



# Environmental Report 2019

Abridged Edition



KOBE UNIVERSITY

# Message from the President



We are now living in an age in which climate change, natural disasters, and other global issues are having a significant impact on the economy, the environment, and our society. On top of that, we are also encountering other new challenges such as rapid urbanization and aging populations. In facing these numerous challenges, it is clear that coordinated initiatives must be taken throughout the international community. At Kobe University, we are employing the traditions and distinguishing features outlined in our university charter to advance cutting edge, interdisciplinary research. In addition, we are fulfilling our duties as a higher learning institution by breaking into new academic fields and cultivating capable individuals who will go on to play leading roles in solving global issues. Accordingly, we have adopted an initiative entitled Transforming Our World: The 2030 Agenda for Sustainable Development, which sets forth universal goals for the international community (spanning Japan and other developed and developing countries) to work together in tackling. In order for Japan to implement effective and comprehensive initiatives to achieve the Sustainable Development Goals (SDGs), a

range of actors in the private sector are working together alongside the government to create a system that will be able to achieve these goals. Against this backdrop, we are re-examining the role the university will need to take to achieve the SDGs. We are working to promote SDG-related initiatives across a wide range of academic fields across the university while incorporating recent achievements in interdisciplinary and new academic fields. Partnering with local communities and industries, we are working to share the principles of the SDGs, and widely publicize the results of our initiatives domestically and overseas. University initiatives include sustained, long-term activities relating to the 3Rs (which aim to reduce the environmental impact of waste), managing harmful substances, spreading awareness about energy conservation, educating students to contribute to environmental improvement, and promoting environmental research projects. To all members of the university, related enterprises, and the local community, we ask for your longterm and widespread support in assisting Kobe University's environmental activities.

## Environmental Charter

### ■ Basic Philosophy

As a world-class center for research and education, Kobe University strives to advance initiatives that address two crucial modern day issues: environmental conservation and sustainable society creation.

The university is committed to building pathways to achieve a sustainable society, something that remains a shared goal for humanity. To do this, we are utilizing the local mountains and seas to cultivate capable, environmentally aware individuals. We regularly publicize academic information from the cosmopolitan city of Kobe to the rest of the world, and we are leading the way in environmental conservation efforts.

### ■ Basic Policies

1. Cultivate and Support Environmentally Aware Individuals
2. Promote Research to Maintain and Support the Global Environment
3. Take a Leading Role in Environmental Conservation



## Topics

PDF, P.7

### Founding and Sustaining Gomi-jp, a Kobe University organization working to Reduce Waste.

*KOJIMA Risa, (Gomi-Japan Director),  
Project Associate Professor, Graduate School of Economics*

The objective of the organization is source reduction of waste, especially, containers and packaging. From 2016 we have also focused on reduction of household food loss and waste.



Gomi-Japan "Heraso"  
Reduction Mark



Student "Heraso" Heroes

## Education

PDF, P.10

### Building A Wood Stove to Encourage Experience with Fire

*TANAKA Takanao, Vice Principal,  
Kindergarten Attached to Kobe University*

We carefully maintain the rich natural environment of the school grounds, fully incorporating it into the children's play and activities.



A Warm Wood Stove



Clock-Shaped Wood Stove

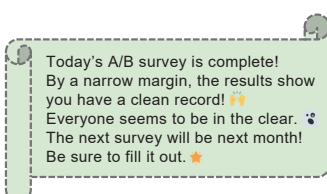
## Topics

PDF, P.8

### FY2018 Seikyo Gakusei linkai (GI) Environmental Activity Report

*SAKAI Mai, Year 2, Faculty of Science*

Poster campaigns and A/B surveys were conducted in order to increase interest among students in collecting and recycling used paper.



Two Survey Examples

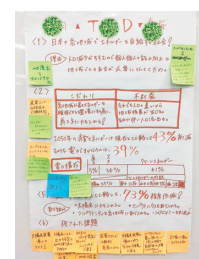
## Education

PDF, P.11

### ESD and Ethics Exercises (Joint Project with Faculty of Economics NPO Practical Course): Next Generation Energy Workshop

*MATSUDA Tsuyoshi, Professor, Graduate School of Humanities*

Builds an academic forum for thorough deliberations on the future of power and energy in Japan, the present and future of science and technology, political and economic trends, social issues in local communities (such as population decline), values, concepts, and other complex factors, and how to build a consensus across society.



## Topics

PDF, P.9

### Using Environmental Reports to Educate on the Environment

We widely publicize the university's environmental report, creating future reports and conducting environmental conservation activities that reflect student opinions.



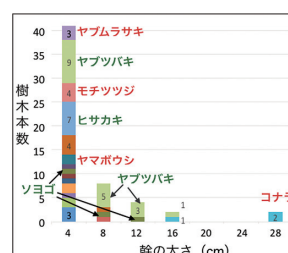
## Education

PDF, P.12

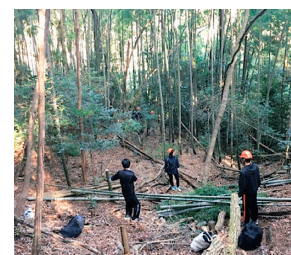
### Proposals to Redevelop Mountainous Regions through Faculty of the Agriculture's Practical Agronomics Agricultural Development Group

*KURODA Keiko, Professor, Graduate School of Agricultural Science*

It provides practical resolutions through dialog with the local community. Uses scientific data to determine issues related to conserving the forest ecosystem.



Tree composition and thickness in an abandoned mountainous region (Kita-ku, Kobe)



Thinning and Utilizing an Abandoned Bamboo Forest (Sasayama)

## Research

PDF, P.13

### On-Site Testing How to Recycle Resources using Small Anaerobic Digesters at a Dairy Farm

IHARA Ikko, Associate Professor,  
Graduate School of Agricultural Science

Two small anaerobic digesters are on-site testing for generating biogas as renewable energy. The digesters are fed with livestock and food biomass at a small-scale dairy farm in urban areas to contribute to sustainable and recycling farming.



Small digester before being buried



Buried small digesters

## Research

PDF, P.16

### Reducing Sludge Emissions from wastewater of laboratory origin by magnetic force

MAKI Hideshi, Associate Professor, Center for Environmental Management  
IHARA Ikko, Associate Professor, Graduate School of Agricultural Science

Emissions reduction of heavy metals in wastewater from laboratory origin on campus depends on the ways to reduce the volume of sludge. We investigated the feasibility of separating the sludge using magnetic force.

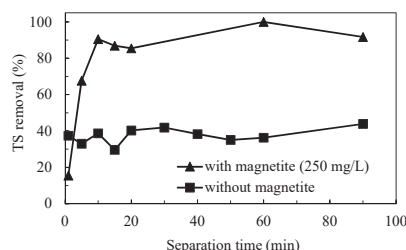


Figure 1 Effect of  $\text{Fe}_3\text{O}_4$  addition on sludge separation. The magnetic separator removes approximately 90% of magnetically-seeded sludge within 10 minutes.

## Research

PDF, P.14

### Estimating economic costs of household food loss and waste

KOJIMA Risa, Project Associate Professor, Graduate School of Economics

The objective of this research is the reduction of household food loss and waste. In order to achieve the objective, we divided the research program into three parts, which are: (1) development of a household FLW diary app, (2) economic evaluation of the benefit of avoidance of FLW generation, and (3) construction of a base for a nationwide municipality network for the reduction of FLW.



Main Screen of Food Loss Diary App

## Conservation Activities

PDF, P.17

### Considering Both Economy and Environmental Conservation in the Ministry of Environment's Environmental Growth Engine Research Group.

OZAKI Hiroyuki, Professor, Graduate School of Science, Technology and Innovation

Examines numerous business examples in which innovation has allowed for the creation of growth alongside environmental conservation. A study analyzing the results is released each year.



Vessel coated with fuel-efficient paint  
Source: Nippon Paint Marine Coatings Co., Ltd.



Seagull Fan modelled on seagull feathers  
Source: Doshisha Corporation



Airshade, a fractal sunshade that artificially reproduces the coolness of a wooden umbrella  
Source: Sekisui Heim Supply Co., Ltd.

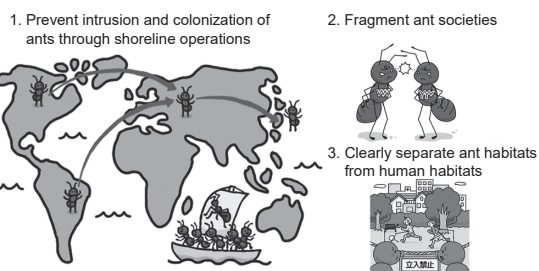
## Research

PDF, P.15

### Research in Neuroethology and Chemical Ecology to Control Invasive Ants Like Red Fire Ant or Argentina Ant

OZAKI Mamiko, Professor, Graduate School of Science

Researched methods to disturb society of invasive ants via chemical communication, by identifying important odor substances (pheromones) for their communication, and using those substances to give false information to them.



Stopping the encroachment of invasive ants

## Conservation Activities

PDF, P.18

### Renovation plan of heat supply system using renewable energy in large hospital

TAKEBAYASHI Hideki, Associate Professor, Graduate School of Engineering  
NAGAIRO Tsuyoshi, Special Project Researcher,  
Office for Academic and Industrial Innovation

Contents:

The followings are considered:

- Heat and electricity demands in target buildings
- Geothermal and solar heat potential
- Heat supply system using renewable energy
- Benefits of the system
- Practical plan

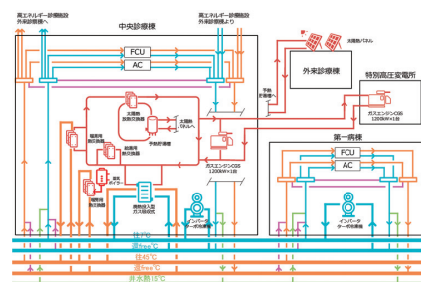


Figure: Heat sharing system using renewable energy



# Kobe University Environmental Performance

## Environmental Management

### Environmental Management Policy

Based on the Kobe University Basic Policy on Environmental and Facility Management, in March, 2016 we established the Basic Policy to Encourage Environmental Management During the Third Mid-Term Goal Period (FY2016 to FY2021). Our environmental conservation activities are based on this policy.

#### Basic Policy to Encourage Environmental Management During the Third Mid-Term Goal Period

##### I Promote the 3Rs

By promoting the 3Rs (reduce, reuse, recycle) among all university members, we will take assertive action to reduce waste while simultaneously reducing resource consumption.

##### II Sensible Energy Usage Initiative

By promoting effective energy usage practices, we will work to reduce the average yearly energy consumption rate\* by more than 1%, and reduce CO<sub>2</sub> emissions throughout the university.

(\*) Consumption rate measured according to the total floor area of buildings.

##### III Execute and Maintain Environmental Management Cycles

To encourage environmental management, we will develop an ongoing action plan and implement a PDCA cycle.

### Paper Waste Reduction Initiative

To encourage environmental management, we promote the 3Rs for paper and trash sorting. Posters on trash separation and recycling are put up in each department in order to spread awareness regarding proper separation and disposal of recyclables (cans, glass, PET bottles), combustible trash, non-combustible trash, miscellaneous trash, and confidential documents. In addition, uniform stickers for separated bins were designed and distributed across all schools.



Disposal bin setup  
(stickers indicate waste separation)



Leftover paper container configuration  
(old paper and magazines separated)

### Please Cooperate in Recycling Leftover Paper

#### Recyclable Paper

- Magazines, Pamphlets, Catalogs, Posters
- Calendars, Sketchbooks, Paper Filters (Remove Metal Filings)
- Paper Boxes, Wrapping Paper (Card), Food Packaging, Medicine, Etc., Tissue Paper Boxes (Not Including Cellophane and Other Non-Paper Parts)
- Envelopes (Not Including Cellophane from Transparent Bordered Envelopes), Money Envelopes, Gift Envelopes, Postcards, Business Cards, Letters, DM (Not Including Vinyl)
- Paper Bags (Not Including Non-Paper Bags)
- Cardstock (Toilet Paper and Wrapping Paper Tubes Are OK), Paper Egg Crates
- Textbooks, Notebooks, School Printouts, Origami, Japanese Writing Paper, Drawing Paper (Including Paper with Ink or Paint)
- Card Stock for Mounting Strips or Stockings, Paper Clothing Tags
- Used Books (Paperbacks, Pocket Books), Dictionaries (Not Including Vinyl Coverings or Other Non-Paper Items), Catalogs, Posters
- Shredded Paper (If Recyclable)
- Copy Paper, Memo Paper (Not Including Thermo-Sensitive Paper)

\*Cellophane, vinyl, and plastic is burnable trash.

#### Collection Methods

- Distribute trash bins and bags in rooms to collect recyclable paper in the course of daily life.
- Place unneeded paper bags, envelopes, etc. inside.
- Stack magazines and file with a cord.
- Wrap up all unneeded paper with a cord.

\*Illustration is taken from Kobe City pamphlet entitled "Do You Know? Leftover Paper Can Be Recycled."

**The items to the right dissolve in water, so they cannot be recycled!**

- Water Proofed or Specially Processed Paper (Vinyl Coated Paper, Paper Cups, Wax Paper Used for Delicatessen Boards, Etc.) (Items With Lots of Attachments)
- Thermal Paper (Faxed Paper, Etc.)
- Carbon Paper (Shipping Slips, Receipts, Etc.)
- Photos
- Photos with Adhesives (Stickers, Photo Albums, Etc.)
- Synthetic Paper (Braille Books, Etc.)
- When-On Transfer Paper
- Paper Soiled with Food
- CDs and DVDs Included with Magazines

Center for Environmental Management Created November, 2016

Poster about recycling leftover paper

## Material Balance

Material balance refers to the energy and resource volume (input) required for business activities, and the environmental impact (output) that results from those activities. With a basic environmental management policy that incorporates the 3Rs (reduce, reuse, recycle), Kobe University is taking the assertive initiative to reduce waste and resource consumption.

INPUT		2018
Total Energy	GJ	861,934
Electricity Consumption	MWh	68,828
City Gas Consumption	1,000m <sup>3</sup>	4,155
Heavy Oil Consumption	kL	1.11
Paper Usage	t	195.16
Tap Water Usage	1,000m <sup>3</sup>	283.802
Well Water Usage	1,000m <sup>3</sup>	122.934



University Overview		2018
Student Body (Undergraduate)	Students	11,596
Student Body (Graduate)	Students	4,660
Study Body (Affiliated Institutions)	Students	1,427
Foreign Student Body	Students	1,303
Students on Academic Scholarships	Students	10,700
Teaching Faculty	People	5,211
Foreign Exchange Programs with Overseas Universities (University Partnerships)	Institutions	170
Foreign Exchange Programs with Overseas Universities (Department Partnerships)	Institutions	239



OUTPUT		2018
CO <sub>2</sub> Output Volume	t-CO <sub>2</sub>	33,962
Waste Material (OA Paper, Newspaper, Cardboard, Confidential Documents, Etc.)	t	305.7
Waste Material (Raw Garbage)	t	4.6
Waste Material (Combustible Waste)	t	526.3
Waste Material (Non-Combustible Waste)	t	0.1
Waste Material (Large Items)	t	201.1
Sewage	1,000m <sup>3</sup>	406.736

## Energy Conservation and Climate Change Prevention

### (1) Energy Consumption

In FY2018, energy consumption from electricity, gas, and heavy oil totaled approximately 860,000 gigajoules. CO<sub>2</sub> emissions from this energy totaled approximately 33,900 tons. Energy consumption decreased by 2.1% from FY2017. Energy consumption per total floor area of each building also decreased by 2.1%. To date, we have worked to conserve energy across all university campuses, and will continue to work to conserve energy going forward. In addition, after facing difficult financial conditions, we publicized the need to transition to updated air conditioning systems and LED lighting both within and outside the university, but have yet to receive the necessary funds to make these changes. Going forward, we will work to secure the required funding to make these low-energy improvements.

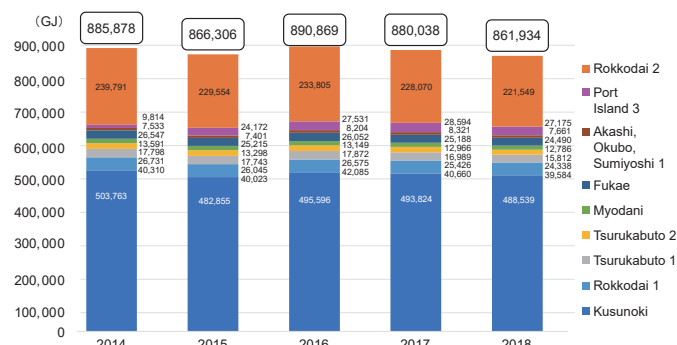


Figure 1 Energy Consumption

FY2017: 1,746 GJ/1,000m<sup>2</sup> → **2.1% Reduction** → FY2018: 1,710 GJ/1,000m<sup>2</sup>

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

Both CO<sub>2</sub> emissions at our 11 main building complexes, and CO<sub>2</sub> emissions per unit area have been decreasing since FY2017.

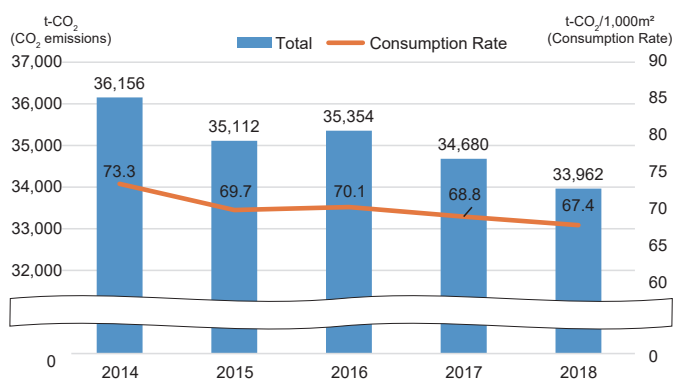


Figure 2 CO<sub>2</sub> emissions

Initiatives comprising students and faculty have been implemented with the aim of reducing total floor area emissions by 1% annually, with the base level implemented in FY2004 (the year the university became a "national university corporation"). Initially, CO<sub>2</sub> emission sources increased as a result of various activities. These include activities conducted to ensure necessary functions for new education and research projects (establishing animal and chemical experimentation facilities), and initiatives to provide advanced medical treatment (minimally invasive treatment, strengthening cancer treatment capabilities, offering treatment environments that are accommodating to women). Despite this, energy conservation activities have allowed us to achieve our targets, with CO<sub>2</sub> emissions per total floor area (504,131 m<sup>2</sup>) falling 17.7% (down 33,962t-CO<sub>2</sub> from the base year).

FY2004: 81.94t-CO<sub>2</sub>/1,000m<sup>2</sup> → **17.7% Reduction** → FY2018: 67.4t-CO<sub>2</sub>/1,000m<sup>2</sup>

### (3) Electricity Consumption

Electricity use at our 11 main building complexes for FY2018 decreased 1.7% from the prior fiscal year. This is believed to be a result of climate-related impacts and our energy conservation initiatives.

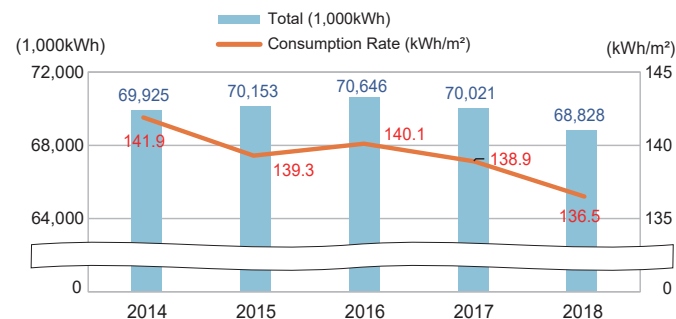


Figure 3 Electricity Consumption

### (4) City Gas Consumption

City gas use at our 11 main building complexes for FY2018 decreased 5.3% from the prior fiscal year. This is believed to be a result of climate-related impacts and energy reduction initiatives.

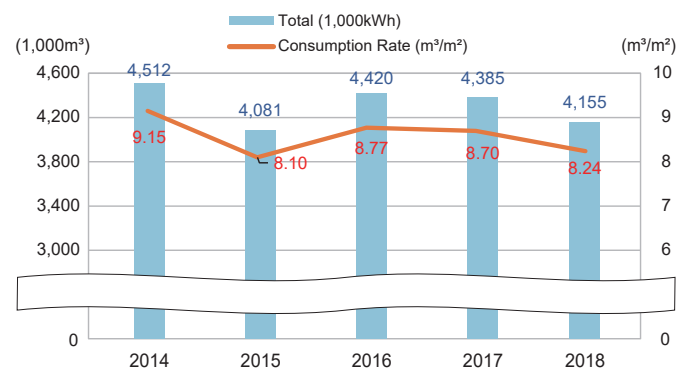


Figure 4 Gas Consumption

### (5) Heavy Oil Consumption

Heavy oil consumption for FY2018 decreased 91.7% from the prior fiscal year. This is a result of demolishing the fuel tank of an absorption type water cooler/heater in the Fukae region in FY2017, changing to gas sources, and adopting electric heat pumps.

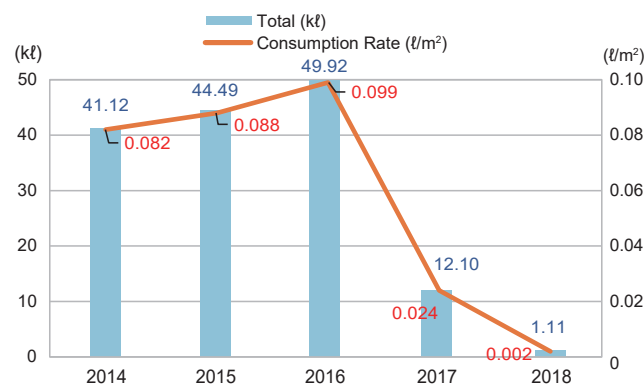


Figure 5 Heavy Oil Consumption



## Resource Conservation and Recycling

### Water Usage

Total water usage for FY2018 was approximately the same as the prior fiscal year (407,000 m<sup>3</sup>). In the Rokkodai area, we plan to conserve resources by using river water from Mt. Rokko for toilets and experiments. In addition, in February 2012, we began using well water in Kusunoki. We will continue working towards efficient use water resources.

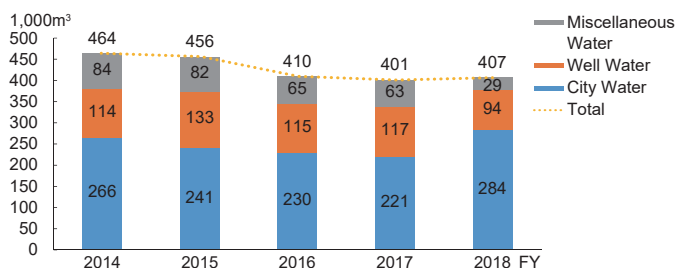


Figure 6 Water Usage (11 Main Campuses)

### Waste

Waste volume from FY2014-2018 is shown in Figure 7. Waste volume for FY2018 decreased 6.53% from FY2017. Waste recycling volume per department for FY2018 is shown in Figure 8. The recycling volume (in the legend) shows how much of the waste (t) was recycled. The recycling rate for FY2014 was 12.7%. University-wide recycling initiatives resulted in a recycling rate of 27.9% for FY2018.

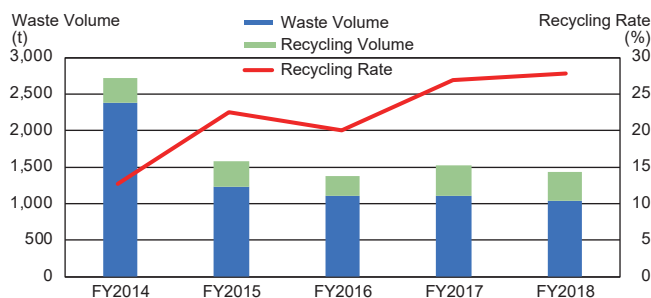


Figure 7 General Waste Disposal Volume

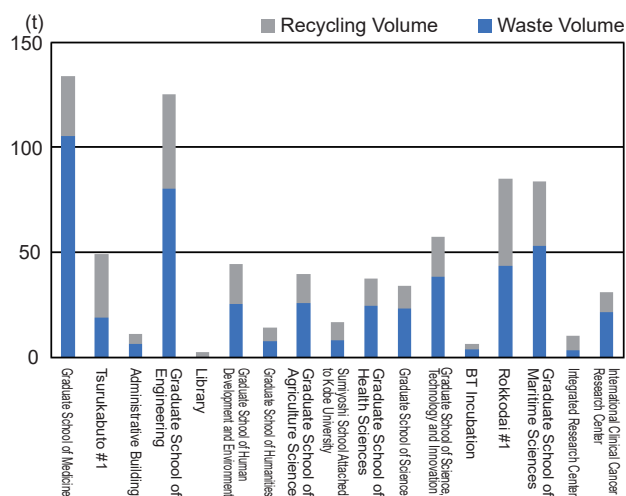


Figure 8 Waste Recycling Volume for FY2018 By Department

The recycling rate by waste type for FY2018 is shown in Figure 9. According to this figure, it is clear that the recycling rate for OA paper, newspapers, magazines, and cardboard has not improved. If the recycling rate for paper reaches 90%, the total recycling rate for all waste will increase from approximately 27.9% to 39% (calculated according to FY2018 waste volume). Kobe University will follow its basic policy to encourage environmental management, and work to further improve the recycling rate moving forward.

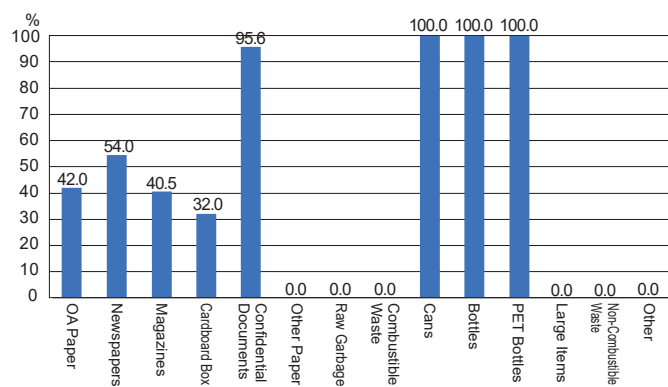


Figure 9 FY2018 Recycling Rate by Waste Type

### Office Consumption Across Departments

Changes in consumption of office paper from FY2014 to FY2018 are shown in Figure 10. Office paper usage volume for FY2018 decreased 7.70% (16.29t) from the prior fiscal year.

Going forward, we will work to reduce our paper usage by making conferences and lectures paperless, introducing double-sided printing, aggregate printing, and reusing the backs of already printed paper.

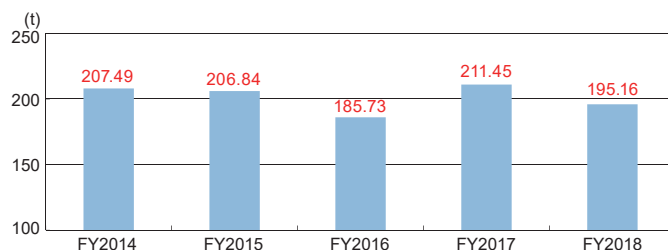


Figure 10 FY2014-FY2018 Office Consumption Across Departments

## Green Purchasing, Procurement and Environmentally Friendly Contracts

### Green Purchasing and Procurement

Based on the Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Green Purchasing Law), Kobe University created a policy for procuring eco-friendly materials. The university procures materials based on this policy, publicizes its results, and provides reports to the Ministry of Environment and Ministry of Education, Culture, Sports, Science and Technology.

The university conducted a study on procurement results for 275 items across 21 fields. Among these, results for 9 major fields are shown in the table below. In FY2018, we achieved a 100% procurement rate for the designated items.

We will create procurement policies based on the green purchasing law, and assertively work to procure eco-friendly materials.

#### Achievements in Green Purchasing and Procurement in FY2018

Field	Item	Total Procurement Volume	Procurement Rate for Specific Items
Paper	Copy Paper	194,330kg	100%
	Toilet Paper	26,675kg	100%
	Other	918kg	100%
Stationery	Ball Pens	9,478	100%
	Envelopes (Paper)	263,860	100%
	Other	154,583	100%
Office Furniture	Chairs, Desks	2,919	100%
OA Equipment	Copy Machines, Printers	4,678	100%
Lighting	Fluorescent Tubes	11,925	100%
Interiors	Curtains	123	100%
Work Gloves		6,548	100%
Other Fibers	Blue Sheets	78	100%
Services	Printing	622	100%
Average			100%

## Outside Opinion

I am happy to have the opportunity to provide an outside opinion on Kobe University's 2019 Environmental Report. It has given me a chance to learn about the consideration the university gives to the environment.

For this mission, I have looked at other past reports as well. Since 2006, Kobe University has been opening its environmental reports to the public through the web, and this year marks the 14<sup>th</sup> edition. Publication of this report requires tremendous efforts on collecting and sorting from a large amount of data, and I realized that Kobe University is diligently working to be an eco-friendly institution. I respect that the university has continued this work, thoroughly gathering and organizing information for over 10 years, despite facing difficulties of budget cuts, and external pressure on continuation of the same work more than 5 years, which are often seen in current national universities. The efforts can be seen not only in whole university's approach on waste reduction and greenhouse gas emissions cut-off, but also in many attempts at various levels, such as the launch of Gomi-Japan, environmental education based on Kobe University environmental report, and a biogas demonstrative experiment. As seen in the environmental performance figures, the university has continued to steadily reduce CO<sub>2</sub> emissions and other targets for the five years spanning FY2014 to FY2018. The results showed that three indicator rates of solid waste generation, water consumption, and electrical consumption per area were reduced by 5-10%.

The university has made several achievements in reducing its environmental impacts, but I believe incorporating a comparative insight may allow the university to strengthen its capabilities and to take even further initiatives. For example, it was difficult for me to understand whether solid waste generation rates in the university were high or low although these values were shown in the report. These would be easily understood if there was an explanation with other comparative values in related activities. One of the comparison ways would be to look at data outside of the university (other businesses and universities), or the past data. Fortunately, the report has been published since FY2006, so that we can check the differences during the last decade. In fact, waste generation rate fell 37% from 2006 (1,600 tons) to 2018 (1,000 tons), but we cannot see this unless seeing the past data. In case there are similar enterprises such as the university CO-OP and 7-Eleven, it is possible to

make comparison across the university. It would be helpful to offer a cross check on good practices for each. For example, the CO-OP notes collection of cans, but there was no description for 7-Eleven. Moreover, it is easy to collect information on water usage and waste generation rates from public organizations. A comparison between these and the university's values would allow one to see impact periods (heat waves, energy crises), and would make the achievements of the university's activities clearer.

As a university member, I really understand how it is difficult for us to tackle several environmental issues under serious economic conditions in universities, but I hope the above comments will prove useful, and that Kobe university will continue to sustain its efforts moving forward.



Name: FUJII Shigeo, Kyoto University, Graduate School of Global Environmental Studies, Department of Technology and Ecology, Professor

### Profile

Completed Masters and Doctorate in Engineering at Kyoto University  
Associate Professor, Asian Institute of Technology (1991-1993)  
Associate Professor, Ritsumeikan University (1993-1998)  
IWA (International Water Association) Fellow, Distinguished Adjunct Professor of AIT (Asian Institute of Technology)

■Specialized Fields: Water Management (Watershed Pollution Mechanisms, Control) Water Sanitation

#### ■Major Committees:

Chair, Environmental Engineering Committee, Japan Society of Civil Engineers (April 2017 - March 2019)

Vice-Chair of Society of Environmental Conservation Engineering

#### ■Major Writings:

Natural Purification Mechanisms (Gihodo Shuppan, Co-Author, 1990), Lake Biwa: Environment and Water Quality Composition (Gihodo Books, Co-Author, 2000), Dictionary on Practical Water Treatment and Utilization (Research Institute of Economy, Trade and Industry, Encyclopedia Center, Co-Author, 2014)

## About the Cover

In order to further publicize this environmental report to our students (who comprise the majority of those in the university), we created the cover by soliciting photos from undergraduate and graduate students at the university, along with students at our affiliated schools. The cover photo was selected by the environmental planning and assessment committee, with the below piece receiving the grand prize.

We would like to express our thanks to all those who applied.

Photo by TSUKAGAWA Keisuke, 1st Year at Kobe University Faculty of Engineering Department of Computer Science and Systems Engineering  
[Photo Comment]

I recently purchased a mirrorless and am always taking photos while commuting to school. A friend told me about the campaign and suggested I participate, so I went ahead and made a submission. I saw these red seeds on the way home, and quickly snapped this photo. I am thankful to all those who maintain the campus every day. They were the ones who made this photo possible.



Photo taken midway along Uribo Road

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- Date of Issue: September 30, 2019
- Created by the Center for Environmental Management
- Inquiries: Kobe University Facilities Department, Equipment Division, Environmental Management Group  
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URL: [https://www.kobe-u.ac.jp/en/about\\_us/charter/environment.html](https://www.kobe-u.ac.jp/en/about_us/charter/environment.html)

