



# Environmental Report 2010

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Abridged Edition

Kobe University 

## Message from the President

The amount of greenhouse gas emissions is greatly influenced by the level of energy consumption. The current global population has exceeded 6 billion; and it is estimated to explode to over 9 billion by 2050. If everyone in the world consumed the same amount of energy as the people in Japan, energy consumption would rise to 2.2 times of what it is now, and we would expect the amount of greenhouse gas emissions to increase dramatically.

Mr. Yukio Hatoyama, the former prime minister, stated in his speech before the United Nations (September, 2009, soon after his assumption of office) that, by 2020, Japan would conditionally reduce the amount of its greenhouse gas emissions by 25% compared to what it was in 1990. This policy statement, which put an increased burden on Japan, gave rise to worries about bad effects on domestic employment and people's daily lives. People are also worried that such a policy may cause the collapse of the economy and the financial system.

In comparison to similar corporations around the world, Japanese corporations have been making a remarkable effort to save energy for some time now. As a result, they have achieved high operating efficiency, to the extent that they have already reached their limits. The carbon credit system, which allows countries that failed to reach their goals to purchase credits from countries that have achieved a significant reduction in greenhouse gas emissions (based on the 1990 emission level), is an advantageous system for countries with surplus emissions credits.

First, the government should quickly announce a clear long-range vision and policies to achieve the goal. Then, technical issues to achieve the goal, such as developing renewable energy sources that are sustainable and practical (e.g., energies produced by wind, water, solar, and biomass) as well as developing further energy saving techniques, must be pursued in cooperation with the industrial, governmental, and academic sectors. Needless to say, it is important for everyone to become more aware of energy saving, and for the whole nation to unite behind this effort.

Let me tell you an old story. Back in the 1970's, there was a strong opposition from the industrial sector to a legislative act



which required more than 90% reduction of nitrogen oxide emissions from gasoline-powered automobiles (what is called the Japanese version of the Muskie Act). Reasons given for the opposition were technical difficulty and the fear that it would lower the automobile's competitiveness in the market. Thanks to the industries' strenuous efforts, the technology to reduce gas emissions was successfully developed in time to meet the implementation of the targeted regulation in 1978. Based on the result of such revolutionary and technological development, the Japanese automobile manufacturing technology leads the world in energy efficiency and cleaner emissions. These have also its current level of prosperity.

Since the social situation has changed and the scientific technology has advanced, we cannot simply compare the current situation with that of the past. However, I believe if we unite the various fields at Kobe University and join forces to meet the challenge in clearing the high hurdle of 25%, we can lead the world as a country that protects and develops the global environment.

A handwritten signature in Japanese calligraphy, reading '福田秀樹' (Fukuda Hideki).

FUKUDA, Hideki  
President of Kobe University

## Kobe University Charter on the Environment

### Environmental Philosophy

As a world-class research and education institution, Kobe University pledges itself, through all of the university's activities, to the preservation of the global environment and to the creation of a sustainable society, which are the two most important challenges the world faces today.

Flanked between the Pacific Ocean and the Rokko Mountains, Kobe University utilizes this regional locality to its advantage for the fostering of ecological-minded students and the dissemination of knowledge gained from academic researches to the world. Kobe University pledges to build a path toward the realization of a sustainable society as a common goal of humanity, through these efforts and by setting an example in the preservation of the environment.

### Environmental Principle

1. To foster and support ecological-minded students.
2. To promote research that sustains the global environment.
3. To promote environmental preservation activities that set an example for others.

## Related Topics on Environmental Education and Research

### Kobe University Symposium on the Environment: How the University Should Respond to Global Environmental Problems

Facilities Planning Division, Facilities Department

The "Kobe University Symposium on the Environment: How the University Should Respond to Global Environmental Problems" was held on Friday, December 18, 2009 at Kobe University's Idemitsu Sazo Memorial Rokkodai Auditorium. It was held for the purpose of considering Kobe University's present role in alleviating global environmental problems and its future role in developing programs not only in environmental research and education, but also in systems and techniques of environmental management.

The First Session ("The forefronts of environmental research") began with opening remarks from the symposium's host, President FUKUDA Hideki of Kobe University. Two keynote lectures, which brought the listeners up to date on the "forefronts", then followed. First was a lecture entitled "Prospects of an environmentally friendly world economy" from Keio University Professor HOSODA Eiji, a prominent researcher both in the fields of social and natural sciences. Next, Professor KASHIWAGI Takao from the Tokyo Institute of Technology gave a lecture entitled "Low carbon energy systems and innovations."



Prof. HOSODA Eiji, Keio University



Prof. KASHIWAGI Takao,  
Tokyo Institute of Technology

In the Second Session ("Kobe University facing global environmental challenges"), Professor KOKUBU Katsuhiko from our Graduate School of Business Administration delivered a lecture entitled "International standardization of environmental management accounting," and Professor MATSUYAMA Hideto from our Graduate School of Engineering gave a lecture entitled "Membrane and film technology that helps reduce the load on the environment." Both lectures brought to light some of Kobe University's contributions in environmental research.

Next was a panel discussion, entitled "Problems and prospects of the university's environmental research, education, and management". The addition of Professor SUEMOTO Makoto from the Graduate School of Human Development and Environment, Associate Professor SHIMAMURA Takeshi from the Graduate School of Law and HIRANO Shigeki, Director and Senior Executive Officer of Osaka Gas Co., Ltd. to the discussion brought active exchange of opinions based on their fields of expertise and perspectives for future developments in research, education and management.

Posters introducing students' environmental activities by two of the university's environmental organizations, "Nonprofit Organization Gomi-jp" and "Environmental Circle Ecolo." were also on display at the symposium.

The symposium was a great success with participants exceeding 360. In addition to students, teaching and clerical staff members, many general public were also on hand to learn from the specialists in the fields of social, natural, and cultural sciences. This positive

response to the symposium illustrated the level of interest there really is in environmental issues. The symposium also provided a good opportunity to publicize, both on and off campus, the efforts made by Kobe University to address global environmental problems.

The symposium came to a close with an address delivered by Dr. TAKEDA Hiroshi, Vice President and Director in charge of Research. He said that the symposium has shown how important it is to deepen specialized research in the social, natural, and cultural sciences, as well as to achieve a united research effort in those fields. As a comprehensive university, Kobe University will use its multi-faceted characteristics to gain cooperation from the various disciplines in further developing environmental education and research so that it may contribute toward solving global environment problems.

According to the results of a survey conducted that day, more than 83% rated the symposium as either "very good" or "good." Some of the student comments were: "Familiar topics and easy to understand," "Discussion from the perspectives of different fields was stimulating!" and "It made me want to think from a broader perspective." On the other hand, opinions like, "I wanted to hear each topic in more detail," or "I wish there were some time set aside for Q and As with the audience," suggested the need for future improvements. Other comments included: "If a recycling project is planned, I'd like to help," "We need comprehensive environmental research that goes beyond the arts and sciences," and "I want an event or course in which students can take the initiative and put their own knowledge to work." Such enthusiastic comments demonstrated a high interest on the part of the students.

Keeping these comments in mind, we will continue to make efforts within the university to improve the environment, and in preparing for the next Kobe University Symposium on the Environment.



Poster for Kobe University Symposium on the Environment



Panel discussion



# Related Topics on Environmental Education and Research

## Environmental Research

### A highly efficient energy system for multifamily housing

ASANO Hitoshi, Associate Professor, Graduate School of Engineering

As the concern for global warming increases; there is an urgent need to reduce CO<sub>2</sub> emissions generated by the use of fossil fuel. To cope with this problem, the government is taking leadership with the adoption of renewable energy (solar and wind power) and by offering incentives such as tax reduction to people who buy eco cars and eco points to people who buy energy efficient home appliances.

However, if we trace energy use back to its sources, we find that alternative energy (e.g., renewable energy) supplies only about 3% of the total energy currently consumed; about 84% comes from fossil fuel such as oil, coal, and natural gas.\* Looking into trends in energy use by sectors, we see that the increase in energy consumption in the industrial sector is not great. By contrast, we see a major increase in the commercial/residential sector (business + home); energy-saving is needed in homes, which encompass about 40% of that sector. We are of course all for the reduction of energy consumption, however we would like to avoid compromising the quality of life through such measures as reducing frequency of bathing, or avoiding the use of air conditioning. And, this is why we need to increase the energy conversion efficiency of the devices we use.

Breaking down the energy consumption in homes, we find that about 50% of the total demand is for home heating and hot water supply. Considering the fact that most current home systems rely on fossil fuel, there is a greater need for a highly efficient heat supply system. Let me introduce the community co-generation system we are developing for multifamily housing.

The “co-” of “co-generation” means “two.” A co-generation system supplies two types of energy — electricity (kinetic power) and heat — simultaneously. The heat engine used at a power plant cannot convert all the given heat energy into electric power. So, the unused heat is discarded into the environment as waste heat. The co-generation system places a generator near the user and supplies heat (that would otherwise have been wasted) along with electric power. A more efficient use of waste heat will lead to a more efficient use of the overall energy. However, there are two problems that must be cleared before installing this system in the individual household.

1. Small demand for energy: The amount of energy use per household is decreasing due to the concentration of population in cities and the trend toward smaller nuclear families. As a result there is no

choice but to use a small capacity generator. The smaller-size generators lower the efficiency of power generation and increase the amount of waste heat. Excessive heat leads to less efficient energy conversion rate.

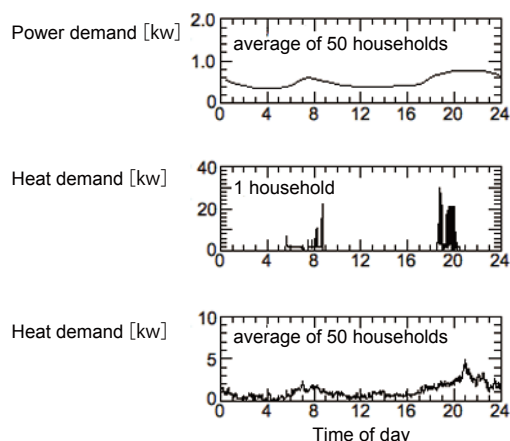
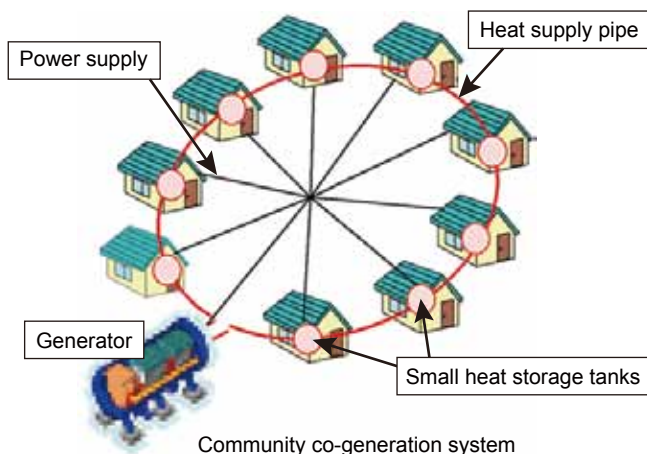
2. Energy-demand changes by time of day: Although there is very little change in the demand for electricity by time of day, there is a significant rise in the demand for heat at night for bathing. To increase the use of waste heat, there is a need to build a large heat storage tank, which requires a large amount of space and high installation costs.

As an alternative solution, we suggest a “community co-generation system.” This is a new type of co-generation system designed especially to suit the Japanese life style (see chart). If the energy is supplied to a multifamily housing (e.g., an apartment complex), the total demand for electricity will increase, making it feasible to install a large capacity, energy efficient generator. Since most hot-water demand in the individual household is to fill the tub for bathing, the actual time for high output of heat use is quite short. The increase in the number of people involved will create a time-lag in the demand for heat, which is expected to ultimately equalize the heat load (see chart).

The conventional multifamily housing heat-supply system is designed to have an excessive amount of hot water circulating the pipes to ensure quick response to multiple simultaneous use or after recovering from stand-by mode. The problem with this system was the loss of heat from pipes. The new system installs a small heat storage tank, sufficient for a one-time use of hot water, separately in each household. Connecting all the tanks with a single pipe will achieve a dispersion of stored heat that can be effectively utilized. This ensures a significant reduction of heat loss through the pipes. The reduction will also reduce the size of the pipe, the power of the pump, and the amount of waste heat. The smaller size heat storage tank will easily fit in the space allocated for pipes in multifamily housing.

In order to make the system viable, highly efficient generator and a better examination of the application logistics, such as support for heat distribution among users and controlling heat storage, are of course necessary. However, I believe that a better understanding by the users will further increase the energy use efficiency.

\* 2009 Annual Energy Report, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry



Changes in demand for energy during a day (January)

# Environmental Activity at Kobe University

## Saving energy and preventing global warming

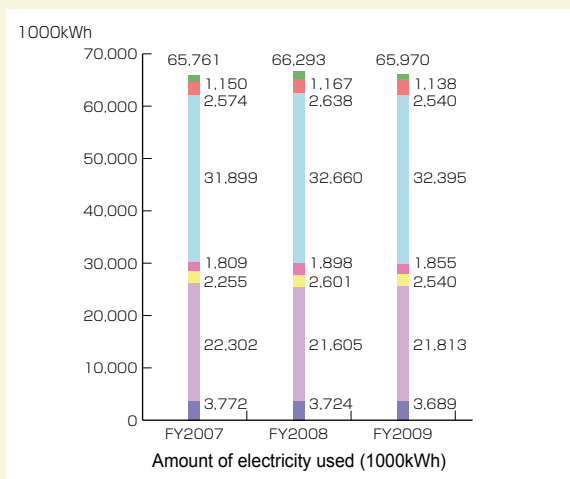
### 1. Goal

Kobe University aims at reducing 1% of CO<sub>2</sub> emissions by total floor area per year.

### 2. Amount of electricity used

Decreased by 0.5% compared to that of the previous fiscal year (FY).

The chart shows the changes in the amount of electricity used from FY2007 to FY2009.



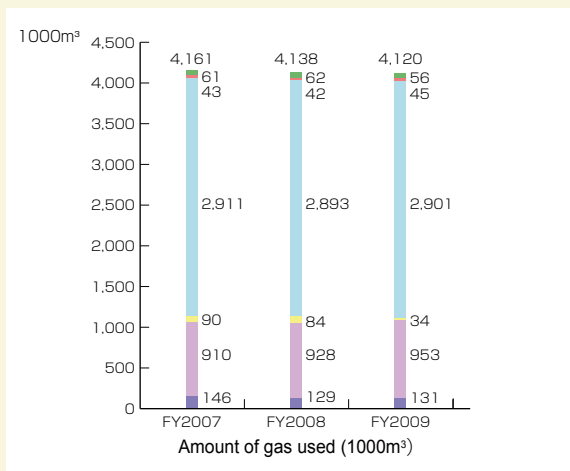
The total amount of electricity used in FY2009 decreased by 323,000kWh (0.5%) compared to that of the previous fiscal year.

The main reason may be because we replaced conventional devices with energy-saving types in the renovation.

### 3. Amount of gas used

Decreased by 0.4% compared to that of the previous fiscal year

The chart shows the changes in the amount of gas used from FY2007 to FY2009.



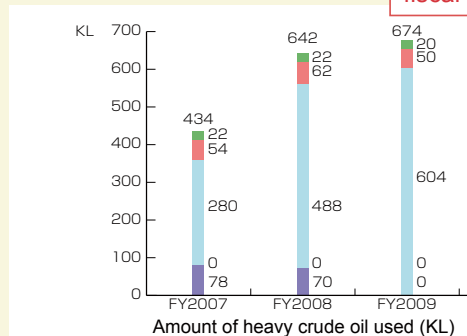
The total amount of gas used in FY2009 decreased by 18,000m<sup>3</sup> (0.4%) compared to that of the previous fiscal year.

The negligible amount of gas used at Tsurukabuto 2 campus is not included in this chart.

### 4. Amount of heavy crude oil used

The chart shows the changes in the amount of fuel oil used from FY2007 to FY2009.

Increased by 5.0% compared to that of the previous fiscal year



The total amount of heavy crude oil used in FY2009 increased by 32kl (5.0%) compared to that of the previous fiscal year. This was mainly due to the maintenance (FY2008) of animal facilities in the Kusunoki area.

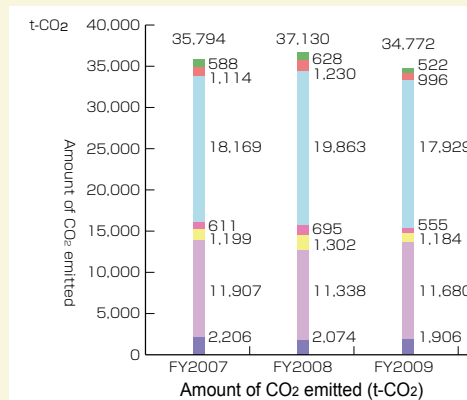
Rokkodai 1 campus stopped using boilers for heating, so the amount of use dropped to zero. Though Rokkodai 2 campus uses heavy crude oil for emergency generators, it is not included in this chart because of its negligible amount. Heavy crude oil is not used in the Tsurukabuto 1 and Tsurukabuto 2 campuses.

In future renovations, we plan to switch to lower CO<sub>2</sub> emitting city gas and electricity to heat the facilities.

### 5. Amount of greenhouse gas emitted

Decreased by 6.4% (6.8% by total floor area) compared to that of the previous fiscal year

The chart shows the changes in the amount of CO<sub>2</sub> emitted from FY2007 to FY2009.



The total amount of CO<sub>2</sub> emitted in FY2009 decreased by 2358 t-CO<sub>2</sub> (6.4%) compared to that of the previous fiscal year.

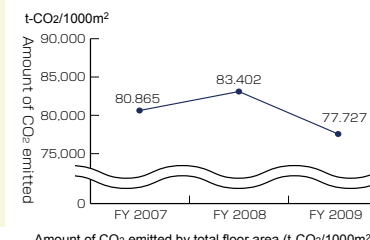
By total floor area, it decreased by 5.68 t-CO<sub>2</sub>/1000m<sup>2</sup> (6.8%) in total compared to that of the previous fiscal year.

The "after adjustment" conversion coefficient was used to calculate the amount of electricity used. When we calculated the amount of CO<sub>2</sub> emitted with the actual emission coefficient, it decreased by 233 t-CO<sub>2</sub>/1000m<sup>2</sup> (0.6%); by total floor area, it decreased by 0.92 t-CO<sub>2</sub>/1000m<sup>2</sup> (1.1%).

The amount of energy used at Kobe University showed a decrease compared to the previous fiscal year. Moreover, the figure representing the amount of CO<sub>2</sub> emitted greatly depends on the officially published CO<sub>2</sub> conversion coefficient of the electricity purchased (published value).

In regards to boilers used for heating in the Kusunoki area, we plan to shift from ones that use crude oil to less CO<sub>2</sub> emitting city gas.

Our university has placed strong emphasis on energy saving measures. All employees and students are asked to comply in order to reduce CO<sub>2</sub> emissions by more than 1% per year.



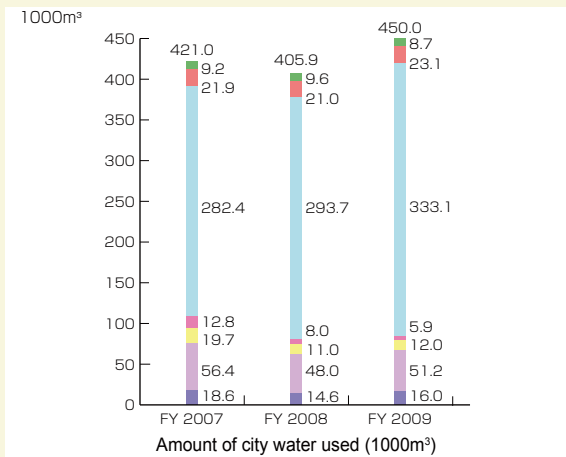
# Conserving resources and recycling

## 1. City water / General service water

### City water

Increased by 10.8% compared to that of the previous fiscal year.

The chart shows the changes in the amount of city water used from FY 2007 to FY 2009.



The total amount of city water used in FY 2009 increased by 44,100 m³ (10.8%) compared to that of the previous fiscal year.

This increase could be attributed to the completion of a large-scale building renovation which allowed us to use those buildings.

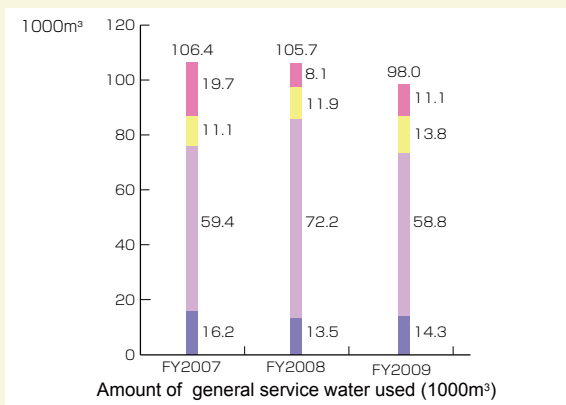
We plan to opt for lavatories with automatic faucets and water-saving toilets in future building renovations.

Also, to protect water resources in the Rokkodai area, we use general service water.

### General service water

Decreased by 7.3% compared to that of the previous fiscal year

The chart shows the changes in the amount of general service water used from FY 2007 to FY 2009.



For the conservation of resources in the Rokkodai area, we use the Rokko mountain river water as general service water in toilet tanks, laboratories, etc.

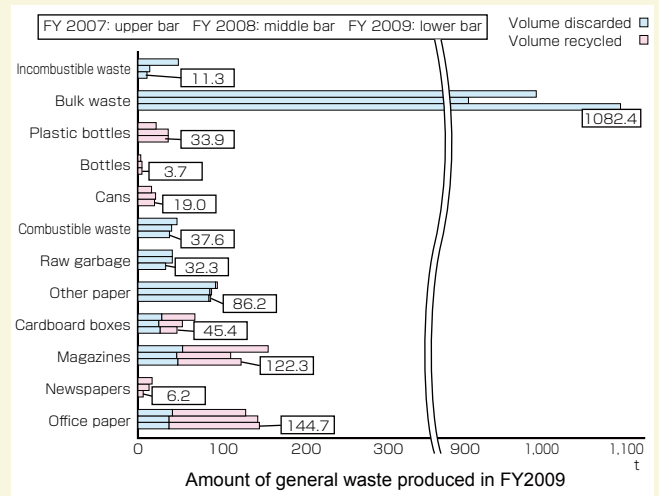
The amount of general service water used in FY 2009 decreased by 7,700m³ (7.3%).

The main reason may be because we installed water-saving toilets in newly renovated buildings.

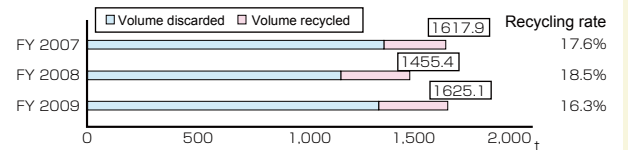


## 2. General waste

The chart below shows the amount of general waste produced from FY 2007 to FY 2009.



Although the amounts of such general waste as incombustible waste, combustible waste, raw garbage, other paper, cardboard boxes, and newspapers decreased in FY 2009, the amounts of plastic bottles, bottles, cans, office paper, etc. did not change much compared to that of the previous fiscal year. However, there was a noticeable increase in the amount of bulky waste. As for the volume recycled, we see an increase in office paper.



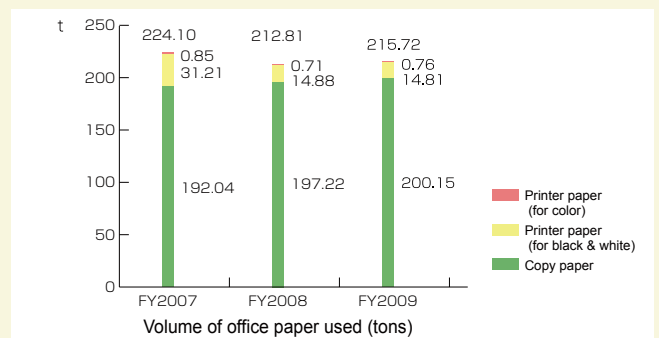
The chart shows a 10% increase in the total amount of general waste produced in FY 2009 compared to that of FY 2008. The recycling rate was 16.3%, which is about 2% less than that of the previous fiscal year.

In recent years, each department has been making efforts to reduce general waste. However, the increase in education and research activities also seemed to have resulted in the increase of general waste. Discarding of unneeded items due to renovation may be the cause for the increase in the volume of bulk waste. This is an issue that requires further consideration in the future.

## 3. Office paper

Usage increased by 1.4% compared to that of the previous fiscal year

The chart shows the changes in the amount of office paper used from FY 2007 to FY 2009.



The volume of office paper used increased by 2.92 tons (1.4%) compared to that of the previous fiscal year.

In the future, we must try to reduce this by holding paperless meetings, lectures, etc.; to make copies using both sides of the paper; and to reuse the blank side of the copies.

## A Review from the Outside

This Environmental Report could be described as something that clarifies the responsibilities of Kobe University, as a collective member of society, towards the environment. It also includes the university's response to the environmental impact of its educational and research activities, and the attention the university devotes to the environment as it engages in those activities. In other words, is the university setting an example in shouldering its social responsibilities as they are described in Kobe University's Environmental Charter?

The Introductory Environment course was offered for the first time in fiscal 2009 and is highly regarded as an interdepartmental educational activity involving the environment. The present report presents the results of a student evaluation of the Environmental Report 2009; which concluded that Kobe University did not deserve a high ranking for education and research activities involving the environment. There were many comments to the effect that, in comparison with other universities, Kobe University was behind in its energy-saving and recycling efforts. It mentioned that the Environmental Report is not well publicized to students. I think the same applies to the teaching staff as well, and that a better effort on the part of the whole university is desired.

There are two articles in the section titled, "Related Topics on Environmental Education and Research." The first, "Students' environmental conference for a sustainable society" is about the second "Students' environmental conference" hosted by the Hyogo-Kobe University Consortium for the purpose of providing nationwide publicity to the environmental efforts of university students in Hyogo Prefecture. I would imagine that there are great difficulties in managing such a challenging task, one that goes beyond the bounds of the university; still, I think it is a very significant project. Although the number of universities (seven) that joined the conference was not many, the article conveyed an active conference with lively speeches and displays of posters. We hope to see further developments in the future, in such areas as content sharing of environment-related courses, the exchange of course credits, and the development of joint e-learning projects.

The other article, "Kobe University Symposium on the Environment," is about the first large-scale effort of its kind which received high student ratings. My expectation is heightened by the conclusion of the report which states that comprehensive university should use its multi-faceted characteristics to gain cooperation from the various disciplines in further developing environmental education and research. The Symposium's high ratings leave me with the impression that it would have been all the better if details of the discourses had been mentioned.

As for the efforts of departments and related organizations, last year's "A Review from the Outside" mentioned the energy-saving activities carried out by the Graduate School of Engineering work group, to wit: "Those efforts are taken as models for subsequent action by each department; as such, they are to be regarded as invaluable." This year's report did not mention those activities; I would like to see what happens with them in the future. I consider it important that the Management Committee for Environment and Facilities and the Center for Environmental Management cooperate with each other and continue to make practical efforts so that neither organization becomes a mere name.



**Name:** MORIYAMA Masakazu

**Present occupation:** Professor, Department of Living and Environmental Design, Faculty of Science and Engineering, Setsunan University

### Profile:

1970: graduated from the Department of Architecture, Faculty of Science and Engineering, Waseda University; then completed a master's course at Waseda's graduate school.  
1972: assistant in the Faculty of Human Life Sciences, Osaka City University  
1980: lecturer at Kobe University; promoted to assistant professor  
1999: professor at Kobe University: Apr. 2010- present  
Research themes: the urban heat-island phenomenon and countermeasures against it: creation of "Klimaatlas" (urban environmental climate maps); energy-saving in building; ecological architecture, etc.  
Publications (including those written jointly): Contemporary Architectural Systems (Chapter 4. Ecological views, 8. Natural environments) (1984, Shokokusha); Klimaatlas of the urban environment — building a city making use of climate information (2000, Gyosei); Countermeasures and techniques for heat islands (2004, Gakugei Shuppansha), etc.

## What Went into This Environmental Report

The purpose of this environmental report is to provide public access to the Kobe University Environmental Report 2009, which is a summary of environmental activities achieved on the Kobe University campuses for a one year period from Apr. 1, 2008 until Mar. 31, 2009.

The Kobe University Environmental Report 2010 was put together in accordance with the following:

Reference guidelines ●	Environmental Reporting Guidelines, Fiscal Year 2007 Version (Ministry of the Environment, June 2007) Guidelines for items to be mentioned in environmental reports, second edition (Ministry of the Environment, Nov. 2007)
Survey locations ●	Rokkodai area: Rokkodai 1 campus : main departments: Faculty of Law, Faculty of Economics, School of Business Administration, Graduate School of Law, Graduate School of Economics, Graduate School of Business Administration, Graduate School of International Cooperation Studies  Rokkodai 2 campus : main departments: Administrative offices, Faculty of Letters, Faculty of Science, Faculty of Agriculture, Faculty of Engineering, Graduate School of Humanities, Graduate School of Science, Graduate School of Engineering, Graduate School of Agricultural Science  Tsurukabuto 1 campus : main departments: Faculty of Intercultural Studies, Graduate School of Intercultural Studies  Tsurukabuto 2 campus : main departments: Faculty of Human Development, Graduate School of Human Development and Environment  Kusunoki area: main departments: School of Medicine, Graduate School of Medicine, university hospital  Fukae area : main departments: Faculty of Maritime Sciences, Graduate School of Maritime Sciences  Myodani area : main departments: School of Medicine Faculty of Health Sciences, Graduate School of Health Sciences
Fiscal year of operations ●	Fiscal 2009 (April, 2009 to March, 2010)
Date of issue ●	September 30, 2010
Planned date of next issue ●	September 30, 2011
Department in charge of publication ●	Environmental Reporting Work Group (chairperson: Prof. KOKUBU Katsuhiko, Graduate School of Business Administration)
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URL ●	<a href="http://www.kobe-u.ac.jp/report/environmental/2010/">http://www.kobe-u.ac.jp/report/environmental/2010/</a>
Cover ●	Idemitsu Sazo Memorial Rokkodai Auditorium, Kobe University A symbolic building of Kobe University and a designated tangible property. The restoration of the Rokkodai auditorium was a memorial project of the Kobe University Fund. The project, which was completed in September 2009, restored its appearance to look like what it did in March 1935 when it was first constructed as the auditorium of Kobe University of Commerce. It is now a multi-function international cultural hall. This is where the "Kobe University Symposium on the Environment: How the University Should Respond to Global Environmental Problems" was held.

