable operation of the wastewater treatment system and biogas power generation performance but also for its ability to accommodate the increased wastewater volume following a rise in production volume. In the future, we would like to hear your proposals for optimizing the whole wastewater treatment, including improvement of the system before and after the wastewater treatment system is modified.



Mr. Tatsushi Matsumoto, Manager of the Recycling Management Department

## Example 12

Fabs P1/P2 and Fab P3, Powerchip Technology Corporation, Taiwan

Wastewater treatment volume of **501,000 m<sup>3</sup> per year**

Customer's Issues

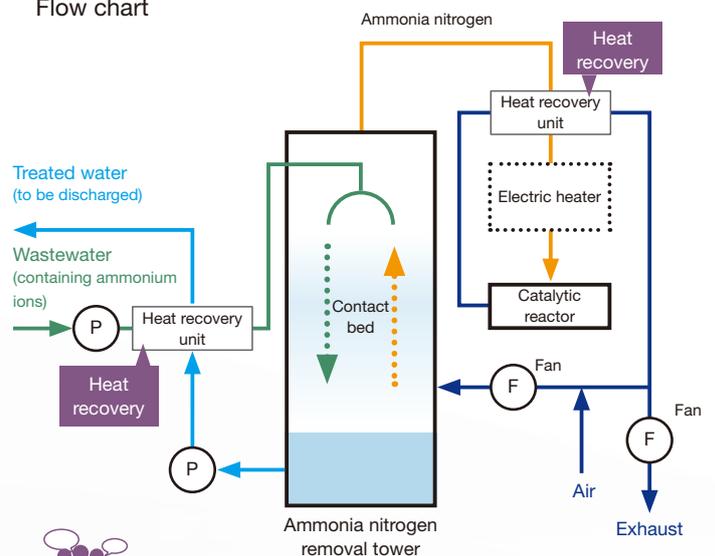
1. Compliance with new regulations on ammonia nitrogen contained in discharged water
2. Energy conservation and improved safety

Solutions

Air stripping and removal of ammonia nitrogen by the catalytic combustion method

Manufacturing semiconductor memories, Fabs P1/P2 and Fab P3 of Powerchip Technology Corporation seek to reduce the environmental footprint of their operations and emphasize safety, in line with the company's policy on the environment, health and safety. The customer needed to achieve compliance with new regulations on ammonia nitrogen contained in discharged water. At Kurita Water Industries, the Facilities Division proposed air stripping and water treatment facilities based on the catalytic combustion method. Using neither gas nor fuel, air stripping is said to be very safe and to be capable of recovering heat with high efficiency. Adoption of the proposal achieved compliance with the regulations on discharged water quality as well as energy saving and safety in operation. Fabs P1/P2 treated 365,000 m<sup>3</sup> of discharged water per year and Fab P3 136,875 m<sup>3</sup> per year.

### Flow chart



### Customer's Voice

In Taiwan, compliance with environmental regulations is a challenge. Action needs to be swift. We are grateful that the results were as we had expected, given difficult circumstances with numerous issues. In the future, we hope to receive proposals offering a speedy resolution of environmental issues for all our fabrication facilities.



Left: Mr. Wei Shan-Hsiu, Deputy Manager, Water Treatment Department  
Right: Mr. Chien Ching-Tse, Principal Engineer, Water Treatment Department

## Other Examples of Environmental Benefits for Customers

■ A steelmaking factory	Waste generation reduced by <b>312 tons</b>	Use of organic coagulant reduces the consumption of inorganic coagulant and the generation of sludge derived from inorganic coagulant.
■ An electronic material factory	CO <sub>2</sub> emissions reduced by <b>55 tons</b>	An analysis of the LTD value and visual inspection of the state of attachment of copper rust are conducted to optimize coolant water chemicals and to cut CO <sub>2</sub> emissions from power consumption.
■ An electronic component factory	Electric power consumption reduced by <b>80%</b>	Demineralizer and other systems are excessive given the scale of production. Replacement with smaller demineralizers and smaller water pumps and increased efficiency help reduce the consumption of electricity as the driving power.
■ A precision component factory	Water consumption reduced by <b>97%</b>	Wastewater is recovered with the ion exchange resin and reused as water for demineralizers, reducing consumption of industrial water.
■ Factories	CO <sub>2</sub> emissions reduced by <b>1,385 tons</b>	Replacing containers for water treatment chemicals with returnable containers that may be used many times reduces CO <sub>2</sub> emissions from combustion of waste containers.
■ An office equipment factory	CO <sub>2</sub> emissions reduced by <b>88 tons</b>	Formerly, industrial water was heated before use in winter. Now heat is recovered from wastewater to eliminate the need for steam for heating and to reduce CO <sub>2</sub> emissions from the combustion of Class-A heavy oil as fuel.
■ General households	CO <sub>2</sub> emissions reduced by <b>44,823 tons</b>	Purchases and installations of water-saving shower heads for faucets reduce the consumption of clean water and fuel for heating.

## Glossary of Terms

Drain	Water resulting from condensation of steam after it loses heat
Scale	A deposited and solidified form of calcium, silica and other substances originally dissolved in water
Barometric condenser	A device designed to condense steam under vacuum conditions or to cool air for eliminating steam from the forming machine.
Water softener	A device that removes from water calcium, magnesium and other minerals that form scale
Amine	A compound that contains an amino group (-NH <sub>2</sub> ) It is likely to react with an acid substance.
Ion exchange resin	A kind of synthetic resin with the effect of exchanging ions in water with its own ions
Ultra-pure water	Water with a purity level of near 100% prepared by removing ions, organic substances, air, fine particles, microorganisms and other impurities to the maximum degree
Pure water	Water resulting from removal of suspended solids, salts, organic substances and other impurities have been removed
LTD	The difference between the condensation temperature of the refrigerant used in the chiller and the coolant water temperature at its outlet, which is used to understand the state of attachment of fouling on the heat transfer surface of copper tubes, etc. A larger LTD value suggests that more fouling is attached on the surface.
Chiller	A device for maintaining at a certain level the temperature of the heat source for an air conditioning system for a building or factory or the temperature of the industrial equipment. It is mainly used for cooling.
Legionella	Bacteria that exist commonly in soil and elsewhere and that tend to propagate in cooling water systems Any person who inhales splash water containing these bacteria from a cooling tower is at risk of suffering an infectious disease that exhibits symptoms similar to those of pneumonia.
RO system	A device that filters water with the use of a reverse osmosis (RO) membrane, which blocks ions, bacteria and other impurities other than water
Inorganic coagulant	A chemical that collects and coagulates suspended solids in water, thereby separating it from water efficiently.
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.
Biogas	Gas generated from bacterial decomposition of organic substances
Sludge	A mud-like form of suspended solids in wastewater as a result of sediment or floating
Carrier-type anaerobic wastewater treatment system	A wastewater treatment system that uses carriers with microorganisms decomposing organic substances attached in wastewater under conditions with little or no oxygen
Air stripping	A method of removing gas and volatile elements contained in liquid by bringing them in contact with air
Copper rust	A bluish green rust generated on the copper surface as a result of oxidization of the copper



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

The following reviews the results for FY2015 and the target for FY2016.

### Results in Fiscal Year Ended March 2015

#### Energy consumption reduction

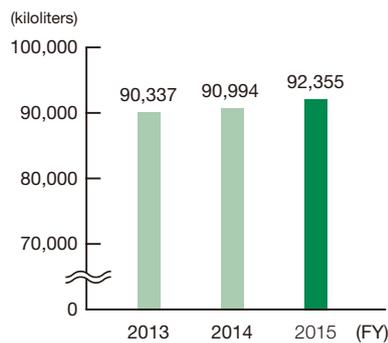
Item	Target	Result
Energy consumption (A production sites *1)	Below <b>94,666 kl</b>	<b>92,355 kl</b>

<Reference>

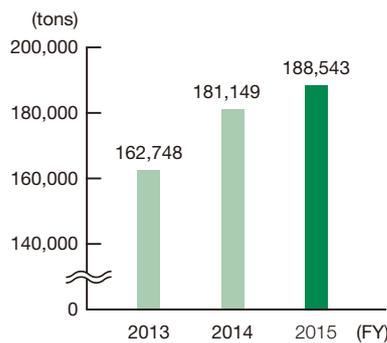
Item	Result
<b>CO<sub>2</sub> emissions</b>	<b>188,543 t</b>
Breakdown	
A production sites	182,509 tons
B Production sites *2	4,205 tons
Non-production sites *3	1,828 tons

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\*4 at its sites as "specified business operators" and "designated energy management factories" under the law. The Kurita Group endeavored to increase blower efficiency in the wastewater treatment process at ultrapure water supply sites, aiming to cut electric power consumption. It also reconsidered the ultrapure water heating method to reduce city gas consumption and control inverters in air conditioners for the clean rooms of group companies. With this step, the Group achieved its targets for per-unit energy consumption and energy consumption.

#### Energy consumption <A production site> (crude oil equivalent)



#### (Reference) CO<sub>2</sub> emissions



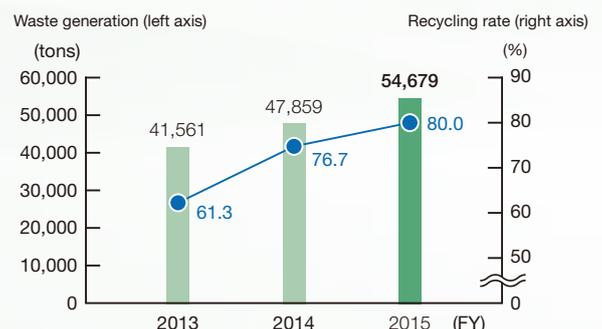
- \*1. Kurita Group companies which are specified business operators and designated energy management factories of Kurita Water Industries
- \*2. Companies and sites manufacturing water treatment chemicals and facilities
- \*3. Non-production sites: Kurita Group companies and sites other than those listed above
- \*4. The value calculated by dividing energy consumption by production quantity, building floor area or other value closely associated with energy consumption

#### Waste Reduction and Increase of Recycling Rate

Item	Target	Result
<b>Waste generation</b>	Below <b>47,859 tons</b>	<b>54,679 tons</b>
Break-down		
C production sites *5	Below 46,309 tons	53,083 tons
D production sites *6	Below 1,266 tons	1,345 tons
Non-production sites *7	Below 284 tons	251 tons
<b>Recycling rate</b>	<b>76.7% or more</b>	<b>80.0%</b>
Break-down		
C production sites	76.8% or more	80.2%
D production sites	80.5% or more	78.7%
Non-production sites	37.7% or more	46.1%

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.



- \*5. C production sites: Kurita Group companies and sites where the amount of waste generated is influenced by the production activities of specific customers
- \*6. D production sites: Kurita Group companies and sites engaged in R&D and the manufacture of water treatment chemicals and facilities
- \*7. Non-production sites: Kurita Group companies and sites other than those listed above

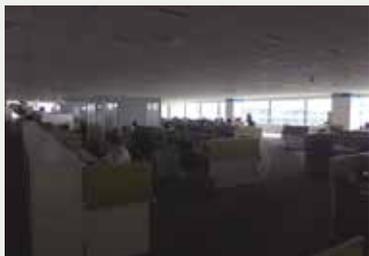
## Improvement Examples

### Example 1

#### Energy consumption reduction at the Head Office of Kurita Water Industries

Located in Nakano-ku, Tokyo, the Head Office of Kurita Water Industries lowered the illuminance of office lighting on all floors from 700 lux to 500 lux, the level recommended by the Tokyo Metropolitan Government. It also turns off all lighting at lunch time and carefully

turns off unnecessary lighting in an attempt to cut energy consumption.



A scene of power-off of all lighting at lunch time

### Example 2

#### Energy consumption reduction at the Tohoku Branch of Kurita Water Industries

Located in Sendai-shi, Miyagi, the Tohoku Branch of Kurita Water Industries replaced fluorescent lamps in its offices with LED lamps, applied thermal barrier film on window glasses, introduced energy-efficient vending machines and took other actions to cut its energy consumption.



A complete view of the branch floor and different actions (a: LED lamps, b: thermal barrier film, c: an energy-efficient vending machine)

### Example 3

#### Per-unit energy consumption reduction at Kuritec Service

Operating a precision cleaning business that removes fouling on customer semiconductor, display and other product manufacturing systems on its own site, Kuritec Service reviewed the operating conditions of air conditioners for the clean rooms of its separate sites

and moved forward with inverter control in an effort to lower its per-unit energy consumption.



The inside of a clean room

### Example 4

#### A rise in the recycling rate at the Toyoura Plant of Kurita Water Industries

Located in the Shimonoseki-shi, Yamaguchi and engaged in advanced refining of ion exchange resins and in recycling of ion exchange resins to be refilled in Kurita's shuttle demineralizers, the Toyoura Plant of Kurita Water Industries sought to use more waste resin as fuel resources in order to raise its recycling rate.



A shuttle demineralizer



Storage spaces for sorted waste

## Targets for Fiscal Year Ending March 2016

Item	Targets for Fiscal Year Ending March 2016	Approach
Energy consumption	Reduce per-unit energy consumption by 1% or more annually in fiscal 2012 onwards	Set a target on per-unit energy consumption in crude oil equivalent on a site-by-site basis to encourage them to address their reduction targets.
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 Kurita Group makes strong use of communications with the participation of employees, aiming to encourage them to be more aware of environmental improvements and to stimulate activities.

### The Kurita Environment Month

The Kurita Environment Month spotlights environmental activities and awareness in the workplaces and households of all Kurita Group staff members and in local communities. It aims to build awareness to encourage activities to improve the environment. It was held for the first time in FY 2015. For a one-month period in August, the Group invited experiences, pictures, photos and slogans relating to

environmental improvement from Group officers, employees and temporary workers in Japan and overseas as well as from their family members. Many Group employees and family members in Japan and overseas responded to the call. Given its success as a new form of communication, we will continue to hold and expand this event.

### Meeting for Discussion on Environmental Improvement Activities

At this meeting, participating members present their experiences on environmental improvement activities conducted on separate sites or at separate sections by Kurita Group employees in day-to-day operations. They also give their own thoughts on environmental improvement. The frank exchange of opinions among members leads to new discoveries and enables greater insight into the connection between operations at their organizations and environmental

improvement activities. This in turn makes clear what actions need to be pursued more intensively in the future. The Kurita Group will continue to organize this meeting as a way to motivate individual employees of the Group to be proactive on environmental activities, aiming to achieve real outcomes in boosting environmental benefits for customers and in reducing the Group's own environmental footprint.

#### T o p i c s

### Providing financial support for research and studies as well as for international exchange on water and the environment

The Kurita Group provides financial support for research and studies and for international exchange in scientific fields concerning water and the environment through the Kurita Water and Environment Foundation, established in 1997 to promote science and technology to contribute to the preservation and creation of good water environments.

In its research grant program, the Foundation selected from among 407 applications 62 research projects to receive financial support for FY 2015. In addition, it offered the Kurita Water and Environment Scientific Research Prizes of Excellence to those researchers receiving research grants with distinguished outcomes or social contributions. In addition, the Kurita Group carries out a program of offering an award (Kurita Award) for the purpose of boosting research motivation among young researchers at the Japan Society on Water Environment, as well as an international exchange support project for providing assistance in efforts to address Asia's water and environmental issues.



The awards ceremony



## The Kurita Group's Activity Targets

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>CO<sub>2</sub> 1</p>	<p>Environmental benefits (in CO<sub>2</sub>) for customers in a single fiscal year</p> <hr/> <p>Internal environmental impact (in CO<sub>2</sub>) in a single fiscal year</p>	<p>100% environmental independence</p>	<table border="1"> <caption>CO<sub>2</sub> Emissions for Customers (Single Fiscal Year)</caption> <thead> <tr> <th>Fiscal Year</th> <th>Value (%)</th> </tr> </thead> <tbody> <tr> <td>2013</td> <td>65</td> </tr> <tr> <td>2014</td> <td>58</td> </tr> <tr> <td>2015</td> <td>43</td> </tr> <tr> <td>2021 (FY)</td> <td>100</td> </tr> </tbody> </table>	Fiscal Year	Value (%)	2013	65	2014	58	2015	43	2021 (FY)	100
	Fiscal Year	Value (%)											
2013	65												
2014	58												
2015	43												
2021 (FY)	100												
<p>CO<sub>2</sub> 2</p>	<p>Environmental benefits (in CO<sub>2</sub>) for customers (cumulative total)</p>	<p>Reducing CO<sub>2</sub> emissions by 600 times the capacity of one domed baseball stadium (1.5 million tons-CO<sub>2</sub>)</p>	<table border="1"> <caption>Cumulative CO<sub>2</sub> Emissions for Customers</caption> <thead> <tr> <th>Fiscal Year</th> <th>Value (0,000 t-CO<sub>2</sub>)</th> </tr> </thead> <tbody> <tr> <td>-2013 (Cumulative total)</td> <td>72</td> </tr> <tr> <td>-2014 (Cumulative total)</td> <td>82</td> </tr> <tr> <td>-2015 (Cumulative total)</td> <td>90</td> </tr> <tr> <td>-2021 (Cumulative total)</td> <td>150</td> </tr> </tbody> </table> <p>Equivalent to 374 times the capacity of one domed baseball stadium</p> <p>Equivalent to 600 times the capacity of one domed baseball stadium</p>	Fiscal Year	Value (0,000 t-CO <sub>2</sub> )	-2013 (Cumulative total)	72	-2014 (Cumulative total)	82	-2015 (Cumulative total)	90	-2021 (Cumulative total)	150
Fiscal Year	Value (0,000 t-CO <sub>2</sub> )												
-2013 (Cumulative total)	72												
-2014 (Cumulative total)	82												
-2015 (Cumulative total)	90												
-2021 (Cumulative total)	150												
<p>Waste 1</p>	<p>Environmental benefits (in waste) for customers in a single fiscal year</p> <hr/> <p>Internal environmental impact (in waste) in a single fiscal year</p>	<p>Attaining a waste reduction factor of 5</p>	<table border="1"> <caption>Waste Reduction Factor for Customers (Single Fiscal Year)</caption> <thead> <tr> <th>Fiscal Year</th> <th>Value (Factor)</th> </tr> </thead> <tbody> <tr> <td>2013</td> <td>2.2</td> </tr> <tr> <td>2014</td> <td>1.2</td> </tr> <tr> <td>2015</td> <td>1.4</td> </tr> <tr> <td>2021 (FY)</td> <td>5.0</td> </tr> </tbody> </table>	Fiscal Year	Value (Factor)	2013	2.2	2014	1.2	2015	1.4	2021 (FY)	5.0
	Fiscal Year	Value (Factor)											
2013	2.2												
2014	1.2												
2015	1.4												
2021 (FY)	5.0												
<p>Waste 2</p>	<p>Environmental benefits for customers in waste (cumulative total)</p>	<p>Reducing waste by the amount equivalent to the full capacity of 1 domed baseball stadium (1.36 million tons)</p>	<table border="1"> <caption>Cumulative Waste Reduction for Customers</caption> <thead> <tr> <th>Fiscal Year</th> <th>Value (0,000 t-CO<sub>2</sub>)</th> </tr> </thead> <tbody> <tr> <td>-2013 (Cumulative total)</td> <td>62</td> </tr> <tr> <td>-2014 (Cumulative total)</td> <td>68</td> </tr> <tr> <td>-2015 (Cumulative total)</td> <td>76</td> </tr> <tr> <td>-2021 (Cumulative total)</td> <td>136</td> </tr> </tbody> </table> <p>Equivalent to 60% of the full capacity of one domed baseball stadium</p> <p>Equivalent to the full capacity of one domed baseball stadium</p>	Fiscal Year	Value (0,000 t-CO <sub>2</sub> )	-2013 (Cumulative total)	62	-2014 (Cumulative total)	68	-2015 (Cumulative total)	76	-2021 (Cumulative total)	136
Fiscal Year	Value (0,000 t-CO <sub>2</sub> )												
-2013 (Cumulative total)	62												
-2014 (Cumulative total)	68												
-2015 (Cumulative total)	76												
-2021 (Cumulative total)	136												

\* The reference to one domed baseball stadium specifically envisions Tokyo Dome. On the assumption that Tokyo Dome has a capacity of 1.24 million m<sup>3</sup>, it is equivalent to 2,430 tons-CO<sub>2</sub> given that CO<sub>2</sub> weights 1.96 kg per cubic meter.

\* 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.



## Profile

The Kurita Group comprises of the parent company, Kurita Water Industries Ltd., its 48 subsidiaries and two affiliates. 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.

## Corporate Data

Company Name:	Kurita Water Industries Ltd.	Date of Establishment:	July 13, 1949
Head Office Location:	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	Number of employees:	5,222 (on a consolidated basis) 1,527 (parent company) (As of March 31, 2015)

## Group Network

### Main Domestic Subsidiaries and Affiliates

Water Treatment Chemicals business	Water Treatment Facilities business
<Sale of water treatment chemicals>	<Operation, maintenance and management of water treatment facilities>
Kurita Buil-Tech Co., Ltd.	Kuritag Co., Ltd.
Kurita BMS Co., Ltd.	<Soil remediation>
Kurita Chemicals Hokkaido Ltd.	Land Solution Inc.
Kurita Chemicals Kantou Ltd.	<Chemical cleaning>
Kurita Chemicals Tokai Ltd.	Kurita Engineering Co., Ltd.
Kurita Chemicals Hokuriku Ltd.	Miyoshi Industries Co., Ltd.
Kurita Chemicals Kansai Ltd.	<Tool cleaning>
Kurita Chemicals Sanyo Ltd.	Kuritec Service Co. Ltd.
Kurita Chemicals West Japan Ltd.	San-ei Industries Co., Ltd.
Kurita Chemicals Oita Ltd.	Nippon Fine Co., Ltd.
Kurita Chemicals Kumamoto Ltd.	Sun Kako Co., Ltd.
<Manufacture of water treatment chemicals>	Aoi Industries Co., Ltd.
Kurita Chemical Manufacturing Ltd.	<Other>
<Other>	Kurita Meiki Ltd.
Kurita Analysis Service Co. Ltd.	Kurita Creation Co., Ltd.
	Kurita Analysis Service Co. Ltd.

### Main Overseas Subsidiaries and Affiliates

Water Treatment Chemicals business	Water Treatment Facilities business
1 Kurita Water Industries (Dalian) Co., Ltd.	2 Kuritec (Shanghai) Co., Ltd.
4 Kurita Water Industries (Jiangyin) Co., Ltd.	3 Kurita Water Industries (Suzhou) Ltd.
5 Angang BK Giulini Water Treatment Co., Ltd.	7 Hansu Technical Service Ltd.
6 Hansu Co., Ltd.	9 Kurita (Singapore) Pte. Ltd.
8 Kurita (Taiwan) Co.,Ltd.	11 P.T. Kurita Indonesia
9 Kurita (Singapore) Pte. Ltd.	12 Kurita Water (Malaysia) Sdn. Bhd.
10 Kurita-GK Chemical Co., Ltd.	19 Kurita America, Inc.
11 P.T. Kurita Indonesia	
12 Kurita Water (Malaysia) Sdn. Bhd.	
13 Kurita Europe GmbH	
14 Kurita Europe APW GmbH	
15 Kurita France S.A.S	
16 Kurita Iberica SL	
17 Kurita Turkey Kimya A.S.	
18 Kurita Sverige AB	
19 Kurita America, Inc.	
20 Kurita do Brasil LTDA.	





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 the Kurita Group Environmental Report 2015 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 also visited Kurita Water Industries' Tohoku Office to check related documents, ask questions of the persons in charge, and check whether the source documentation for publicly disclosed data is being handled systematically in a predefined manner.

### Evaluation and comments

The Kurita Group engages in environmental improvement activities in three specific areas: Technological Innovation, Customer Needs and Internal Change. Among these three areas, as an indicator of the achievements in Customer Needs, environmental benefits for customers and other indicator values have risen. These achievements are very highly regarded. In the future, these indicators will be more effectively used as a means of environmental management by specifically associating improvements in indicator values with value creation. In addition, we believe it is time to reconsider the indicators themselves, for example by restudying the scope of the environmental benefits to expand it if possible.

In terms of communications, we regard the initiative of *The Kurita Environment Month*, which was launched in FY 2015, as highly effective for boosting employees' motivation. To continue it every year, the positive participation of management executives will be required along with some improvements, such as an event for jointly creating something with participants. As it is a good initiative, we hope that it will be continued effectively.

As for overseas implementation, we appreciate the Group's encouragement of environmental management and its emphasis on information disclosure. We hope that overseas activities will be expanded to attract attention outside Japan as well in consideration of the information needs of overseas social investors.

Within the scope of our basic examination, we found no serious discrepancies in 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. When a customer replaced a small-sized boiler, the Kurita Group personnel gained an accurate insight into the customer's requests and proposed a joint solution with a boiler manufacturer that met the requirements. As a result, the customer adopted the proposed solution and rated the Kurita Group highly. We also found that the customer's confidence in the Kurita Group was heightened by successfully proposing a solution that was estimated to produce an effect close to the real benefit from it on the basis of the collection of data for detailed analysis. We are convinced that Kurita's strength lies in this capacity to propose solutions. By making an inquiry to Kurita, customers not only receive solutions to problems but, more importantly, also enjoy synergy. This results in increased customer satisfaction. We hope that the Kurita Group will continue to build win-win relationships with customers in a bid to carry out environmental improvement activities through its core business.

### The Kurita Group's environmental improvement activities

We visited the Tohoku Office to interview some of its personnel involved in environmental improvement activities and took a look at their activities. This was our first visit to a non-production site. Non-production sites are responsible for only a small proportion of the Group's environmental impact. However, they are where a large number of employees work. This means that environmental improvement activities at these sites are significant in building awareness of environmental conservation among personnel in the Kurita Group. The Tohoku Office and all sales branches under its control set environmental targets and made individual efforts, such as the application of heat barrier film to window panes and switching from conventional lighting to LED lighting. Although these are all small activities, the accumulation of these efforts produces a considerable impact. High ratings are also given to improvements in the practice of turning unwanted lights off, reducing power consumption and other factors in order to promote spontaneous actions with an awareness of environmental activities. Even at non-production sites with minor environmental impacts, the numerical figures were monitored in close detail and a sound management system was in place.

June 13, 2015

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)



## Kurita Water Industries Ltd.

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

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

