Kobe University Environmental Report 2020

Environmental Report 2020

KOBE UNIVERSITY

Message from the President

Hiroshi Takeda, President

April 2003: Dean of Kobe University Faculty of Science
Director of the Biosignal Research Center
April 2007: Director of Kobe University Library
April 2009: Executive Vice President of Kobe University
April 2015: President of Kobe University

Since the opening of Kobe University's predecessor Kobe Higher Commercial School in 1902, the university has evolved from its roots in social sciences into a comprehensive university with the philosophy of "harmony between science and reality."

We believe that the "cultivation of capable individuals through education and research and the inheritance and creation of knowledge" form the foundations of the role that a university should play. One of the defining characteristics of a university is that education and research have an inseparable relationship, and it is this sense of unity in education and research that is the essence of fostering capable individuals. Therefore, we believe that it is the university's mission to thoroughly deepen academic and basic research.

On the other hand, there are many problems in this modern global society that need to be solved on a worldwide scale, such as global warming, lack of water resources, infectious diseases, and other such "global issues". To this end, it is necessary to promote efforts related to the Sustainable Development Goals (SDGs), which are universal goals for the entire international community including both developed and developing countries, as well as Japan. In January 2019, the university announced its plans to contribute towards the SDGs. This was followed by the establishment of the "SDGs Promotion Office" in February 2020, which will carry out these practical activities. Then in April 2020, we established the Kobe University Value School (commonly known as "V.School"); an organization that aims to realize cross-disciplinary research, education, and social contribution with "value" as its keyword.

Solving environmental problems not only requires scientific and technological approaches. Approaches from the humanities and social fields, as well as economic analyses and policy-related approaches are also necessary. We will promote efforts aimed at attaining the SDGs across various fields throughout the university and strive to advance research into environmental conservation that integrates the humanities and the sciences.

Kobe University will also continue to promote environmental conservation activities that limit our environmental impact, such as 3R activities and using energy efficiently. We will also make continuous efforts to enhancing environmental education and promote research projects on the environment.

To all members of the university, related enterprises, and the local community, we ask for your long-term and widespread support in assisting with Kobe University's environmental activities.

Environmental Charter

Kobe University established an Environmental Charter on September 26, 2006 and carries out various environmental conservation activities based on these basic principles and policies. The environmental and energy-saving efforts of the university are summarized in an annually publicized environmental report.

Basic Philosophy

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

The university is committed to building pathways towards the realization of a sustainable society, something that remains a shared goal for humanity. To do this, we are utilizing the local mountains and oceans 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

Established September 26, 2006

Environmental Management

Environmental Management Policy

Conservation of the global environment and the creation of sustainable societies are the most important issues of our time. In working toward the "Kobe University Vision", we will do our utmost, as an institute for education and research which meets the highest international standards, to tackle these issues through all our activities at the university. In March 2016, we established the Basic Policy to Encourage Environmental Management During the Third Mid-Term Goal Period (FY2016 to FY2022), which was based on the Kobe University Environmental Charter and the Kobe University Basic Policy on Environmental and Facility Management. Our environmental conservation activities are based on this policy.

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

To achieve the "Kobe University Vision" as the world's highest-level education and research center, we will do our utmost to conserve the global environment and create a sustainable society, which are the most important issues of our time, through all activities at the university. Based on the Kobe University Environmental Charter and the Kobe University Basic Policy on Environmental and Facility Management, which summarizes the basics of the university's environmental and facility management, we established the following environmental management policy 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_2 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

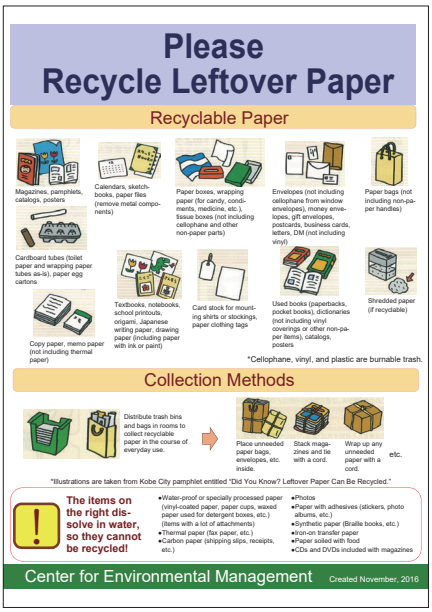
The results of an investigation into trash can garbage and garbage collection sites by a group of environment surveyors found that paper which could have been recycled was in the mixed garbage. To encourage environmental management, we promote the 3Rs for paper and trash sorting. Posters on trash separation and recycling are put up in each department in order to spread awareness on the proper separation and disposal of recyclables (cans, glass, PET bottles), combustible trash, non-combustible trash, miscellaneous trash, and confidential documents. In addition, uniform stickers on separated bins were designed and distributed across the university.

Garbage investigation

Unseparated garbage

Trash can setup
(stickers indicate waste separation)

Container for recycling paper
(separated into old paper and magazines)



Material Balance

Material balance refers to the amount of energy and resources used for conducting business activities ("input"), and the environmental impact generated by those activities ("output"). Kobe University promotes the 3Rs (reduce, reuse, recycle) as part of our basic policy for environmental management, and we are actively working to reduce both consumption and waste of resources.

INPUT		FY 2019
Total energy	GJ	851,370
Electricity consumption	MWh	68,644
Gas consumption	1,000m^3	4,053
Heavy oil consumption	kL	0.8
Paper usage	t	188.4
City and other water usage	1,000m^3	345.5
Miscellaneous water usage	1,000m^3	72.1

University Overview		FY 2019
Student body (undergraduate)	People	11,577
Student body (graduate)	People	4,649
Study body (affiliated institutions)	People	1,363
Foreign student body	People	1,399
Students on academic scholarships	People	11,131
Teaching faculty	People	5,167
Foreign exchange programs with overseas universities	Institutions	367

OUTPUT		FY 2019
CO_2 output volume	t-CO_2	33,272
Waste material (OA paper, newspaper, cardboard, confidential documents, etc.)	t	305.5
Waste material (raw garbage)	t	4.6
Waste material (combustible waste)	t	558.9
Waste material (non-combustible waste)	t	1.6
Waste material (large items)	t	318.3
Sewage	1,000m^3	384.3

Energy Conservation and Climate Change Prevention

Energy Consumption

In FY 2019, energy consumption from electricity, gas, and heavy oil totaled approximately 851,000 gigajoules (※1).
CO_2 emissions from this energy totaled approximately 33,300 tons.
(※1 Converted calorific values for electricity, heavy oil, gas, etc. based on Article 4 of 'Regulations on Rationalization of Energy Use, etc.')
Energy consumption decreased by 1.2% from FY 2018. Energy consumption per total floor area of each building also decreased by 2.6%.
To date, we have worked to conserve energy across all university campuses, and will continue to work to conserve energy going forward.

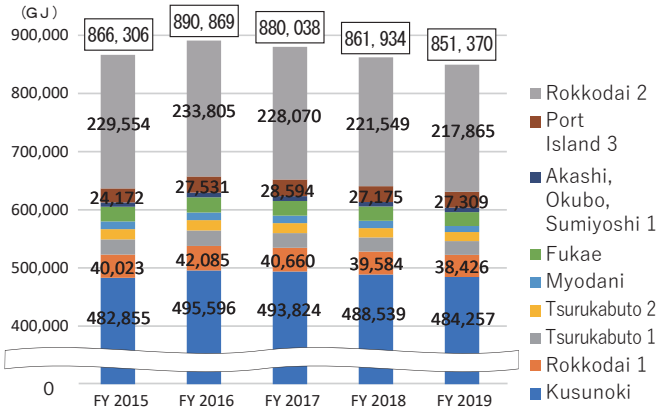


Figure 1: Energy consumption

FY 2018 1,710 GJ/1,000m² → **2.6% Reduction** → **FY 2019 1,665 GJ/1,000m²**

CO_2 Emissions

Initiatives to reduce CO_2 emissions involving students and faculty have been implemented throughout the university. CO_2 emission sources have increased as a result of activities necessary for new education and research projects, and initiatives to provide advanced medical treatment. Despite this, energy conservation activities have allowed us to achieve a 20.6% reduction in CO_2 emissions (33,272 t-CO_2) per total floor area in FY 2019 (511,444 m²) compared to the base level set in FY 2004 (the year the university became a "national university corporation").

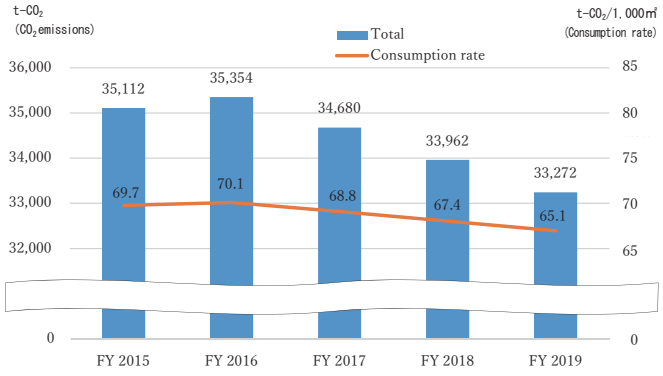


Figure 2: CO_2 emissions

FY 2004 81.94 t-CO_2 /1,000m² → **20.6% reduction** → **FY 2019 65.1 t-CO_2 /1,000m²**

Electricity Consumption

In FY 2019, the electricity use at our 11 main building complexes decreased 1.7% from the previous fiscal year as a result of energy conservation activities.

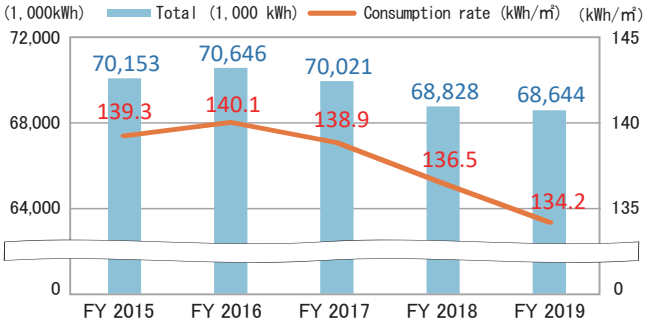


Figure 3: Electricity consumption

FY 2018 136.5 kWh/m² → **1.7% reduction** → **FY 2019 134.2 kWh/m²**

City Gas Consumption

In FY 2019, city gas usage at our 11 main building complexes decreased 3.9% from the previous fiscal year as a result of energy conservation activities.

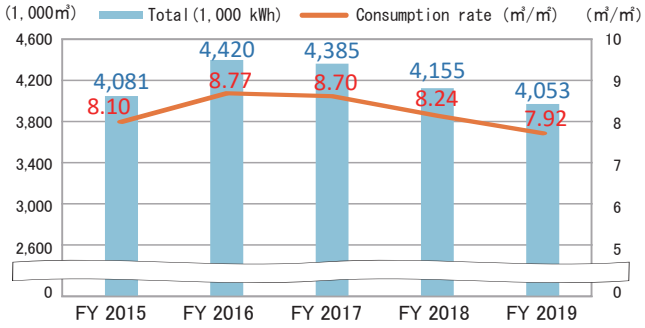


Figure 4: Gas consumption

FY 2018 8.24m³/m² → **3.9% reduction** → **FY 2019 7.92m³/m²**

Heavy Oil Consumption

Heavy oil consumption for FY 2019 decreased 50.0% from the previous fiscal year. This is a result of the FY 2017 demolition of an absorption type water cooler/heater's fuel tank in the Fukae region, changing to gas sources, and adopting electric heat pumps.

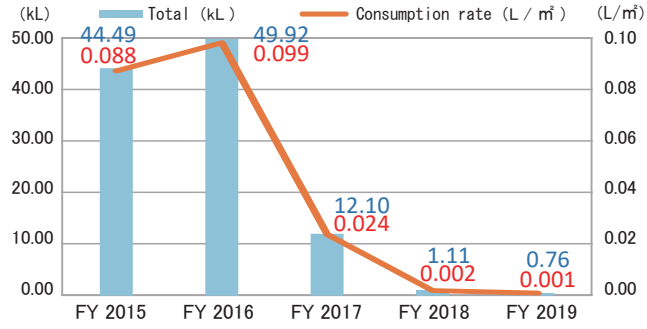


Figure 5: Heavy oil consumption

FY 2018 0.002 L/m² → **50% reduction** → **FY 2019 0.001L/m²**

Resource Conservation and Recycling

Water Usage

Water usage for FY 2019 decreased by 20,000 m^3 (4.7%) compared to the previous fiscal year.
In Rokkodai, we plan to conserve resources by using river water from Mt. Rokko for toilets and experiments.
We will continue striving to efficiently use water resources going forward.

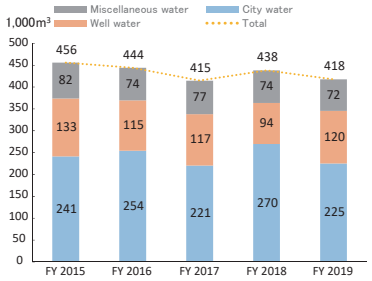


Figure 6: Water usage

Waste

Waste volume from FY 2015-2019 is shown. The volume of waste in FY 2019 increased by 14.6% compared to FY 2018.
The university's recycling efforts resulted in an increase in the recycling rate from 22.6% in FY 2015 to 25.8% in FY 2019.
The FY 2019 recycling rate by waste type is shown in Figure 8. According to this graph, 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 25.8% to 35.7% (calculated according to FY 2019 waste volume). Kobe University will follow its basic policy to encourage environmental management, and work to further improve the recycling rate.

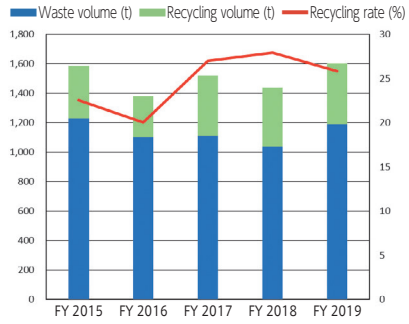


Figure 7: General waste

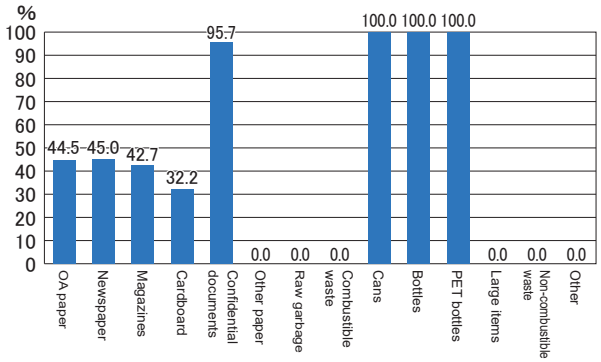


Figure 8: FY 2019 recycling rate by waste type

Office Consumption Across Departments

Changes in consumption of office paper from FY 2015 to FY 2019 are shown in the figure below.
Consumption decreased 3.47% (6.77t) from the previous fiscal year.
Going forward, we will work to reduce our paper usage by making conferences and lectures paperless, and will make double-sided printing, aggregate printing, and reusing the reverse side of printed paper the norm.

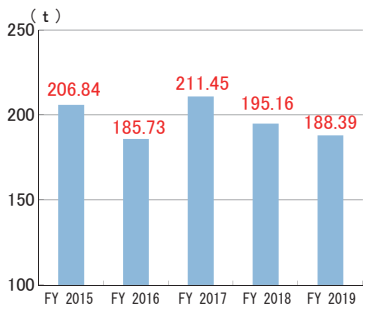


Figure 9: FY 2015-2019 university-wide paper usage

Implementation of Electronic Manifest Information Sessions

The following types of waste are generated by universities: general business waste such as paper and empty cans, and industrial waste including liquids left over from experiments and other waste generated by research facilities. Although the amount of industrial waste may be relatively small in quantity, it encompasses various kinds of waste due the university's involvement in a wide range of research fields.
Even a small amount of this waste is required to be properly treated in accordance with the Waste Disposal and Public Cleansing Law (Waste Management Law).
In principle, industrial waste is outsourced to an outside contractor for disposal, but the law requires that the waste generator be responsible up until the final stage of disposal; this includes after the waste is handed over to the contractor.
There are various aspects that must be considered when disposing of waste, including its classification, storage, the consignment contract, and the handling of management forms. According to the Waste Management Law, it is the responsibility of the waste generator to oversee the management forms (manifest) that are issued to outsourced waste disposal contractors until they are returned by the contractor upon completion of disposal. The waste generator is then responsible for the storage and general management of the manifests.
Recently, we have shifted from paper to digital manifests, and believe that it is necessary to continue with digitization from the perspective of storage security and operational efficiency within the university.
Therefore, we held an electronic information session for the people in charge of each department on September 3, 2019. The session focused on the implementation of this electronic manifest system, in addition to important points in the revised Waste Management Law.
Regarding the manifests, we plan to continue our efforts to promote digitization from the perspective of strengthening both environmental and risk management.

Electronic manifest information session
(Takigawa Memorial Academic Exchange Hall Conference Room)
September 3, 2019
16:00-17:00

Green Purchasing and Procurement, and Environmentally Friendly Contracts

Green Purchasing and Procurement

The Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Green Purchasing Law) was implemented in April 2004. This law prescribes the necessary procedures for the promotion of environmentally friendly goods procurement by the national government, provides information on increasing the demand for such goods, and aims to realize a society capable of sustainable development with less impact on the environment. It was established with the aim of contributing to people's health and cultural life both now and in the future, with the government and other organizations taking the initiative in stimulating the purchase of environmentally friendly goods.
Based on this Act, Kobe University creates a policy for procuring eco-friendly materials every year. It also provides reports to the Ministry of Environment and the Ministry of Education, Culture, Sports, Science and Technology on the procurement of materials based on this policy.
The university conducted a study on procurement results for 281 items across 21 fields. A selection of these results from 9 major fields are shown in Table 12. In FY 2019, we achieved a 100% procurement rate for the designated items.
We will continue to create procurement policies based on the Green Purchasing Law, and proactively work to source eco-friendly materials.

Table 12: Green purchasing and procurement achievements in FY 2019

Category	Item	Total procurement volume	Procurement rate for specific items
Paper	Copy paper	187,528kg	100%
	Toilet paper	53,668kg	100%
	Other	1,525kg	100%
Stationery	Ballpoint pens	8,330	100%
	Envelopes (paper)	196,488	100%
	Other	72,990	100%
Office furniture	Chairs, desks	2,208	100%
OA equipment	Copy machines, printers	4,776	100%
Lighting	Fluorescent tubes	13,045	100%
Interiors	Curtains	77	100%
Work gloves		4,616	100%
Other textile products	Blue sheets	46	100%
Services	Printing	596	100%
Average			100%

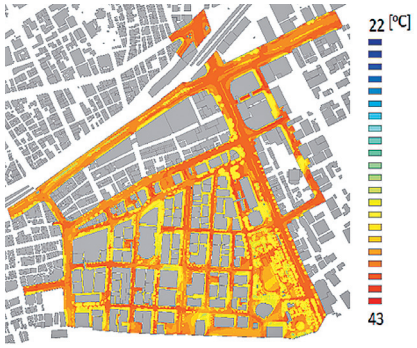
Research

PDF p.13

Research on measures against extreme high temperature in Kobe City

Hideki Takebayashi, Associate Professor, Graduate School of Engineering

In order to obtain the necessary knowledge to formulate a basic plan for Kobe City to work on measures against extreme high temperature, we analyzed the results of an environmental survey on summer heat in the central part of Kobe City and summarized the recommendations for a basic countermeasures plan based on a simulation of the thermal environment.



Thermal environment index at 13:00 on a sunny day in summer
SET* distribution map (August 5, 2019)

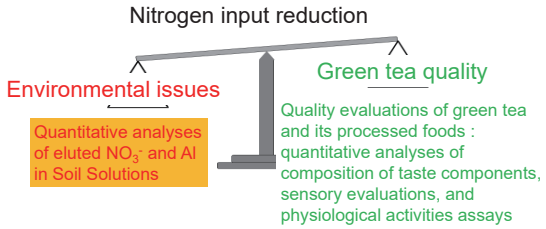
Research

PDF p.14

Studies in dietary environmental science from an interdisciplinary perspective: Environmental issues caused by eating habits

Naoko Shirasugi, Professor, Graduate School of Human Development and Environment

In order to reduce nitrogen pollution from farmlands by excessive fertilizer input, we are trying to find clues to solve environmental issues by weighing environmental issues in tea plant cultivation in a balance against the food culture.



Conflict between food culture and environmental issues in tea cultivation

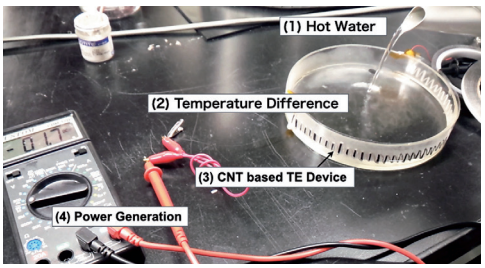
Research

PDF p.15

Research on thermoelectric conversion of "waste heat" to "Electricity"

Kenji Ishida, Professor, Graduate School of Engineering

The technology to harvest wasted energy, convert it into electricity, and use it is called "energy harvesting", and is considered to be a renewable energy source. Energy harvesting has great significance from the perspective of effectively utilizing energy that would otherwise be wasted.



Flexible thermoelectric conversion materials

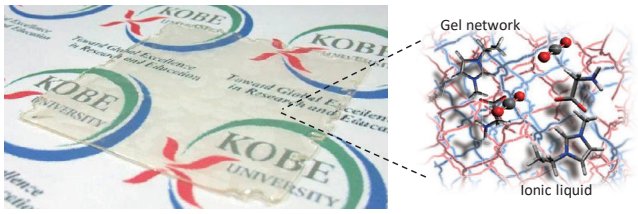
Research

PDF p.16

Research on carbon dioxide separation using membranes

Eiji Kamio, Associate Professor, Graduate School of Engineering

A CO_2 separation membrane can be made by using a special material that absorbs CO_2 but hardly absorbs any other gas components. We are developing a CO_2 separation membrane using "ionic liquid" as this special material.



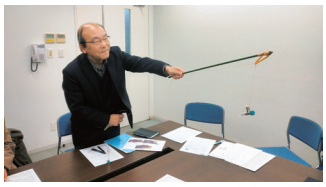
Conservation Activities

PDF p.17

Cooperative activities to solve the problem of fecal E. coli contamination in the Toga River (2)

Graduate School of Science: Toshinobu Suzaki, En Kitagawa, Wataru Inoue
Center for Environmental Management Chisato Yoshimura
Graduate School of Health Sciences: Minato Nakazawa, Katsumi Shigemura
Hideyuki Iriko, Norina Horiguchi
Graduate School of Science, Technology and Innovation: Koichi Kitagawa
Local activity group "Toga River Protection Society"

About four years ago we began cooperating with the Toga River Protection Society, a local activity group in Nada Ward, to carry out water quality conservation activities for the Toga River system that flows near the Rokkodai Campus.



Mr. Hiroshi Hyodo, director of the Toga River Protection Society, explains how to use handmade water sampling tools.

Conservation Activities

PDF p.18

Research and development of environmentally friendly concrete using crushed stone by-products

Mariko Suzuki, Assistant Professor, Graduate School of Agriculture

We are aiming to expand the use of crushed stone powder, which is one of the by-products of crushed stone, by conducting research to clarify the various characteristics of concrete that contains it.

Crushed stone powder

Concrete specimens

*For more details, see the Environmental Report 2020 on the Kobe University website. (The page number at the top indicates the page number in the PDF version.)

Topics

PDF p.7

Practical evidence-based efforts by industry-government-academia to reduce food waste

Risa Kojima, Project Associate Professor, Graduate School of Economics (Director of NPO Gomi Japan)

Since the usefulness of the food waste diary for reducing household food loss has already been demonstrated, we are supporting local governments nationwide in the application of this policy, as well as promoting corporate food waste prevention efforts.

Home screen of the food waste diary app

Topics

PDF p.8

Report on the 2019 Co-op Student Committee (GI) environmental activities

Yuka Nishimura, 2nd year student, Department of Health Sciences, School of Medicine

We carried out an initiative called Candle Night with candles made with waste oil from the cafeteria, which attracted the interest of many Kobe University students, as well as collecting used paper.

Collecting used paper

Candles made with waste oil from the cafeteria

Topics

PDF p.9

Using Environmental Reports to Educate on the Environment

The Environmental Report has been issued by the university every year since 2011, in order to make our efforts widely known to people on campus. It also enables us to take into account students' opinions in both the preparation of future reports and environmental conservation activities.

Education

PDF p.10

Sumiyoshi River estuary environmental survey experience (KU "try-al")

Kobe University Research Center for Inland Seas

Toshimasa Asahi Specially Appointed Assistant Professor , Mitsuru Hayashi Associate Professor

The purpose of this program is to help people understand, through work experience, environmental issues that they are unaware of in their daily lives, and to have them reconsider these problems.

Survey on the Sumiyoshi River

A flock of ducks around the mouth of the Sumiyoshi River with Rokko Island in the background.

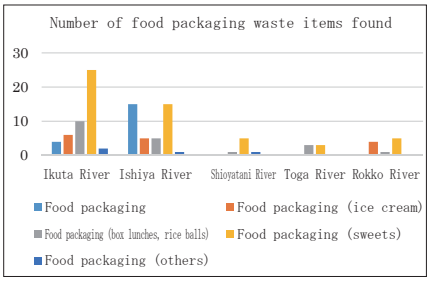
Education

PDF p.11

Marine plastic waste in Kobe City: river area survey (ESD exercises I and II)

Risa Kojima, Project Associate Professor, Graduate School of Economics

We are conducting action research into marine plastic waste based on a social science approach. We begin by discussing where there are issues with marine plastic, letting the students from their own hypotheses, design and conduct field surveys, and create final reports.



Breakdown of the types of discarded food packaging found near each river

Education

PDF p.12

ESD exercise & theoretical ethics exercise: next-generation energy workshop

Tsuyoshi Matsuda Professor, Graduate School of Humanities

We tackled the issue of how to form a social consensus on the best methods for next-generation energy generation, taking into account factors such as the social conditions and values of the region, including trends in science and technology, the political economy, and population decline.

(Material from a student's proposal presentation)

*For more details, see the Environmental Report 2020 on the Kobe University website. (The page number at the top indicates the page number in the PDF version.)

Outside Opinion

First of all, I would like to express my sincere gratitude for the opportunity to write the third-party comment on the Environmental Report. This Environmental Report 2020 is very interesting because it contains many fascinating educational research cases on Kobe University's environment, detailed data on environmental performance, and the ambitious activities of the Environmental Conservation Promotion Center.

Of the presented cases, I was particularly interested in the research on carbon dioxide separation using membranes in the field of applied chemistry. The Advanced Membrane Engineering Research Center at Kobe University produces various outstanding studies in this field. I believe that this particular technology will evolve further and help solve the CO_2 emission problem, which presents a serious challenge. I also sincerely hope that it will be an important step towards achieving the SDGs.

Looking at the data on environmental performance over the past five years, the overall environmental footprint has decreased for most items such as energy, CO_2, and electricity consumption, and the continuous energy conservation promotion activities are steadily bearing fruit. Even though universities' administrational governance (especially that of national universities) has recently grown stronger, I think it is still very difficult to achieve definitive results with regard to energy conservation at the workplace. In addition, air conditioners and electric lights have already been changed to energy-efficient ones, so energy conservation promotion activities themselves are not as easy as they were a long time ago. Under such circumstances, it must be presumed that the steady reduction trend is maintained by the constant efforts of all concerned parties. On the other hand, as pointed out by the Outside Opinion (by Professor Shigeo Fujii, Kyoto University) in last year's Environmental Report, there is a need to consider the scale university to determine whether or not each value is appropriate as an absolute amount. I think it is very difficult to judge whether there is still room for reduction. I felt that it would be easier to understand if there were some absolute indicators and their comparisons.

In addition, I thought that the section on the digitization of waste management forms (manifests) was also very important. You may have noticed a delay in digitization at the university during COVID-19. We, as faculty members, also struggled with remote learning via the web, but more than that, I was reminded of the reality that the university's administrative organization is still mainly paper-based (perhaps it is only our university). I very much hope that these efforts toward digitization will continue.

I feel that it is becoming more and more difficult to work on environmental conservation and management within the very limited budget of the university. Kobe University has inherited nearly 120 years of tradition from its beginnings as Kobe Higher Commercial School, and is well-known both in Japan and overseas as a comprehensive university with strengths in economics and management. How can you tackle environment-related challenges without spending money? In the future, it may be worthwhile to introduce some thought-provoking initiatives from the perspectives of university management and environmental conservation.

Name: Seiji Suga
Current position: Vice President of Okayama University
(in charge of science and engineering reform)
Professor, Graduate School of Natural Science and Technology
Director, Environmental Management Center

Profile

Completed doctoral program at Nagoya University Graduate School of Science
Postdoctoral fellow, Oxford University, UK (as a JSPS Overseas Research Fellow)
After working as an assistant, lecturer, and associate professor at Kyoto University Graduate School of Engineering, became a Professor at Okayama University Graduate School of Natural Sciences in 2008
Okayama University Director/Vice President (in charge of finance & facilities) (2017-2019)

- Awards: Synthetic Organic Chemistry Encouragement Award, Organic Electron Transfer Chemistry Encouragement Award, BCSJ Award, Nagase Research Promotion Award, Okayama Engineering Promotion Association Yuzo Uchiyama Science & Technology Award
- Research fields: Synthetic organic chemistry, electron transfer chemistry

About the Cover

In order to further publicize this Environmental Report to our students (who comprise the majority of the university population), 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 photo below receiving the grand prize.We would like to express our thanks to all those who submitted photos.

Kobe University　Graduate School of Economics　2nd year master's program student　Kazushi Ikeuchi

[Photo Comment]

Due to the impact of COVID-19, entering the grounds of the university is prohibited, but graduate students are allowed to use the library if their instructor permits it. I went to the library with permission, but there was no one around from the Main Gate to the Main Building, and there was not one cloud in the sky. I was able to take a picture like this because there were no people. COVID-19 has had a bad effect on the students, but when I looked at nature, I felt that it was full of life. I thought that when we begin our activities as usual after the pandemic, we need to cherish nature.

Photo location: Rokkodai 1st Campus
(Photograph of Main Building from Main Gate stairs)

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■Inquiries:Kobe University Facilities Department, Equipment Division, Environmental Management Group
1-1, Rokkodaicho, Nada-ku, Kobe-shi, Hyogo Prefecture 657-8501
E-mail: shis-kankyo@office.kobe-u.ac.jp
URL: https://www.kobe-u.ac.jp/en/about_us/charter/environment.html