CAS-
Net
JAPAN
Campus Sustainability Network in JAPAN

Contact:Takayuki NAKAMURA
Executive Director:CAS-Net JAPAN
President:National Institute of Technology,
Fukushima College
E-mail:nakamura@fukushima-nct.ac.jp
TEL:+81-246-46-0701

Good Practices on Campus Sustainability in Japan 2016

CAS-Net JAPAN

Good Practices on Campus Sustainability in Japan 2016

CAS-Net JAPAN
Campus Sustainability Network in JAPAN

CAS-Net JAPAN Collection of Cases Preface

Naoki Sato
Chair, CAS-Net JAPAN (Campus Sustainability Network in JAPAN)
Executive Vice-President for Finance, Facilities, and Environmental Health and Safety Kyoto University

While more than a dozen years have passed since the onset of the 21st century, environmental challenges seem to have intensified on a global basis over these years. It could be said that not a single day goes by without some news about floods, droughts, desertification, food shortages or other serious problems stemming from environmental changes in many parts of the world, such as air pollution, ozone layer depletion and global warming, which cause extreme weather phenomena and acid rain. These problems affect a wide area of the world in many different ways, and are closely associated with the issues of population increase and economic development. For this reason, solutions to these problems require an extensive understanding of many factors that are intricately intertwined with each other, which makes the unavoidable environmental threats that humanity faces even more daunting and difficult.

As shown by the adoption of the Sapporo Sustainability Declaration at the G8 University Summit held in July 2008, however, we recognize the necessity of taking the initiative ourselves in meeting these challenges from various perspectives, such as research, education and lifestyles, instead of just waiting for national governments to take action. We also believe that higher educational institutions, especially universities, should closely exchange information for this purpose and facilitate individual and collaborative activities, with renewing awareness of the importance in their roles in fostering and developing human resources capable of contributing to solving environmental problems.

Bearing this understanding in mind, we established the Campus Sustainability Network in Japan (CAS-Net JAPAN) in March 2014 especially for developing cooperative ties among Japanese universities, thereby keeping up with well-organized environmental initiatives being promoted at an accelerated rate by universities around the world, especially in Europe and the US, and the global trend toward inter-university collaboration.

By establishing CAS-Net JAPAN, we aim to share experiences of universities and other institutions that have been conducting environmental activities in various parts of Japan, whether extensively or locally, to further promote such environmental initiatives, in conjunction with encouraging information exchanges in versatile ways and providing venues for relevant institutions to act in unison. In addition, we hope to connect closely with networks of universities overseas engaged in environmental activities, work together proactively to achieve our goal of creating sustainable campuses, and eventually broaden the base of our activities in society.

CAS-Net JAPAN organized three annual meetings in the past, during which participants shared their experiences in conducting environmental activities in their efforts to find solutions to environmental problems in Japan. We selected noteworthy cases from among these experiences and published a booklet titled *Case Studies of Approaches to Campus Sustainability: No. 1*. In designing this booklet, we endeavored to make the contents as relevant and clear as possible to all the people who support CAS-Net JAPAN. I hope this booklet will help readers gain a better understanding of CAS-Net JAPAN and highly appreciate those who continue to support our endeavors. If you have any comments or questions about this booklet, please do not hesitate to contact us. We look forward to receiving frank opinions from many readers.

Enriching Transactions of CAS-Net JAPAN

Vice-chair,
CAS-Net JAPAN(Campus Sustainability Network in JAPAN)

Takashi Mikami
Board Member of Executives, Vice President

CAS-Net JAPAN was established on the 26th of March, 2014. It has passed about 2 years after we had the general meeting for establishment and the first subcommittee meeting for reporting activities in Kyoto University. The subcommittee meeting was divided into 4 parts, such as the management of university for environmental impact reduction, the collaboration with local communities and network making, the participatory projects for student, the eco-friendly facility and maintenance. There were 6 presentations by 3 universities and 1 organization.

CAS-Net JAPAN 2014 was held in Hokkaido University on the 26th of November, 2014. The second subcommittee meeting was divided into 3 parts, such as the participatory projects for student, the management of university for environmental impact reduction and eco-friendly facility management. There were 15 presentations by 8 universities and 1 technical college.

CAS-Net JAPAN 2015 was held in Chiba University on the 13th of November, 2015. The third subcommittee meeting was divided into 3 parts, in the same way as the second subcommittee meeting. There were 14 presentations by 6 universities, 1 technical college and 1 organization. Various universities became to give presentations, and contents of those presentations were enriched. I could find that universities and organizations became to be able to keep pace together and deepen their activities by influencing each other for those 2 years.

This first transactions of CAS-Net JAPAN contains 14 reports by 7 universities, 1 technical college and 1 organization. The transactions is the fruit as meet the aim of activities by CAS-Net JAPAN, and is the driving force for activities. I understand that the aim of activities is to share the information on creating sustainable campus, to assemble the collective wisdom and to drive activities for fulfilling the university social responsibilities.

I appreciate CAS-Net JAPAN members, staffs of facility departments and students who contribute to the transactions and National Institute of Technology, Fukushima College which compiled it voluntarily.

There are many networks on creating sustainable campus in the world, such as EAUC in the United Kingdom, AASHE in USA, ACTS' in the Republic of Korea, CGUN in the People's Republic of China and ISCN as the international network since 2007. It is important to develop CAS-Net JAPAN for leading on creating sustainable campus and providing beneficial information which is gathered through networks in the world. Let's utilize this transactions as a tool for making international networks. I hope activities of CAS-Net JAPAN to be deepened and the transactions to be enriched. I would like to ask your cooperation for CAS-Net JAPAN.

In CAS-Net JAPAN Casebook Publication

CAS-Net JAPAN Vice-Chair Professor Hye-Sook PARK
(President, Mie University Regional ECO System Research Center)
Hye-Sook PARK

I am glad by CAS-Net JAPAN (Campus Sustainability Network in JAPAN) Casebook Publication very much. In CAS-Net JAPAN, it was started for International Symposium for the Establishment of Sustainable Campuses in Kyoto University in March, 2014, and an annual conference was held in Hokkaido University in November. The second annual conference was held in Chiba University in November, 2015. In addition, the 1st Asian Conference on Campus Sustainability (ACCS) was held in Korea Maritime and Ocean University (KMOU) in November, 2015, international cooperation such as Japan (CAS-Net JAPAN), Korea (KAGI; Korean Association for Green Campus Initiative), China (CGUN; China Green Campus Network) and Malaysia (Malaysian Green Campus Network) attended. They introduced their activities and exchanged the information concern sustainable and green campuses. I participated as an examination committee and a commendation committee of the outcome and output presentation by the Korean university students who participated in the leader green training project. I was able to obtain a good chance to learn the fullness of their action contents of each university and high presentation ability, especially, the cooperation between universities was planned by the voluntary suggestion of students, and the strength of each university was stronger, and there were many parts to be able to learn from the weakness planning the progressive expansion of the movement utilized the scale merit to supplement. The second ACCS meeting will be held in China in October, 2016.

In Asia where correspondence to environment of the 21st century is pursued in most, I am convinced when I can expect further development of CAS-Net JAPAN by the international exchange through the network between universities.

The action of universities becoming a corporate member of CAS-Net JAPAN is introduced by this casebook. Because it is a valuable casebook to be useful for very much in other universities as for the improvement to result and a problem by various invention for sustainable campus while making use of the characteristic of each university, I would like to wish for aggressive utilization. This casebook expects that it is an effective tool planning the fusion with an environment-conscious campuses through the integration of hardware and the soft aspect of the environmental personnel training while it is asked the University Social Responsibility (USR).

Contents

Development and Application of Assessment System for Sustainable Campus - ASSC

HOKKAIDO UNIVERSITY

1. Development of Assessment System for Sustainable Campus - ASSC

The Assessment System for Sustainable Campus – ASSC was developed by Office for a Sustainable Campus, Hokkaido University, Japan, in 2013.

ASSC adopted inclusive points of view to define the concept of "sustainable campus". The picture below is suggesting an example of its broad concept. Especially the two axes "Local society and social responsibility of a university" and "local economy and university management" encourage each university member to interact with local societies and people and contribute to establish a sustainable society. Other assessment systems like LEED Neighborhood Development (US) and CASBEE urban planning (Japan) also have similar criteria. However, ASSC has been developed especially aimed at the evaluation of higher education institutions. The result of this assessment system will inform each institution of strengths and weaknesses in terms of sustainability. The relative comparison to other institutions is also available. The development team of ASSC from Hokkaido University expects these findings would help each institution make a decision of their strategies for the sustainable future.

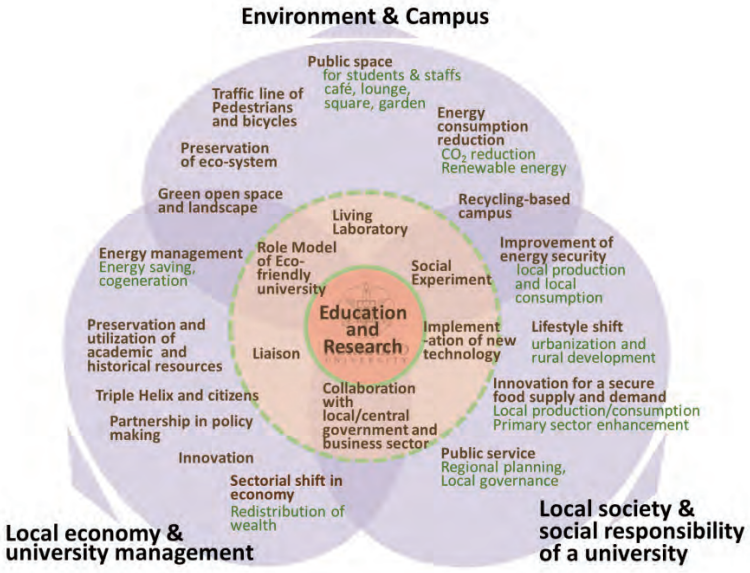


Fig 1. The concept of a sustainable campus proposed by ASSC. This concept suggests that a sustainable campus would include not only environmental impact reduction but also the activation of campus use for social learning program and the collaboration with other sectors such as local industries and communities.

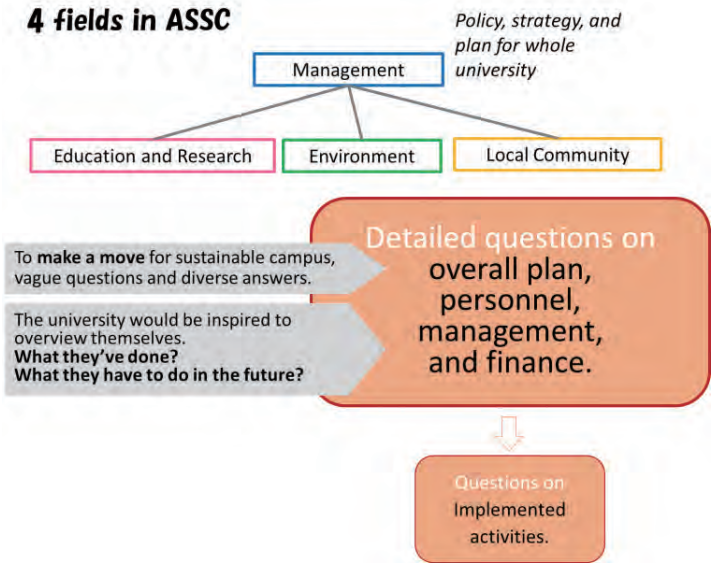


Fig 2. The structure of ASSC. ASSC has 4 fields in 2 layers: The field of Management in the 1st layer includes the overall plan of a university, personnel, management system, and finance.

The assessment system is comprised of four fields: Management, Education and Research, Environment, and Local Community. Total number of evaluation criteria is amounted to170 items.

The criteria cover the entire university management in the field of Management in the 1st layer, and then, corresponding to the criteria in Management, the other 3 fields, Education and Research, Environment, and Local Community in the 2nd layer evaluates the holistic activities of a university.

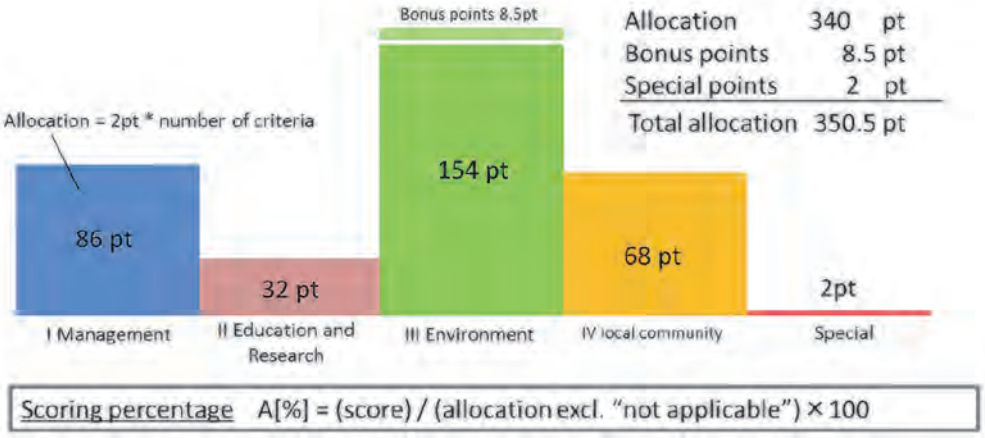


Fig 3. Scoring percentage is defined as the ratio of a gained score to allocated score in each field, area, or section. Fig 5 and 6 shows the results of this scoring percentage in fields and areas of Hokkaido University.

Management	I-1 Policy and overall plan	I-1-1	Education and research
		I-1-2	Campus
	I-2 Organization to consider sustainability	I-2-1	Dedicated staff
		I-2-2	Activities
		I-2-3	Mechanisms to support policy decisions
	I-3 Financial resource management	I-3-1	Long-term planning
		I-3-2	Securing budgets and acquiring funds
		I-3-3	Operations
	I-4 Asset management	I-4-1	Community utilization of university assets
		I-4-2	Servicing of university assets
	I-5 Facility management		
	I-6 Network to enhance sustainability		
	I-7 Personnel training	I-7-1	Faculty evaluation
		I-7-2	Recruiting talent
	I-8 Procurement and contracts	I-8-1	Procurement
		I-8-2	Contracts
Education and Research	II-1 Education	II-1-1	Curriculum
		II-1-2	Sustainability Literacy
	II-2 Research	II-2-1	Sustainability research
		II-2-2	Living lab
		II-2-3	Practical community research
	II-3 Students	II-3-1	Encouraging and supporting student activities
		II-3-2	Student participation in university management

III Environment	III-1 Ecosystem		
	III-2 Land	III-2-1	Green space and forest land
		III-2-2	Other open space
	III-3 Public Space		
	III-4 Landscape		
	III-5 Waste		
	III-6 Energy and resources	III-6-1	Energy management
		III-6-2	Greenhouse gases
		III-6-3	Renewable energy
		III-6-4	Other resources
	III-7 Basic Equipment		
	III-8 Facilities	III-8-1	Environmental performance
		III-8-2	Indoor environment
	III-9 Transportation	III-9-1	Flow planning
		III-9-2	Pedestrians and cycling
		III-9-3	Connecting with the local community
	III-10 Use of historical assets on campus		
V Local Communi	IV-1 Collaboration between industry, academia and government		
	IV-2 Community service	IV-2-1	System
		IV-2-2	Activities
	IV-3 Dissemination of Information		
	IV-4 Disaster prevention	IV-4-1	Disaster prevention inside the university
		IV-4-2	Disaster prevention in the local area
	IV-5 Role of university after strike	IV-5-1	Continuity of university's function (BCP-Business Continuity Plan)
		IV-5-2	Support for local community

Fig 4. Assessment areas and sections in the 4 fields.

2. Result of Hokkaido University evaluated by ASSC in 2014

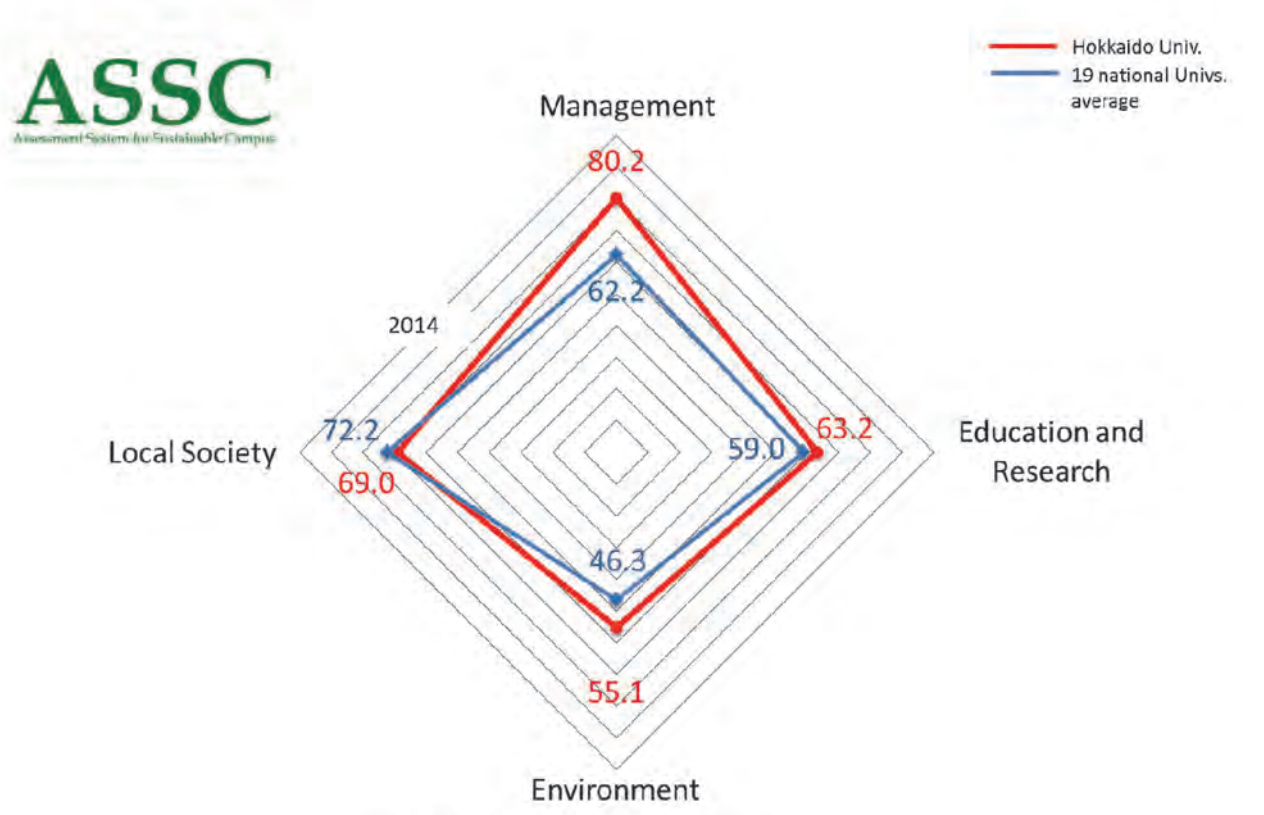


Fig 5. Scoring percentage of 4 fields

The result of Hokkaido University in 2014 is given as follows. This would help you understand how ASSC works and contribute to the strategy making or planning actions of a university. From Fig. 5, you see Hokkaido University has a strength in the field of Management.

Hokkaido University scored in the field of "Are the internal and external information and opinions related to sustainability being collected in the framework of the entire university? (I-2)" in the field of Management."WorldCafé" was held a sthe 1st interactive meeting to bridge staffs from different divisions. This was a kind of participatory process to give all staffs an opportunity to think the concept of sustainability of Hokkaido University and why they had to promote environmental impact reduction as a whole university. This was a quite unique challenge and will be held regularly to break the autonomy of each faculty in terms of the environmental impact reduction of our campus.

In the field of Education and Research, Hokkaido University had the 779 classes related to sustainability out of total 10,007 classes in 2014. The ratio was 7.8% and the score was 0.23 pt. That rate was reasonable; however, the problem was that those classes were not integrated under the umbrella of sustainability. Now we are trying to open opportunities for students to reach the information related sustainability throughout the university.

In the field of Environment, our score was not so high. Office for a Sustainable Campus is working hard to involve faculties in the campus planning and facility management. To conceptualize the facility design in line with the needs of faculty members and students, the office is going to hold regular workshop and consultation for environmental quality, and is reflecting those results to the whole campus planning. The new structure of bodies to enhance the communication is inevitable.

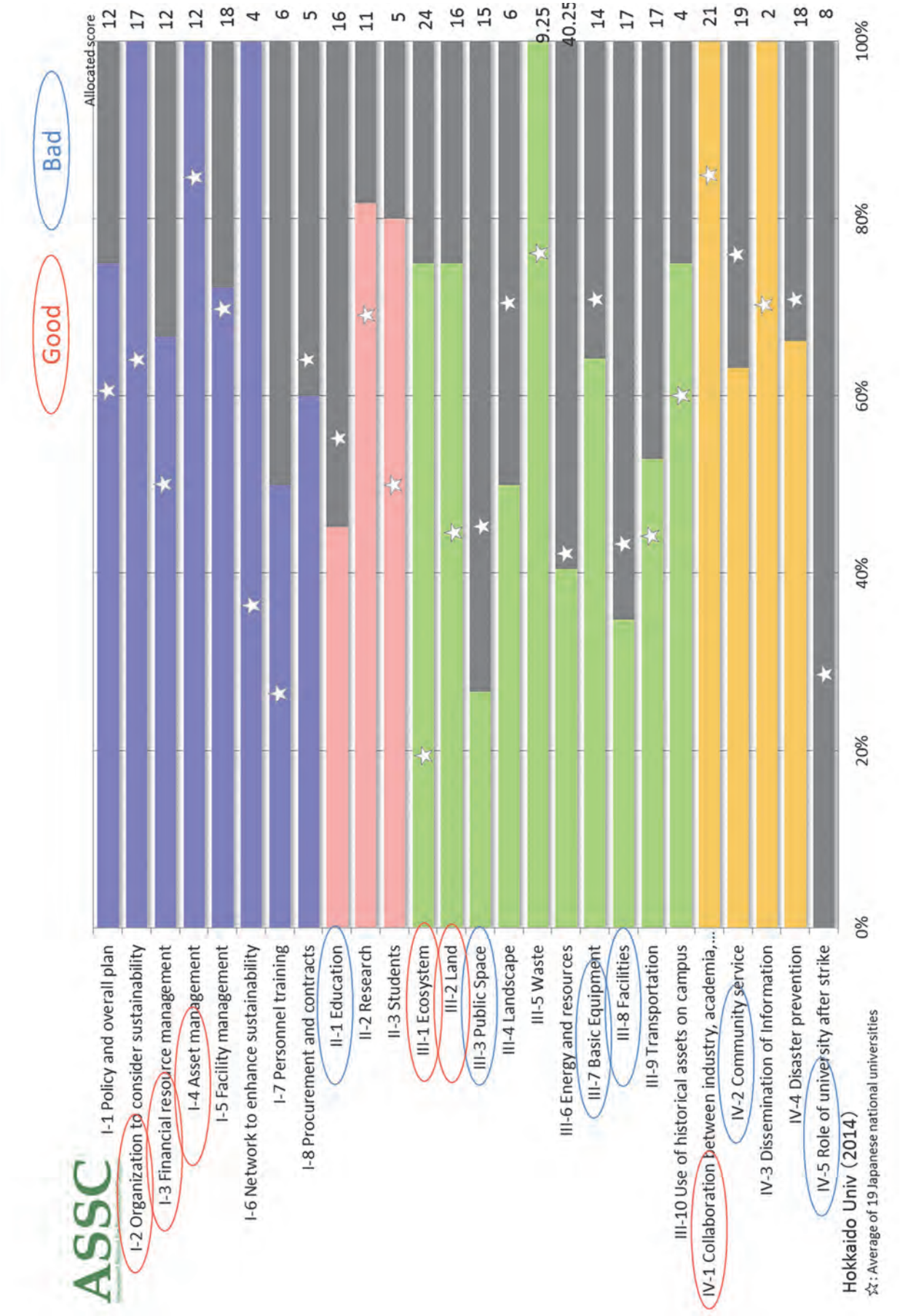


Fig 6. Scoring percentage of each area defined in each filed. Blue, pink, green and orange color represents the areas in the 4 fields, respectively.

Management of Ecological Environment Task Force (MEETF) for sustainable campus.

HOKKAIDO UNIVERSITY

I. The role and status of the MEETF in Hokkaido University

Executive Office for Campus and Environment Planning division, which is mainly in charge of the planning, maintenance, conservation and management of campus' facility and environment. This division consists of the "Master Plan Realization Task Force", which is concerning the Campus Master Plan, the "Historic Property Utilization Task Force", which is managing the renovation and utilization of historic property and the "Management of Ecological Environment Task Force (MEETF)", which is conserving the natural environments (Fig. 1). Each TF consists of mixture of both of the academic and administrative staffs, who have the specialized knowledge and skills.

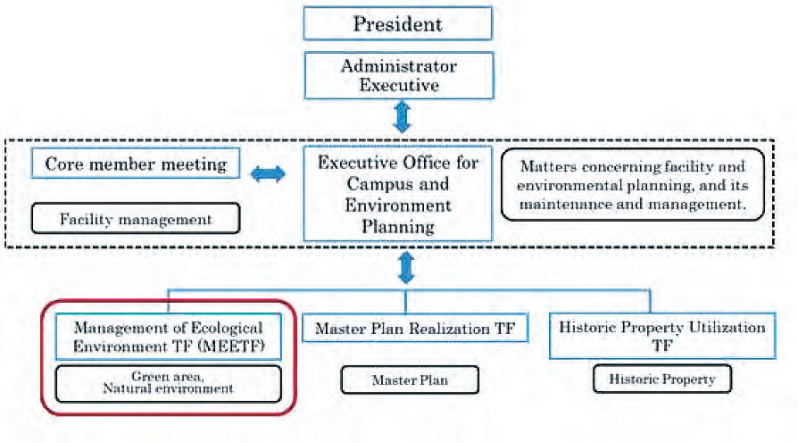


Fig 1. Status of the MEETF in Hokkaido University.

II. The general feature of green area, its multiple effects and its maintenance

Sapporo campus of Hokkaido University is known to be located in the heart of Sapporo city (Fig. 2), but to have a large land area of 171 ha (including farm land of 50 ha). Green area amounts to 43 % of total campus land area, and is covered by trees, forest, and plants (Table 1). Over 10,000 trees are registered as fixed assets. Green area in a city is well-known to provide the multiple-effects (Fig. 3) such as;

a. The environmental control effect;
b. The physical and psychological health effect;
c. The social effect;
d. The conservation effect of biological environments;

for long term.

For example, the cooling effect was observed on 12th July 2015 by satellite images showing the lowest surface temperature of 25.0 ℃ in the campus green area in Hokkaido University, despite the highest surface temperature was 37.8 ℃ in the city center(Fig. 4). Moreover, the comfortable environment and the remnant of old landscape are provided to the academic and administrative staffs, students, local people, and tourists(Fig. 5).

Fig 2. Sapporo campus of Hokkaido Unibersity is located in the heart of Sapporo city

	Site area	Green area[a)]	Green area ratio
Including Farm land and accommodations	171 ha	95 ha	56 %
Excluding Farm land and accommodations	121 ha	52 ha	43 %

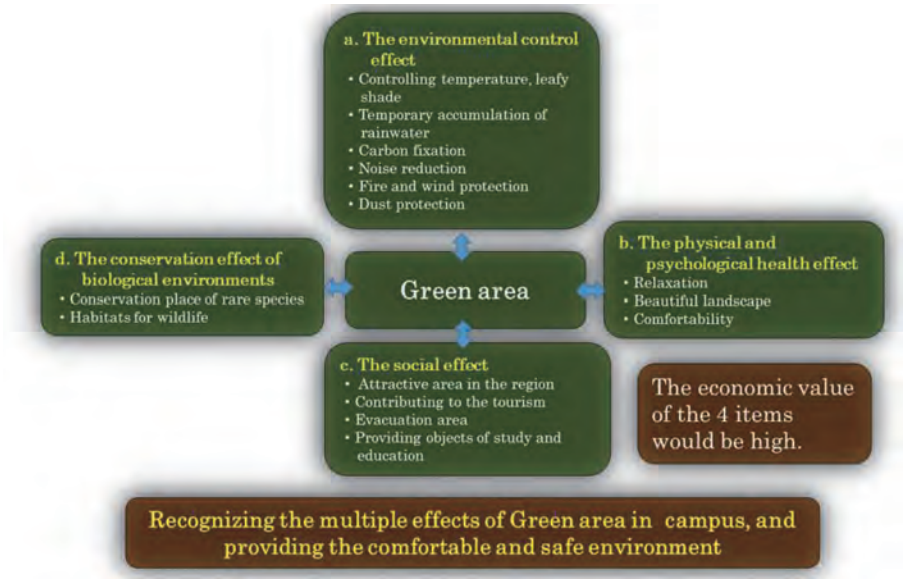


Fig 3. Green area's multiple effects in Sapporo campus of Hokkaido University

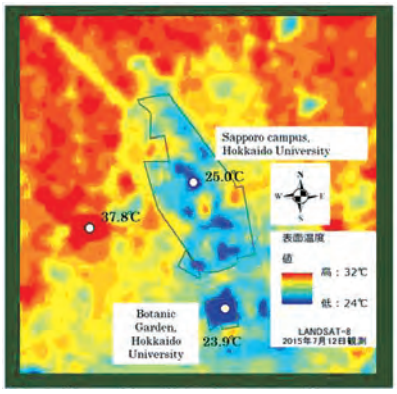


Fig 4. The coolinfg effect of green area in campus
The surface temperature was 37.8˚C, 25.0˚C, and 23.9˚C in city center, campus green area in Hokkaido University, and Botanic Garden, Hokkaido University, respectively.

Fig 5. The Central Lawn and Sakusyukotoni River

III. Activities of the MEETF

To keep and manage the multiple effects of green area in our campus, the following five items are considered mainly (Fig. 6).

i. Retention of green area

- Tree cutting plan by the MEETF: Request of application form and decision will be made by the MEETF
- Recommendation of re-planting the seedling of native tree species after the cutting old tree.
- Identification of the reduction of green area due to the construction of new buildings.

ii. Investigation and maintenance for hazardous trees
- Patrolling the campus for identifying the hazardous and old trees with a risk of falling branch, the disturbing tree with a risk of damaging the building nearby, and the tree growing their branches beyond the campus boundary.
- Survey of invasive alien trees species.
- Maintenance of the tree by cutting and pruning.

iii. Maintenance and management of lawn, wild flowers
- Maintenance and management of the lawn area.
- Enhancing how to use the lawn area.
- Enhancement of wild flowers by mowing management.

iv. Control of pest and wild animals
- Extermination of hemlocks.
- Inhibition of feeding to foxes and crows.
- Elimination of crow's nests, and warding off crows.
- Elimination of hornet's nests.

v. Conservation of biodiversity
- The detailed biological survey.
  *For environmental assessment.
  *Utilization for conservation countermeasures of diminished species in city area which are not designated as rare species and valuable, unique and beautiful plants in northern district.
- Extermination of invasive alien plant species such as black-eyed-susan, goat-weeds by the university staff.
- Distribution of the biological map, and publish it online to enhance to conservation of biodiversity.

Fig 6. Activities of the MEETF

IV. Full investigation of biodiverse habitats, and utilization of that's data for environmental assessment and conservation of rare species.

Sapporo campus of Hokkaido University is known to retain large green area even in the city center (Table 2, Fig. 7). The campus provides the habitat to a lot of animals, insects, and especially plants such as rare species and valuable species including high decorative species, and native northern species.
MEETF has been conducting the detailed biological survey of not only number of species but also individual numbers and their location by GIS. Those data are stored in the data base in the excel file. That data base is utilized for the environmental assessment when planning the constructions, the conservation of rare species and the enhancement of native wild flowers to keep the good landscape. MEETF opens the location information of original and native species in Hokkaido University to public for announcing the abundance of natural resources of Hokkaido University on the google earth website (Fig. 8).

	Plant	Insect[1)]	Amphibian	Reptile	Bird[2)]	Mammal
Total number of living species	746	163	6	1	143	5
Precious species[3)]	13[5)]	0	1	0	20	0
Invasive foreign species[4)]	30	1	0	1	0	0

[1)]Only identified insect species are recorded in the above table and real numbers of insect species are more than the number in the table.
[2)] Based on the investigation of the Birding club in Hokkaido University. Numbers include the number of passing individuals.
[3)] Species that published in RDB of the Ministry of the Environment and RDB of Hokkaido prefecture.
[4)] Include the species listed as invasive species in the RDB of the Ministry of environment, and the species considered to be eliminated according to the Blue List of Hokkaido prefecture.
[5)] There may be some precious species of plant to be brought into the campus unnaturally. The obvious spontaneous species in precious species are Ezo-hawthorn, Kugenuma-orchid, Sparganium erectum, Kamchatka-lily in the campus.

Fig 7. High population of the *Trillium* which was used a motif of the University symbol mark.

Fig 8. Location of hemlocks population, which is an invasive alien plant species identified by the field survey.

Our data base is opened to external people, whose application was approved through the prescribed procedures. For example, we have provided it to Sapporo City as a basic data for consideration of "Red List ver. Sapporo City" (completion scheduled in fiscal year 2015). Moreover, when new facilities are planned to be built in the habitat of Kugenuma-Orchid,rare species, we transplanted the species to another similar habitat in advance. These survey and compiling of all sorts of data are conducted by the environmental survey company in Sapporo on a budget of the Sustainable Campus Promotion Division who runs the MEETF.

On the other hand, ensuring the budget for biological survey in one of the most important issues. Our annual budget, not cheap, allows us to conduct the survey only for 1/5 area of our campus. That means that it takes five years to complete the survey for whole campus, while its land use is always changing.
Furthermore, one of issues is the short time we have been for modifying a facility construction project plan and taking action such as transplantation for conservation of rare species and valuable species. The reason is that a plan of facility construction project used to be announced officially just prior to start the construction work even though the data of biological survey is utilized for making an assessment for construction project. The checking system in advance for conservation of biodiversity, facility design, energy consumption and plot plan regarding as the construction project is being built now.

The Preservation and Utilization of Historic Properties at Hokkaido University

HOKKAIDO UNIVERSITY

1. Seismic retrofitting of important cultural properties in the Model Barn

Seismic retrofitting project for nationally-designated important cultural properties which are in the Model Barn and Botanic Garden Hokkaido University have been completed in March 2015, in Sapporo campus of Hokkaido University. There are Model Dairy Barn and Corn Barn which were built in 1877 and other buildings in the Model Barn and Main Museum which was built in 1882 and other buildings in Botanic Garden Hokkaido University. We have hardly seen thus large-scale retrofitting project which dealt with many important cultural properties for a short term at the same time.

Regarding a repair project of cultural properties, it is important for keeping definite authenticity to distinguish clearly original parts of properties which have historic value from added parts as it is repaired. Reinforcement by using of a steel frame and a plywood for structural use was adopted in this seismic retrofitting project, and these added parts were put down in writing and painted in a color which was different from original colors. The technique in this project fulfills the requirements for repairing historic properties.

For the reinforcement of Corn Barn, advanced and creative techniques were developed such as a reinforcement method of foundation for which a small section earth anchor as a bearing pile was adopted, because we expected that there were the Jomon period's buried cultural properties beneath the foundation of Corn Barn and intended that the damages of these buried cultural properties by foundation work would be minimized. From the comprehensive viewpoint that combines the preservation and utilization of historic properties on the ground and the preservation of buried cultural properties underground, the repairing method was determined.

2. Symposium on the Preservation and Utilization of Historic Properties after the completion of seismic retrofitting project.

The Symposium of Seismic Retrofitting Project in the Model Barn and the study tour on the project site with explanation were held in June, 2015 at Enyu Gakusha Community Hall contiguous to the Model Barn to be opened to the public, for recognizing the public and people in Hokkaido University on details and fruits of this project. As one of guest speakers, Prof. Taro Eguchi of Tekijiku Memorial Center of Osaka University was invited. Osaka University considers Tekijiku which is nationally-designated important cultural property as a core of its international strategy. A technical officer from the Agency for Cultural Affairs, engineers from the Japanese Association for Conservation of Architectural Monuments (JACAM) who designed this seismic retrofitting project were invited from out of the university. Researchers on agriculture, engineering and letters, a stuff of Facility Department and Office for a Sustainable Campus participated from the university. In the Symposium, opinions from various special field of studies and roles were exchanged as presentations and a panel discussion. The main point of opinions was that inclusive and comprehensive approaches on the historic properties utilization have to be continued from now on. It is significant for us to hold the same recognition in common that we do not only use historic properties for exhibition facilities restrictively but also utilize them as a property by considering its historic value and reflecting the present requirements.

Symposium on the Preservation and Utilization of Historic Properties at Hokkaido University

■Date: June 13, 2015 ■Venue: Hokkaido University Enyuu Gakusha building

To mark the completion of seismic retrofitting for the Model Barn and the Hokkaido University Natural History Museum, which are important cultural properties, a public event was held as a platform for discussion and consideration of ideal ways to preserve and utilize historic properties at HU based on a range of perspectives.

Part I
Report on the present situation of historic properties at HU and related initiatives
Five speakers gave presentations with titles including "Campus Master Plan and Historic Properties," "Preservation and Utilization of Underground Cultural Properties" and "Seismic Retrofitting Method for the Model Barn and Historic Structures in the Botanic Garden Hokkaido University."

Part II
Toward the utilization of historic properties at HU's Sapporo Campus
Presentations on historic properties at Osaka University and society-university collaborative activities were followed by related discussions by six attendees from HU and elsewhere.

Pre-opening of the Model Barn
Prior to the symposium, retrofitting work was described on a tour of the Model Barn.

3. Historic Properties in Sapporo campus of Hokkaido University

Hokkaido University has other historic properties besides in Sapporo Campus and in Botanic Garden Hokkaido University. Regarding historic properties, Hokkaido University has 6 nationally-registered important cultural properties besides important cultural properties in the Model Barn and Botanical Garden Hokkaido University as mentioned. There are many Jomon period's buried cultural properties along Sakushukotoni River in Sapporo campus, therefore an elaborate excavation is conducted in case of a construction work with digging in the campus in close coordination with the board of education of Sapporo City. In addition to those cultural properties, there are many historic properties such as trees, river systems and artificial drainage system in Experimental Farms. Not only real properties but also movable properties which faculties keep such as specimens, samples and literatures are also valuable historic properties to be preserved and utilized. Thus, Hokkaido University possesses various kinds of historic properties and the preservation and utilization policy which reflected properties' value and capability synthetically is desired.

4. Organization and activities

Historic Property Utilization Task Force is one of three task forces which are organized for each purpose conducted by vice-president in charge of facilities in Hokkaido University. The task force members are constituted by various experts on such as engineering, letters, agriculture, museology. The task force becomes to be a platform on which the task force members give consideration to preserve and utilize historic property by using of a wide field vision. Symposium on the Preservation and Utilization of Historic Properties at Hokkaido University was planned and considered by the task force, and implemented by Executive Office for Campus and Environment Planning of Hokkaido University.

The task force has worked in various activities since the predecessor working group had worked. For example, making the list and rank according to historic value of properties of the university, the evaluation system on a degree of safety, urgency and necessity on reinforcement and repair, the trail on cultural properties (the study tour to buried cultural properties and historic properties with explanation on site), setting the information board on the site, the research project on evaluation method for utilization of historic properties commissioned by the Ministry of Education, Culture, Sports, Science and Technology, and so on.

5. Task

The preservation and utilization of historic properties at Hokkaido University has attached too much importance to deal with the historic properties which were severe antiquated and needed urgently to give seismic retrofitting. However, on the way of planning of the symposium and by discussion in the symposium, participants of the symposium became aware that it was important to comprehend the real properties such as buried cultural properties, trees, river systems and civil engineering heritages and the movable properties which faculties keep such as specimens, samples and literatures as valuable historic properties as mentioned before, and furthermore, that it was important to put the general and comprehensive utilization of historic properties into the management policy of university.

For putting thus utilization strategy into the university management policy, the public relations strategy for making the value of historic properties universally known, the utilization in cooperation with research and education which are the duty of university, the cooperation with a community aimed an opened university and the contribution to a society are necessary with consensus-building within a society and the university. Furthermore, the organization which can go on with the specific and effective action by ensuring a revenue source should be strengthened still more.

Chronological Table of Hokkaido University Architectural Monument Designation and Related Matters

Year	Date	Details
1968	Nov. 27	Six structures (the Model Dairy Barn, the Corn Barn, Furukawa Memorial Hall (previously the Forestry Hall of the Agricultural Department of Tohoku Imperial University), the Former Agricultural Economics Hall, the Former Reading and Stackroom of Sapporo Agricultural College, the Sapporo Agricultural College Entomology and Sericulture Hall) were designated as HU buildings for preservation.
1969	Aug. 19	The Model Barn buildings of HU's Faculty of Agriculture (the Former Agricultural Department of Tohoku Imperial University) were collectively designated as an Important Cultural Property.
1970	Jun. 17	The Former Sapporo Agricultural College Drill Hall (today known as the Sapporo Clock Tower) was designated as an Important Cultural Property.
1979	Apr.	The Former Agricultural Economics Hall was destroyed by fire.
1985		The Former Keiteki-ryo (student dormitory) was removed and reconstructed for preservation in the Historical Village of Hokkaido.
1986		The Former Arishima-ryo (student dormitory) was removed and reconstructed for preservation as the Former Takeo Arishima Residence in Sapporo Art Park.
1988	May 20	The Auditorium of the School of Fisheries Sciences (on the Hakodate Campus) was renovated.
1989	May 19	The buildings in the botanic garden of the Faculty of Agriculture were collectively designated as an Important Cultural Property.
1994	Jul. 1	Restoration work for the botanic garden and museum of the Faculty of Agriculture was completed, and the structures were opened to the public.
1997	Sep. 16	Furukawa Memorial Hall (previously the Forestry Hall of the Agricultural Department of Tohoku Imperial University) was designated as a cultural property.
2000	May 17	The Batchelor Memorial Building, the Miyabe Kingo Memorial Building, the Entomology and Sericulture Hall, the Former Reading and Stackroom of Sapporo Agricultural College, the Forest Memorial Hall in the Faculty of Agriculture's Tomakomai Experiment Forest, and the School of Letters' Nibutani House (the Former N. G. Munro Residence of Biratori Town in the Saru-gun region) were designated as cultural properties.

Hokkaido University Architectural Monuments

The Model Barn buildings


Milking Processing Plant


Threshing, Hulling & Cleaning Room


Farm Office


Food-processing Plant


Corn Barn


Cart-scaling Place


Model Dairy Barn


Milking-cow Barn


Bull Barn

■: Important Cultural Property of Japan
■: National Tangible Cultural Property
■: HU historic building


Main Building of the Faculty of Agriculture


The Hokkaido University Museum


Entomology and Sericulture Hall


Administration Bureau


Security Guardhouse and South Gate


Former Reading and Stackroom of Sapporo Agricultural College


Furukawa Memorial Hall


Main Museum


Gate House


Ex-administrative Office


Buildings in the Botanic Garden Hokkaido University


Batchelor Memorial Building


Miyabe Kingo Memorial Building

"Toward recovery and revitalization of Iwate University"
By utilizing all power of Iwate University
Environmental preservation connected with World from Iwate University

Iwate University

The eco-campus design of Iwate University is a foundation of any activities involved with the realization of the sustainable campus in Iwate University, as a comprehensive concept with perspectives of Environmental Education, Environmental Management System (EMS) and Environmental Leadership Development.

Iwate University Environmental Management Student Committee (EMSC) is the organization which plays the central role on the eco-campus design through students' participation. The activities, including environmental education, involved in the promotion of students' participation are the Iwate University Environmental Leadership development program.

The organization and program are not only designing the sustainable campus in Iwate University, but also beginning to contribute to the development of sustainable communities in Iwate through the collaboration with nonprofit organizations (NPO), administrative organs and private sectors.

ECO-CAMPUS DESIGN THROUGH THE PARTICIPATION OF STUDENTS - THE ACTIVITIES OF IWATE UNIVERSITY ENVIRONMENTAL MANAGEMENT STUDENT COMMITTEE (EMSC)

The Environmental Management Student Committee (EMSC) was established on 1 October, 2008, as an official Iwate University EMS organization. EMSC students are the members of Iwate University EMS who hold the equal status with university administration and teaching staff members. This organizational position for the participating students lays the groundwork for the cooperative operation of Iwate University EMS by students and staff members.

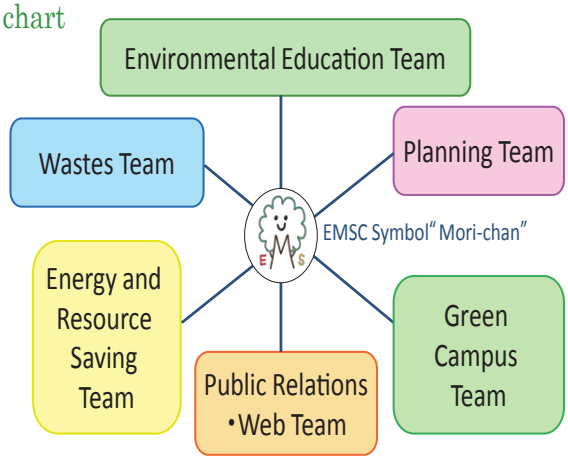
EMSC is composed of six teams, Environmental Education, Planning, Public Relations・Web, Energy and Resource Saving, Wastes, Green Campus. The main activities are as listed below:

- ●Providing "Eco Campus tour," on-campus empirical environmental learning opportunities for local children
- ●Editing "Iwate University Environmental Report," environmental educational DVDs and brochures called "Eco Gan-dai created by students"
- ●Investigating the condition of wastes separation on campus
- ●Trash picking on and around the campus
- ●Collecting plastic bottle caps discharged on campus and offer them to social welfare facilities
- ●Collecting wastepaper on campus
- ●"Uchi-mizu," that is to sprinkle water to cool down the campus in summer
- ●Creating "Green Curtain" beside the Iwate University Library building

Gan-chan, Iwate University Symbol

ECO-CAMPUS DESIGN THROUGH THE PARTICIPATION OF STUDENTS - THE ACTIVITIES OF IWATE UNIVERSITY ENVIRONMENTAL MANAGEMENT STUDENT COMMITTEE (EMSC)

Iwate University Environmental Management Student Committee (EMSC) organization chart



"Green Curtain" of Iwate University Library

STARTING FROM ENVIRONMENTAL EDUCATION THAT ENCOURAGES THE PARTICIPATION OF STUDENTS AND LEADING IT TO FOSTER THE SENSE OF ESD (EDUCATION FOR SUSTAINABLE DEVELOPMENT), ENVIRONMENTAL LEADERSHIP DEVELOPMENT AND "IWATE CO-CREATION PARTNERS"

In 2000, four "Environmental Education" subjects were newly offered as general education courses. Currently, the number has increased to twelve. Sixty teaching staff members from four faculties offer several omnibus lectures on the topics related to the environment and such keywords as life, urban, water, waste, forestry and animal. Undergraduate students are required to select and attend one of twelve subjects for their graduation.

Teaching Materials for Environmental Education Subjects

Between FY 2006 and 2008, Iwate University implemented "Reconstruction of liberal arts education for sustainable society: [Galaxy of Learning] project" as a "Support Program for Contemporary Educational Needs" adopted by the Ministry of Education, Culture, Sports, Science and Technology of Japan. The main purpose of this project was to foster the coordinators for designing sustainable society, who are "21 century citizens" imagined as the "T-type Human Resources" with broad perspectives and knowledge on the issues of humankind (horizontal axis) as well as a high level of expertise (vertical axis), based on the value of ESD.

STARTING FROM ENVIRONMENTAL EDUCATION THAT ENCOURAGES THE PARTICIPATION OF STUDENTS AND LEADING IT TO FOSTER THE SENSE OF ESD (EDUCATION FOR SUSTAINABLE DEVELOPMENT), ENVIRONMENTAL LEADERSHIP DEVELOPMENT AND "IWATE CO-CREATION PARTNERS"

Between FY 2009 and 2011, Iwate University implemented "Program for Developing π-type Environmental Leadership utilizing the ISO14001 and Industry-University-Government-Citizen Collaboration" adopted by the Ministry of the Environment, as the successor of "Galaxy of Learning" project. This program has been continued by Iwate University independently, even after the end of the support provision by the Ministry of the Environment as well as the completion of initial program development.

This program aims to develop π-type environmental leadership while inheriting and developing the achievement of the "Galaxy of Learning" project. The π-type environmental leadership is a leadership which is equipped with the "ESD values" as well as the "basic environment competency" on the basic knowledge of environmental fields (horizontal axis), expertise of four faculties (Humanities & Social Science, Education, Engineering, and Agriculture) (vertical axis), and the "practical environmental competency" (another vertical axis) based on empirical acquisition of the knowledge and skills on environmental management. The undergraduate students, who meet with the designated requirements, are awarded by the president of Iwate University with the authorized qualification called "Iwate University Certified Environmental Management Specialist," as a certification of the "π-type" Environmental Leadership program. The total of seventeen students has received the award in four years since FY 2011.

The environmental management subjects were also established in order to develop the field of "practical environmental competency." After learning the basic knowledge of EMS and obtaining the requirements of international EMS standards, ISO 14001, the candidate students acquire the practical skill of environmental management through the work involved with the internal audit of Iwate University EMS in cooperation with university teaching and administrative staff. Seventy-six students in total experienced the internal audit work in six years since FY 2010.

Iwate University EMS internal audit

"Iwate University Certified Environmental Management Specialist" Awarding Ceremony

ECO-CAMPUS DESIGN OF IWATE UNIVERSITY AND ENVIRONMENTAL LEADERSHIP DEVELOPMENT EVOLVE INTO THE DEVELOPMENT OF SUSTAINABLE COMMUNITIES IN IWATE

EMSC activities and Iwate University Environmental Leadership Development program have evolved into a way of local contribution for developing sustainable community in collaboration with people in the community.

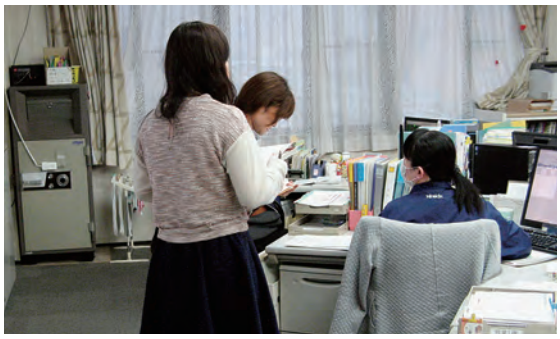
EMSC has received a request from a local NPO and has planned and offered empirical environmental learning opportunities for parents and children four times since FY 2014.

The Iwate University Environmental Leadership Development program has also offered lectures regarding the corporate environmental management, where students help local small and medium size enterprises compile their environmental report and involve in internship and volunteer activities as a way of a local contribution.

The lecture program started in FY 2010 with an aim of nurturing "practical environmental competency." Forty-nine students assisted 18 small and medium size enterprises for six years with the preparation of their environmental reports. Those enterprises belong to the Iwate Conference of the Association of Small Business Entrepreneurs. Three Iwate University students helped one of those enterprises apply for the certification of the EMS standard "Eco-Action 21."

Moreover, the total of nine students involved in the self-evaluation of EMS standard "Iwate Environmental Management System Standard" by Morioka City in four years since FY2011.

Empirical environmental learning at a local kindergarten



The lecture to help local small and medium enterprises prepare their environmental reports

EMS Self-Evaluation by Morioka City Hall

Since FY 2013, Iwate University has been working on a project adopted as the Center of Community (COC) Project by Ministry of Education, Culture, Sports, Science and Technology of Japan. The purposes of this project are to foster the prospective Iwate Co-creation Partners personnel and to promote such personnel to settle in local communities. Based on the environmental education, ESD and the Environmental Leadership Development program that have been carried out so far, the university seeks to realize these purposes by offering community specific subjects along with the general and specialized faculty subjects in such a structured manner as adding subjects learned at the disaster-stricken communities to the required subjects for all students. It is expected that these approaches will foster the human resources who would get involved with developing a sustainable community and thus contribute to our local community.

Sustainable Campus Award 2015-Year Prize (Department of Student Activity)

Student-led Environmental and Energy Management Systems

Chiba University

10years experience of Student-led EMS

After introducing a student-led EMS and running the ISO program for 10 years,Chiba University has seen three main effects. The first is the energy and resource conservation effect; the second is the external evaluation of the university; and the third is the educational effect on students.

Chiba University was established in 1949 and was incorporated in 2004. Currently, it has around 15,000 students and 2,900 teaching staff, and is one of the leading comprehensive universities in Japan. It has 9 faculties (Faculties of Letters, Education, Law and Economics, Science, Pharmaceutical Sciences, Engineering, and Horticulture; and Schools of Medicine and Nursing) and 11 graduate schools.

One of the factors that sparked the university's quest to acquire ISO 14001(international standard for environmental management systems: EMS) was an urgent need to cut costs ahead of its incorporation in academic year 2004 after the cabinet decided in November 2002 to incorporate national universities. The university president officially declared the start of the university's effort to acquire ISO certification in October 2003, for which he gave four reasons.

1. To fulfil the university's social responsibility to reduce its environmental impact as a large-scale business operator
2. To be a leader in environmental management as a public education institution
3. To demonstrate Chiba University's leadership to society by introducing a completely new type of environmental management system in the form of student-led ISO acquisition
4. To make efficient use of expenses by reducing utility and waste processing costs

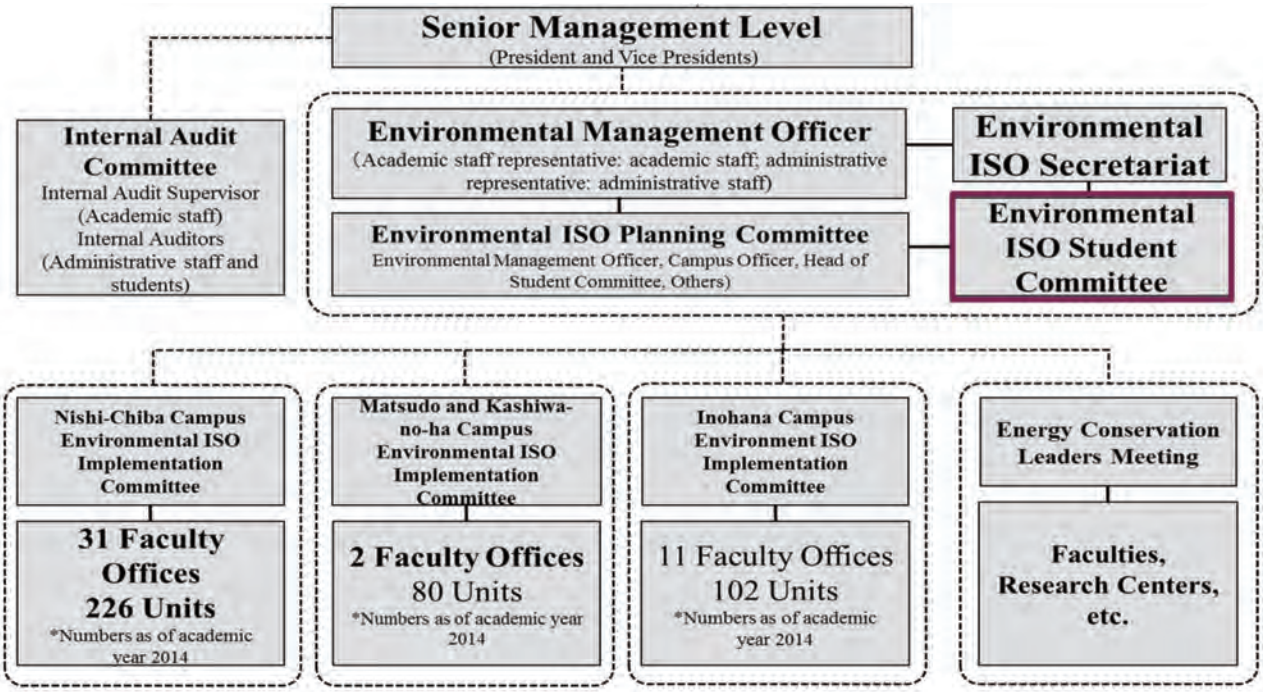
The use of the key expression "student-led" in item 3 is a characteristic of Chiba University. The main supporting pillar of Chiba University's "student-led EMS" is the existence of the Chiba University Environmental ISO Student Committee. The Student Committee is not a student club but an organization of the university incorporated into the EMS operation framework. The Student Committee performs the duties of the ISO Secretariat as a "practicum" and also submits proposals and activity reports to the Planning Committee. The chair of the Student Committee also sits on the Planning Committee.

In 2005, the Nishi-Chiba Campus (main campus) acquired ISO14001. Then, the scope of application was expanded to the Matsudo and Kashiwa-no-ha Campuses. And then to Inohana Campus in 2007.In 2013, the university acquired ISO50001 (international standard for energy management systems: EnMS) as the first university in Japan.

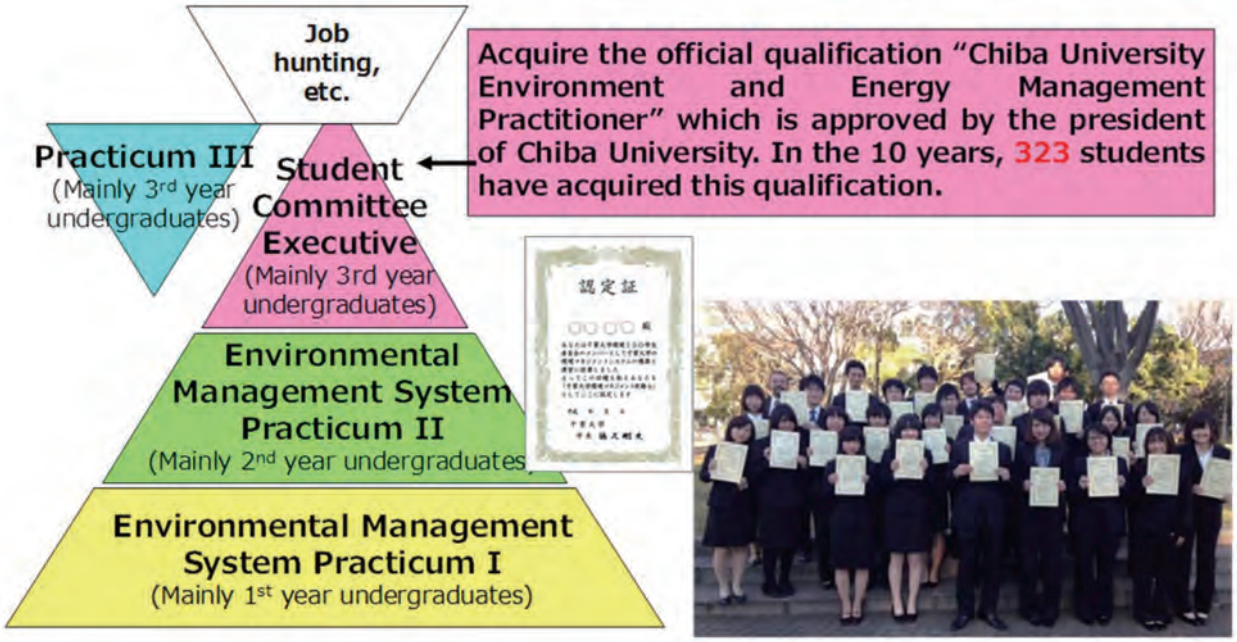
Chiba University considers the construction and operation of the EMS/EnMS as an opportunity for students' practical education. The activities are treated as creditable coursework, and the university also carries out accreditation of qualifications.

CHIBA UNIVERSITY

EMS/ENMS MANAGEMENT ORGANIZATIONAL CHART IN CHIBA UNIVERSITY



CREDIT SYSTEM FOR EMS/ENMS ACTIVITIES



VAROUS ACTIVITES BY THE STUDENT COMMITTEE

Energy and Resource Conservation

Putting power saving stickers to all switches in the campus.

Holding an event calling for energy saving every summer.

Calling for waste separation.

Posting a poster calling for power saving in winter and summer.

Landscape management & Exchange with local residents

Planting trees and woodlands conservation in cooperation with companies.

Making a flower bed with local residents.

Creating a compost with fallen leaves on campus.

Operating a share cycle to reduce bicycles on campus.

Making "green curtain" with bitter gourd in summer to save energy.

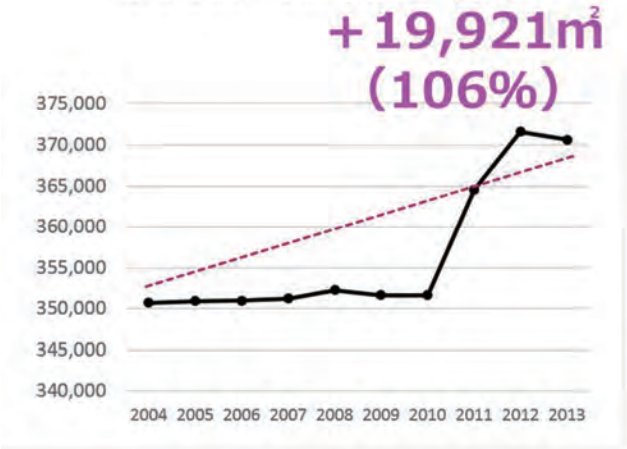
Environmental education

Having a picture-story show about environment in kindergarten.

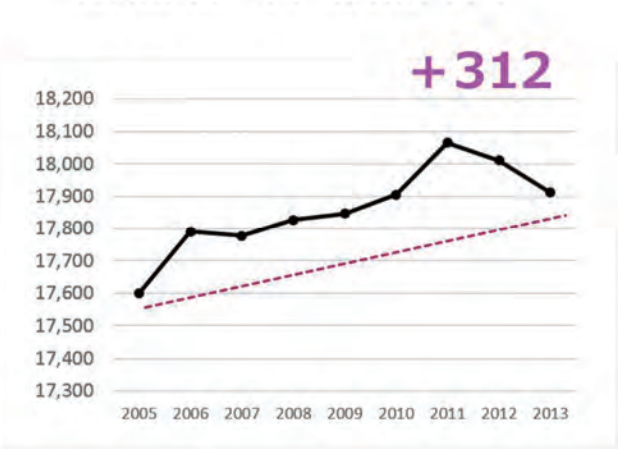
Giving a lesson about environment in elementary and junior high schools.

ENVIRONMENTAL ACHEVEMENT IN 10 YEARS

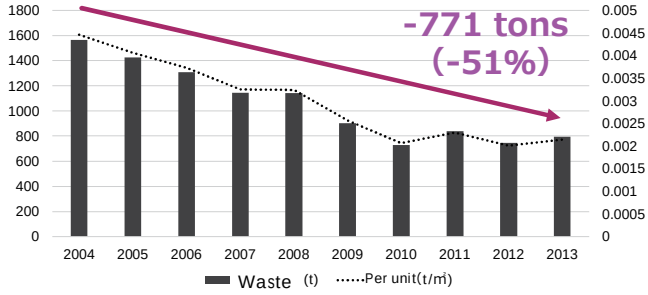
Floor Areas (m²)



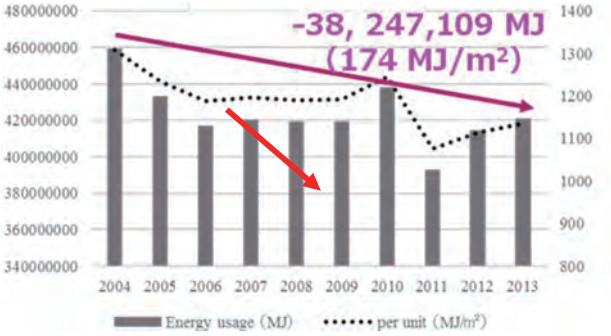
Number of Members



General Waste



Energy Consumption



Despite the university's floor area and the number of its members have been increased in 10 years, the overall amount of waste output and energy input decreased. Moreover, energy consumption declined sharply over three years from the year of acquisition 2004, showing a direct impact from ISO.

Summary

The student-led construction and operation of the EMS/EnMS at Chiba University not only led to the reduction of energy usage and waste emissions through the acquisition of ISO 14001 and ISO 50001 but also improved the university's external evaluation and provided a training ground for students to learn common wisdom and skills through work. Changing the students each year involves unique challenges, such as ensuring the quality of the EMS and the tendency of student activities to become routine. To deal with these issues, teaching staff should provide support to ensure that newcomer students take over the program properly.

contribute to peaceful coexistence across the global community

Kyoto University

Creating sustainable campuses through a participatory approach

ECOle de Kyodai 2015 ～ Early Summer Campaign ～

We implemented a project named **"ECOle de Kyodai 2015"** in June, an environmental month, to give momentum to our efforts to create sustainable campuses and reduce their environmental impact through a participatory approach. During this month-long period, we carried out various programs mainly on the Yoshida Campus. "*ECOle de*" is a neologism that combines "eco" and "world" and represents our message: "Think globally, Act locally, Feel in the Campus!" This word also has a connotation to the French word *école* (school) as this initiative involves offering various opportunities to learn about the environment in Kyoto University.

Sustainable Month: June 2015

●Events held during the month

We set up an Open Laboratory named “Researchers engaged in environmental studies at Kyoto University” on the first floor of Kyoto University Co-op Renais, where researchers who pursue environmental issues through various approaches were stationed and rotated daily. This year, beverages were offered to the participants, each of whom were asked to bring his or her own cup, and they enjoyed talking with each other while drinking beverages, such as Fairtrade coffee, honey-based drinks, and teas from various parts of the world. Hands-on activities, such as dyeing cloth with natural dye extracted from camphor branches and leaves; making crafts with fabric scraps; wrapping things with *furoshiki* cloth; as well as an exhibition of eco-art works, were attended by many people. In addition, we worked with groups from both inside and outside the university, to organize an eco-cooking class and a workshop to develop teaching materials for environmental education.

● Eco-candle Program

We opened an environmentally-friendly beer garden named “Nile Beer de Sustainable Night” in cooperation with Kyoto University Co-op’ s cafe-restaurant, Camphora. The beer garden lighted by eco-candles made from waste oil and bamboo from Katsura Campus, and ingredients produced in the university and recyclable cups were used. On June 19, we celebrated the 118th anniversary of Kyoto University with the participants.

● Eco-performances at Kusu-chan Festa

On June 20, we held **Kusu-chan Festa** in and around the Clock Tower Centennial Hall of Kyoto University. (***Kusu-chan*** is a mascot that symbolizes environmental activities at Kyoto University.) On the first floor of the hall, eco-performances were given by groups of students and a special symposium was held to discuss measures to reduce waste. Around the hall, many groups set up booths and various items were sold in the charity bazaar. The day-long festival attracted many people, who increased their environmental awareness in various ways as they enjoyed listening to songs, eating, learning about environmental issues, and interacting with animals.

● “One eco-friendly action a day” project

Utilizing SNS, we promoted a project to encourage at least “one eco-friendly action a day” with a view to stressing the importance of continuing to act in an eco-friendly manner. In the project, an individual (or a group) posted one video on our Facebook site (https://www.facebook.com/ecosengen) a day, sending an eco-message while hand-stirring *nukadoko* (salted rice bran bed) in which vegetables to be pickled are fermented, in a relay fashion. In the video, each participant voiced a unique, impressive message as he or she was doing *tenchigaeshi* (stirring the *nukadoko* to replace the surface bran with bran from the bottom), which is an essential process for making *nukazuke* (pickles fermented in rice bran). At the same time, we renewed our awareness of the wisdom of our ancestors who invented *nukazuke* and other traditional preserved foods to use ingredients to the fullest extent possible.

Voices from student staff and others involved

◆One eco-friendly action a day/*Nukazuke* Challenge

Yuta Ando (4th-year student from the Faculty of Engineering)

By using a *nukazuke* pot (for stirring the *nukadoko*) as a relay baton, this event aimed to publicly communicate the activities of the "One eco-friendly action a day" project and the environmental efforts of the **ECOle de Kyodai** through our Facebook site. I think *nukazuke* is the embodiment of the concept of sustainability. Specifically, *nukazuke* makes effective use of rice bran that is not fit to eat and is usually wasted. Vegetables to be pickled are more nutritious, and can be eaten with their skin on after the process of being fermented in a rice bran bed. Also, salt added to rice bran slows down the process of vegetables going bad. *Nukazuke* has these great advantages. I am glad to note that key persons in various fields as well as collaborators for the Ecole de Kyodai Early Summer Campaign joined us in doing *tenchigaeshi* (stirring the *nukadoko* to replace the surface bran with bran from the bottom). One of the achievements we have made through this event is a significant increase of visitors to the Facebook site of ECOle de Kyodai. After the start of the event, the number of persons who clicked the "like" button on our Facebook site increased by more than 150, and the maximum number of visitors a day to the site reached 3,000. The event made our Facebook site more widely known and more effective for disseminating information. The *Nukazuke* Challenge has been continuing since June.

◆Open Laboratory:

Erika Yokoyama (2nd-year student from the Faculty of Law)

The Open Laboratory was provided at the entrance space on the first floor of Kyoto University Co-op Renais, where Kyoto University's researchers specialized in environmental issues were stationed and rotated daily to share their research results with participants. As the Open Laboratory was visited by 153 people last year, we set the target number of visitors to this year's event to 300; almost double the last year's number. As it turned out, the number of participants in the Open Laboratory exceeded our target and reached 408, including both students and local residents. Environmental measures are not limited to global warming prevention, electricity saving, and recycling. I believe that the Open Laboratory was a valuable venue for many people to deepen their understanding of environmental issues from multifaceted perspectives, and hope to continue to hold this meaningful event next year as well.

◆Nile Beer de Sustainable Night (Eco-candle Program)

Koki Nishibori (1st-year student from the Faculty of Engineering)

The Nile Beer de Sustainable Night project was implemented at Kyoto University Co-op's cafe-restaurant, *Camphora* from June 15 to 19, 2015 (excluding June 18), and the highlight of this project was the Eco-candle Program. This program consisted of three events: lighting the terrace seating area with eco-candles (throughout the project period); a workshop titled "Let's make eco-candles" (June 15 to 17), and the celebration of the 118th 'birthday' of Kyoto University (June 19). I think this program was successfully implemented with many participants on June 17 and 19, but I felt overwhelmed on June 15 and 16 due to lack of sufficient preparation and rehearsal. I failed to fully consider any restrictions that could affect an outdoor event, and will remember this lesson in the future.

◆Kyoto Jungle – Let's be Tarzan:

Yusuke Yamaguchi (4th-year student from the Faculty of Science)

The Kyoto Jungle program is a new eco-performance program that was implemented for the first time at ECOle de Kyodai 2015. We think that Kyoto is our home and is also a home to a great variety of living things. This program is designed to invite people to explore the natural environment of Kyoto, similar to how Tarzan would explore a jungle. One of the events conducted under this program was "*Gasaire*," in which participants went to the *Kamo* River, near to Kyoto University and familiar to everyone in Kyoto, to observe living things there firsthand. While the word "*Gasaire*" today means "house search by the police," its original meaning is "to catch living things in a river all at once using a net."

Participants in the event caught mainly fish, amphibians, and aquatic insects, while observing birds, mammals, and large freshwater fish from the river bank. The main participants in the event were elementary school children, who were so full of curiosity that they gladly went into the river and contributed greatly to the catch of the day.

Special Symposium

Spreading Kyoto's culture of *shimatsu* (thrift) to the world: working toward 2R (Reduce and Reuse)

※Kusu-chan

The culture of *shimatsu* (thrift) is said to constitute an integral part of living in Kyoto. Today, the contemporary version of this culture is expected to contribute to reduce waste. Against this backdrop, a special symposium was held as part of the Kusu-chan Festa on June 20, 2015, in which ongoing efforts to reduce waste were reported by people with diverse viewpoints: family, tourism, food and drink industry, researchers, and the younger generation. This was followed by a discussion to explore measures to be taken in the future. Professor Shinichi Sakai (Director, Environment Preservation Research Center, Kyoto University) served as a coordinator of the symposium, and the presentations were made by Mr. Daisaku Kadokawa (Mayor of Kyoto City), Mr. Masanori Shoji (Director, Office for Recycling Promotion, Waste Management and Recycling Department, Minister's Secretariat, Ministry of the Environment), Ms. Hisako Saeki (President, Kyoto City Liaison Council of Local Women's Societies), Mr. Hiroyuki Horiba (Proprietor of Rokusei, a Kyoto-style restaurant) and the members of the 2R Research Project Team of Saikyo Senior High School. The Participants then discussed how we could offer hospitality to visitors in a manner specific to Kyoto while reducing waste at the same time, and also the activities being undertaken at high schools. This provided important insights for the future policy direction.

*For more details, refer to "*Bikkuri! Eco-shimbun*" (http://www.eco100.jp/index.html) issued by an affiliated group.

Environmental Education Design Workshop

By Yuki Araki, Representative of NPO Terakoya Project (Tera School)

On June 7 (Sunday), 2015, Environmental Education Design Workshop was held at Camfora as part of a program to learn about eco-friendliness by Tera School, an NPO that runs several *jukus* (after-school tutoring schools) at temples. The workshop was attended by 14 people, including undergraduate and graduate students of Kyoto University, students of other universities such as Ritsumeikan University and Kansai University, and citizens. The participants were divided into some groups according to their interests, such as the "Value of a Cup of Water" group that addressed issues concerning water resources and the "Profitable Ecology" group that discussed how we could make a profit while protecting the environment. Each group was asked to design an educational program consisting of several 40-minute sessions for elementary and junior high schools.

Originally, the workshop was planned as a two-hour event, but many of the participants found that two hours was not enough time to have thorough discussions. Therefore, we moved to the Kyo Salon in the Clock Tower to continue discussions. The result was "Eco Rich Man," a board game that teaches children the importance of acting in unison to achieve a sustainable society. The game has already been introduced in the three sessions at two Tera School locations (Shoren-in temple and Myoshin-ji temple). In the first and second sessions, children played the game individually and as a team respectively, and in the final third session, they were guided to think about oil reserves to production ratio, and the regenerative capacity of forests in the real world. Overall, the game was favorably received by the elementary and junior high school students, which indicates that the workshop was successful.

Summary

Thanks to the cooperation of many people, we could successfully implement various programs. We hope this project has helped participants increase their awareness of the importance of reducing environmental impacts and prompted them to take action themselves. Learning from this experience, we will continue our ongoing efforts to organize more attractive programs in the future.

contribute to peaceful coexistence across the global community

Kyoto University

To reduce energy and greenhouse gases discharged from facilities of Kyoto University

Kyoto University Environmental Tax System

Before introducing the Environmental Tax System, CO_2 emissions from Kyoto University had jumped approximately 93% since 1990, and were expected to increase from the maintenance of Katsura Campus and from the wards and facilities of Kyoto University Hospital, forcing the university to take countermeasures. Accordingly, Kyoto University formulated the "Kyoto University Environmental Tax System Policy" in January 2008 and commenced the Environment Tax System in FY2008 to save energy and reduce greenhouse gases.

For the purpose of preventing global warming, this policy aims to achieve a 2% total annual reduction of energy consumption and CO_2 emissions in the consumption rate, 1% by hardware renovations and 1% by environmental conservation-oriented activities in research laboratories, etc. each year, through the cooperation of all members of the university. The Environmental Tax System was not established to collect taxes but rather to create incentives for energy saving as well as financial resources for reinvestment in improvement programs for ensuring energy saving.

- Reduction target set by Kyoto University

A total reduction of 2% in both energy consumption and CO_2 emissions in the consumption rate per unit area from the level of the preceding year, 1% by hardware-related countermeasures and 1% by software-related countermeasures

- Law Concerning the Rational Use of Energy

A reduction of 1% in energy consumption in the consumption rate per unit area from the level of the preceding year

- Kyoto Prefecture/Kyoto City Global Warming Countermeasures Ordinance

An annual average reduction of 3% in total CO_2 emissions in the planned period of three years

Basic policies

The Environmental Tax System, which began in FY2008, promoted energy-saving countermeasures in two separate terms: Term I from FY2008 to FY2012 and Term II from FY2013 to FY2015, based on the respective basic policies described below.

- Term I (Period: 5 years, from FY2008 to FY2012)

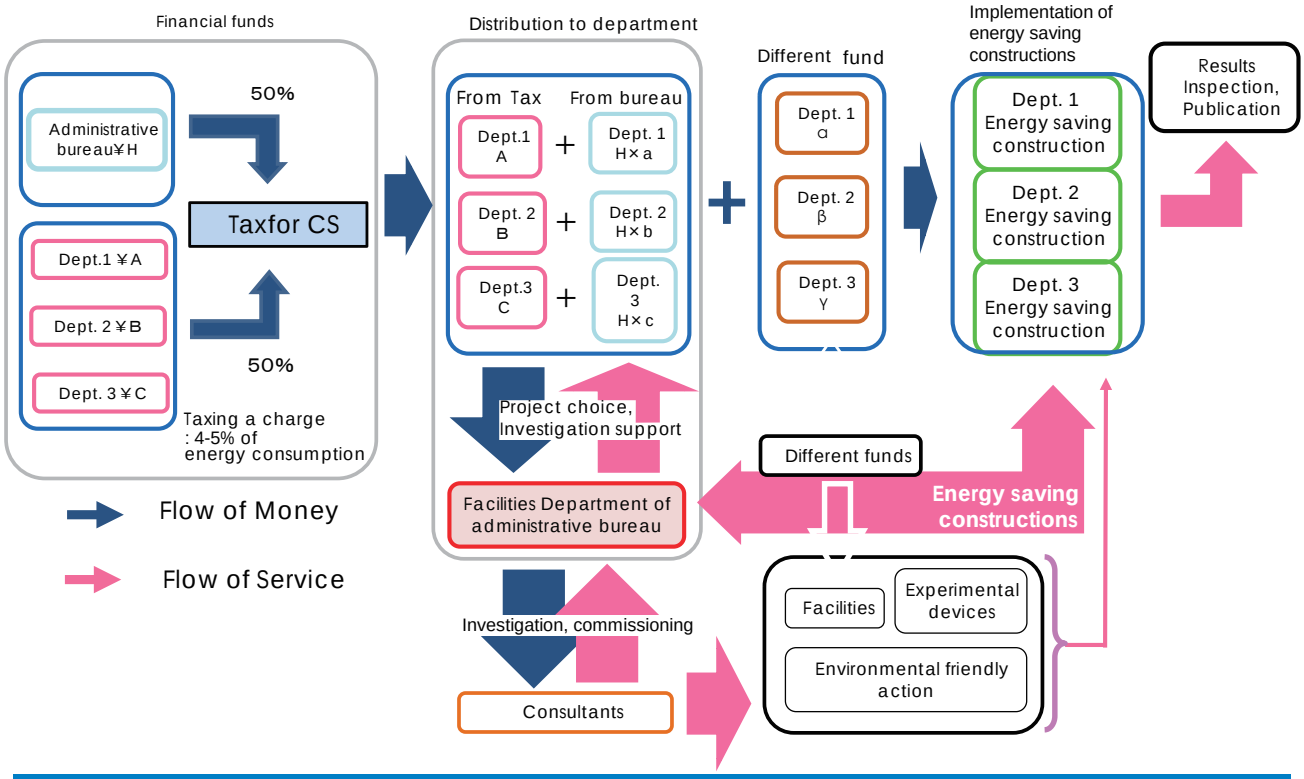
Implementation of countermeasures considering fair benefits to individual divisions.

- Term II (Period: 3 years, from FY2013 to FY2015)

Preferential implementation and budgeting for highly cost-effective programs, to increase the efficiency of reducing primary energy consumption and CO_2 emissions.

Collecting and returning

The Environmental Tax System collects the environmental taxes from the respective divisions in proportion to their energy consumption (4–5%), and an annual budget of approximately 240 million yen, half borne by the divisions and half borne by the expenses of the entire university, is spent on energy-saving countermeasures for hardware. (See the table below.)For the divisions, energy-saving countermeasures requiring higher cost than the amount of the taxes collected from them are performed, and budgets are principally allocated to programs with a particularly high energy-saving effect to promote the countermeasures.



Effects of Environmental Tax System

The table below shows the reduction of energy consumption and CO_2 emissions achieved by the program each year based on the Environmental Tax System, and the number of units of major equipment renewed. The primary energy reduction in the years when the program was performed totaled 214,226 GJ/year by simple calculation, equivalent to approximately 9% of the total 2,393,114 GJ/year consumed by the entire university in FY2008 before the commencement of the Environmental Tax System. In addition, the hardware-related countermeasures successfully reduced the primary energy consumption and CO_2 emissions by 1% in the consumption rate, which was the target of the university.

Item	FY of implementation of program							Total
	2008	2009	2010	2011	2012	2013	2014	
Reduction of primary energy consumption (GJ/year)	23,654	27,795	25,791	51,921	35,473	26,839	22,753	214,226
Reduction of CO_2 emissions (**t**-CO_2/year)	1,129	1,518	1,349	3,023	1,625	1,374	1,118	11,136
Reduced heating and lighting expenses (1,000 yen/year)	30,750	36,133	33,528	67,497	46,114	34,890	29,578	278,490

Past renewals (from FY2008 to FY2014)

Item	Number of units	Unit
Renewal to LED lights	25,133	Unit
Renewal to LED outdoor lights	117	Unit
Installation of light/human body sensors	373	Unit
Installation of photovoltaic power generation equipment	46	kW
Renewal to high-efficiency transformers	7,425	kVA
Renewal to high-efficiency air conditioners	375	Unit
Renewal to high-efficiency central heat source air conditioners (including replacement of central heat source systems with individual air conditioning systems)	183	Unit
Air conditioning controllers, CO_2 ventilation controllers	813	System
Installation of pump and fan inverter controllers	26	Unit
Renewal to high-efficiency compact type through-flow boilers	7	Unit
Installation of heat exchangers for outdoor unit sprinkler systems and external mounting outdoor units	21	Unit
Replacement of fan belts with energy-saving fan belts	166	Unit
Installation of water saving devices and sound effect devices	61	Unit
Installation of screen doors and heat shielding films	464	Unit
Installation of circulators	25	Unit
Renewal to high-efficiency hot water suppliers	3	Unit

Examples of energy-saving countermeasures

① Renewal of steam absorption type cold/hot water suppliers and steam heat exchangers to high-efficiency HP chillers

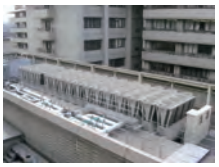
・Implemented Program: ESCO program on Kyoto University Yoshida Campus in FY2011

・Building: Central Clinical Facilities

Reduction of primary energy	Approx. 29,000 GJ/year
Reduction of CO_2 emissions	Approx. 1,800 t-CO_2/year
Heating and lighting expenses	Approx. 42 million yen/year

Steam absorption type cold/hot water supplier 400RT×2unit

Renewed



Air-cooled HP chiller 150kW×15unit

Exhaust heat recovery type HP chiller 42kW×1unit

② Renewal of flue fire tube boiler to high-efficiency compact type through-flow boilers

・Implemented Program: ESCO program on Kyoto University Yoshida Campus in FY2012

・Building: Service Supply Department Building

Reduction of primary energy	Approx. 16,000 GJ/year
Reduction of CO_2 emissions	Approx. 800 t-CO_2/year
Heating and lighting expenses	Approx. 27 million yen/year

Flue fire tube boiler 10t/h×1unit

Renewed

Compact type through-flow boiler 2.5t/h×4unit

③ Renewal of GHP to high-efficiency EHP

・Implemented Program: ESCO program on Kyoto University Yoshida Campus in FY2012

・Building: Graduate School of Agriculture/Graduate School of Biostudies, etc.

*This renewal was also implemented and yielded successful results in other fiscal years.

Reduction of primary energy	Approx. 510 GJ/ year
Reduction of CO_2 emissions	Approx. 40 t -CO_2/year
Heating and lighting expenses	Approx.1.2 million yen/year

GHP

Renewed

EHP

④ Renewal of fluorescent lights to LED lights

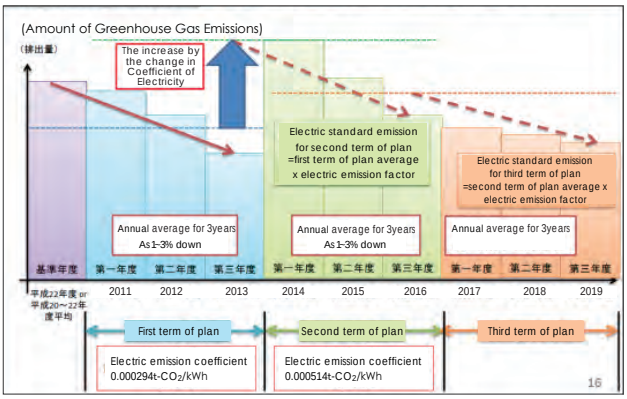
・Implemented Program: ESCO program on Kyoto University Yoshida Campus in FY2013

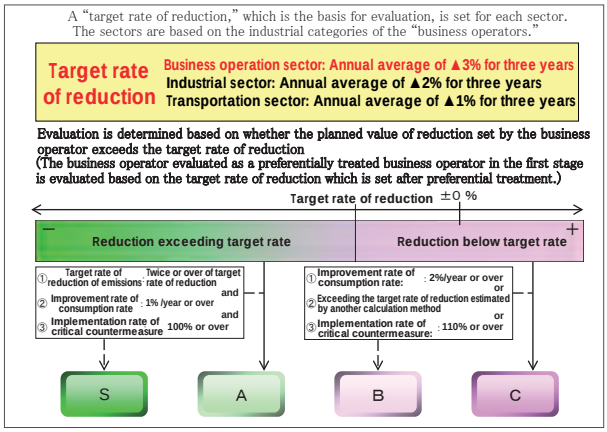
・Building: Graduate School of Agriculture/Graduate School of Biostudies, etc.

Reduction of primary energy	Approx. 10,000 GJ/year
Reduction of CO_2 emissions	Approx. 490 t-CO_2/year
Heating and lighting expenses	Approx. 13 million yen/year

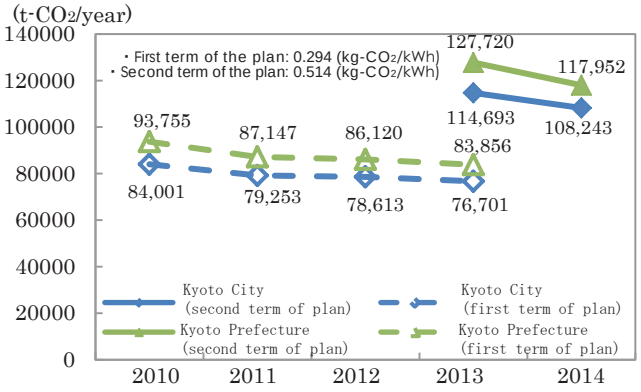
Achievements of the reduction targets

Kyoto Prefecture and Kyoto City introduced a business operator emissions reduction plan system as a result of the revision of their respective ordinances. For business operators discharging more than the specified amount of greenhouse gases, the first term of the plan was set for the three years from FY2011 to FY2013 (the system is currently in the second term from FY2014 to FY2016) for achieving the target of reducing the total amount of greenhouse gases by more than 3% on average for three years, with their achievements as well as their efforts to reduce greenhouse gas emissions in each term assessed by a comprehensive evaluation.





Awards ceremony for excellent business operator in terms of emissions.



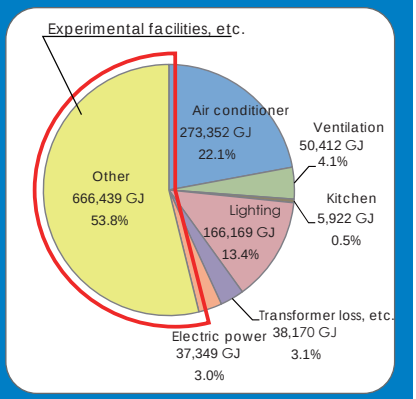
*The reason why greenhouse gas emissions are greatly different between the FY2010-FY2013 term and the FY2013-FY2014 term is due to the different electric emission factor fixed for each term.

In the first term of the plan, Kyoto University achieved a 8.6% reduction of greenhouse gases on average in Kyoto Prefecture and a 6.9% reduction on average in Kyoto City for the three years, and was rated as S, the highest evaluation rank, in the comprehensive evaluation and was designated by both Kyoto Prefecture and Kyoto City as an excellent business operator in terms of emissions.

Summary

Future plan

Kyoto University has preferentially renewed existing equipment and units to those offering high cost effectiveness, such as central heat source equipment. However, it connot be said that Kyoto University is committed to in-depth studies and countermeasures for energy saving of the experiment equipment and facilities, which consume approximately 55% of the energy of the entire university. Kyoto University is therefore planning to reduce energy consumption and CO_2 emissions through countermeasures to reduce the energy consumed by experimental equipment and facilities but without affecting education, research, and medical care, in addition to continuing to switch to LED lights and improve the efficiency of air conditioners.



※Percentage of energy consumption by application on entire Yoshida Campus (cited from the FY2011 energy saving master plan of Kyoto University Yoshida Campus)

contribute to peaceful coexistence across the global community

Kyoto University

Acquisition of LEED certification

International Science Innovation Building of Kyoto University

The International Science Innovation Building of Kyoto University was constructed on the main campus at the end of 2014 with the aim of supporting collaboration between industry, government, and academia. Five stories above ground and a basement provide a total floor area of 11,112 m^2 to accommodate many rental offices and laboratories where company and government personnel are committed to activities for the creation of innovation. On the occasion of the construction of this facility for harmonizing activities inside the university with those in the outside world, Kyoto University endeavored to acquire LEED certification as a new objective for environmental considerations. As a result, Kyoto University was the first national university to acquire "Gold" certification.

Photo 1 Appearance of the International Science Innovation Building

First national university of Japan to acquire LEED certification

LEED, which stands for "Leadership in Energy and Environmental Design," is the environmental performance assessment system for buildings developed and managed by the U.S. Green Building Council (USGBC). As of 2015, LEED-certified buildings have been registered in more than 150 countries in the world, and approximately one-third of the buildings, or 45% of the floor area, have been registered outside the U.S., which means that LEED is the de facto global standard in environmental design rating. In Japan, the cumulative number of registered LEED-certified buildings is on the increase: from 15 in 2011 to 31 in 2012, 44 in 2013, and 58 in 2014, and this assessment system is steadily becoming more popular inside Japan. In the U.S., many of the highly rated universities acquire this certification when constructing new distinctive buildings. Among Japanese universities, only the Okinawa Institute of Science and Technology Graduate School has this certification, and the International Science Innovation Building of Kyoto University is the first national university of Japan to receive it.

Differences between LEED of the U.S. and CASBEE of Japan

Although both LEED and CASBEE* are environmental performance assessment systems for buildings and there are some similarities between them, they differ in the following aspects

1)Assessment covering the construction stage
CASBEE roughly judges the assessment results in the design stage for execution, but LEED includes even the construction stage in its assessment.

2)Difference in the emphasis of assessment because of the characteristics of the country or region
The emphasis of assessment on water conservation is different between CASBEE of Japan that has relatively abundant water resources and LEED of the U.S. for which water is an important resource.

3)Assessment of site selection
In LEED, approximately 10% of all rating items are determined by site selection, such as the utilization of existing public transportation systems and a plan using developed sites.

4)Rejection of certification
CASBEE makes some assessment on all registered buildings, whereas LEED certification is not issued for buildings with a score lower than 40 points. In addition, LEED includes some required items in the assessment category, and buildings that fail to meet even one of the requirements cannot receive LEED certification.

*CASBEE (Comprehensive Assessment System for Built Environment Efficiency): The system for comprehensively assessing the quality of buildings in Japan, including not only environmental considerations, such as energy saving and the use of materials and equipment with a less environmental burden, but also design considerations, such as the level of comfort indoors and the landscaping.

Types of LEED assessments

There are seven certification systems in LEED, which are applied depending on purpose of the buildings. The International Science Innovation Building was registered as “New Construction,” which is assessed from the design of a new building to its construction and completion.

Figure1 LEED assessment categories

Figure 2 Assessment levels of LEED

LEED sets four assessment levels: “Platinum” for a building receiving a score of 80 or more points, “Gold” for a score of 60 to 79 points, “Silver” for a score of 50 to 59 points, and “Certified” for a score of 40 to 49 points.
The environmental performance of buildings is rated based on these assessment levels.

Assessment category of “New Construction”

Seven categories are set for assessing environmental performance in “New Construction” (Table 1).
Each category has “required items” and “optional items,” and certification is not possible for buildings that fail to meet the requirements. In addition, points are added by selecting the optional items.

【Sustainable Sites】サステイナブルな敷地利用
 credits encourage strategies that minimize the impact on neighbor ecosystems, environment, etc.
【Water Efficiency】節水
 credits promote smarter use of water, inside and out, to reduce potable water consumption.
【Energy & Atmosphere】エネルギーと大気
 credits promote better building energy performance through innovative strategies.
【Materials & Resources】材料と資源
 credits encourage to use sustainable building materials and to reduce waste.
【Indoor Environmental Quality】屋内環境のクオリティ
 credits promote better indoor air quality and access to daylight and views.
【Innovation】革新性
 credits address sustainable building expertise and design measures not covered under the five LEED credit categories.
【Regional Priority】地域別優先項目
 address regional environmental priorities about buildings different geographic regions.

Table 1　LEED assessment categories in “New Construction”

Scorecard (rating points)

The International Science Innovation Building obtained high points in such categories as “Sustainable Sites,” “Water Efficiency,” and “Energy and Atmosphere” as a result of active efforts, including the introduction of wastewater utilization equipment, the adoption of water conservation units, and the improvement of the thermal insulation performance of outer surface materials (Table 2).

1000036505, Kyoto, Kyoto-fu

KYOTO UNIVERSITY CENTER OF INNOVATION

LEED BD+C: New Construction (v2009) — **GOLD, AWARDED JUL 2015**

SUSTAINABLE SITES		AWARDED: 19 / 26
SSc1	Site selection	1 / 1
SSc2	Development density and community connectivity	5 / 5
SSc3	Brownfield redevelopment	1 / 1
SSc4.1	Alternative transportation - public transportation access	6 / 6
SSc4.2	Alternative transportation - bicycle storage and changing rooms	1 / 1
SSc4.3	Alternative transportation - low-emitting and fuel-efficient vehicles	3 / 3
SSc4.4	Alternative transportation - parking capacity	2 / 2
SSc5.1	Site development - protect or restore habitat	0 / 1
SSc5.2	Site development - maximize open space	0 / 1
SSc6.1	Stormwater design - quantity control	0 / 1
SSc6.2	Stormwater design - quality control	0 / 1
SSc7.1	Heat island effect - nonroof	0 / 1
SSc7.2	Heat island effect - roof	0 / 1
SSc8	Light pollution reduction	0 / 1

WATER EFFICIENCY		AWARDED: 10 / 10
WEc1	Water efficient landscaping	4 / 4
WEc2	Innovative wastewater technologies	2 / 2
WEc3	Water use reduction	4 / 4

ENERGY & ATMOSPHERE		AWARDED: 11 / 35
EAc1	Optimize energy performance	10 / 19
EAc2	On-site renewable energy	1 / 7
EAc3	Enhanced commissioning	0 / 2
EAc4	Enhanced refrigerant Mgmt	0 / 2
EAc5	Measurement and verification	0 / 3
EAc6	Green power	0 / 2

MATERIAL & RESOURCES		AWARDED: 5 / 14
MRc1.1	Building reuse - maintain existing walls, floors and roof	0 / 3
MRc1.2	Building reuse - maintain interior nonstructural elements	0 / 1
MRc2	Construction waste Mgmt	2 / 2
MRc3	Materials reuse	0 / 2
MRc4	Recycled content	1 / 2
MRc5	Regional materials	2 / 2

MATERIAL & RESOURCES		CONTINUED
MRc6	Rapidly renewable materials	0 / 1
MRc7	Certified wood	0 / 1

INDOOR ENVIRONMENTAL QUALITY		AWARDED: 7 / 15
EQc1	Outdoor air delivery monitoring	0 / 1
EQc2	Increased ventilation	1 / 1
EQc3.1	Construction IAQ Mgmt plan - during construction	1 / 1
EQc3.2	Construction IAQ Mgmt plan - before occupancy	1 / 1
EQc4.1	Low-emitting materials - adhesives and sealants	1 / 1
EQc4.2	Low-emitting materials - paints and coatings	1 / 1
EQc4.3	Low-emitting materials - flooring systems	0 / 1
EQc4.4	Low-emitting materials - composite wood and agrifiber products	0 / 1
EQc5	Indoor chemical and pollutant source control	0 / 1
EQc6.1	Controllability of systems - lighting	0 / 1
EQc6.2	Controllability of systems - thermal comfort	0 / 1
EQc7.1	Thermal comfort - design	1 / 1
EQc7.2	Thermal comfort - verification	1 / 1
EQc8.1	Daylight and views - daylight	0 / 1
EQc8.2	Daylight and views - views	0 / 1

INNOVATION		AWARDED: 5 / 6
IDc1	Innovation in design	4 / 5
IDc2	LEED Accredited Professional	1 / 1

REGIONAL PRIORITY		AWARDED: 4 / 4
EAc1	Optimize energy performance	1 / 1
EAc5	Measurement and verification	0 / 1
WEc1	Water efficient landscaping	1 / 1
WEc2	Innovative wastewater technologies	1 / 1
WEc3	Water use reduction	1 / 1

TOTAL	61 / 110

40-49 Points	50-59 Points	60-79 Points	80+ Points
CERTIFIED	SILVER	GOLD	PLATINUM

Table 2 Scorecard of the International Science Innovation System

Photo 2 Photovoltaic panels on the roof

Photo 3 Wastewater utilization system

(Figures 1 and 2 and Table 1 are reprinted from the website of Woonerf Inc. by courtesy of the company.)

Summary

In the process of receiving LEED certification, we found that some assessment items were not suitable for the environment of Japan, due to differences in the way of thinking about the environment. We studied how to gain points while conforming to the characteristics of the LEED assessment method. Kyoto University sees the acquisition of LEED certification as an opportunity to promote further measures for environmental protection.

Kyoto University CO-OP

Kyoto University CO-OP has long contributed to the building of an "eco-campus" based on the Kyoto University Environmental Charter by encouraging CO-OP members to reduce the use of plastic shopping bags and to recycle meal containers. As part of our efforts to reduce the environmental load of Kyoto University CO-OP as a whole, we obtained the KES Step 2 certificate in 2009 and have maintained it ever since. In March 2014, we became a member of the Campus Sustainability Network in Japan organized by Kyoto University and other institutions

Steady resource saving through facility renovation

Kyoto University renovated three CO-OP cafeterias from 2011 to 2014. With newly-installed equipment using less water and energy, these facilities were able to successfully reduce water and energy consumption. The use of water in particular has decreased significantly.
With new equipment such as LED lighting, the new facilities use less electricity and gas as well. The renovations truly achieved facilities with less environmental load.

Further promotion of the recycling of meal containers is necessary

We have long promoted the recycling of meal containers, but we still need to continue our efforts.
The average recycling rate was not particularly high in 2014, at only 34.7%. Some shops such as Clock Tower CO-OP Shop and Hokubu Shop surpassed 40%, but no shops surpassed 50%.
Since the recycling rate is declining, albeit slightly, we need to further promote the recycling of meal containers on various occasions.

Table 1: Meal containers recycling rate

Shop	Amount	Recycling rate
Clock Tower CO-OP	11,506	40.0%
Yoshida Shop	4,413	31.1%
Yoshida Cafeteria	5,251	70.2%
Hokubu Shop	7,780	44.2%
Nanbu Shop	3,462	26.5%
Katsura Shop	8,294	36.2%
Others	4,707	17.6%
Total	45,413	34.7%

Challenge to build a sustainable campus

In the "Ecorld Kyodai Early Summer 2015 Campaign," we actively participated in various activities to offer new perspectives. We opened the Open Lab event at Shop Renais, and the Sustainable Night (beer garden) event at Camphora. Many more people visited the Sustainable Night event than last year.

As part of our challenge, we offered at our cafeterias bowls of rice mixed with "ancient rice" grown in the Ueyama area of Tango Town, Kyotango City, in cooperation with a seminar of the Graduate School of Agriculture. We donated 3 yen per bowl of the rice to the Ueyama Fund, which was used to protect farmlands in the area from wild animals.

Kyoto University CO-OP will continue our challenge to achieve sustainability by taking appropriate measures to comply with the Food Recycling Law, and promoting the consumption of locally-grown foods and fair trade.

Summary

Renovation of University Co-op facility is a chance of saving resources
It will participate in the realization of a sustainable campus. With University Co-op members , university , community.Realization of sustainable campus .
It is a challenge related to the raison d'etre of the University Co-op

A Multifaceted Approach for "Japan's Leading Eco-School"

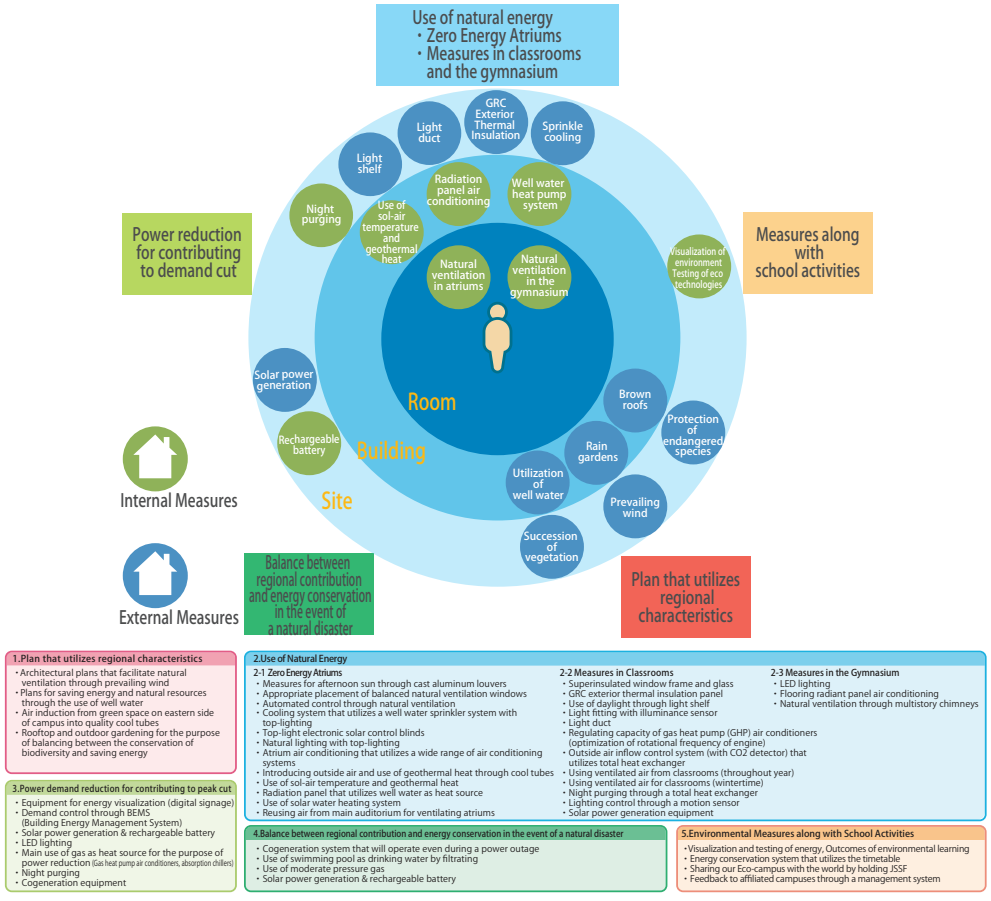
Ritsumeikan Junior and Senior High School Nagaokakyo Campus

Ritsumeikan Junior and Senior High School has adopted the 4-4-4 integrated education system, which divides the 12 years of elementary and secondary education into three spans of four years. Roughly 2,000 students- those in the upper grades of elementary school as well as those in junior high school and high school- study at our campus. Our school is characterized by a system of integrated education implemented through international cooperation as well as high school-university cooperation that takes full advantage of our school's strengths as an attached school to Ritsumeikan University.

To promote our project, we have mapped out a course of action to make active efforts to reduce CO2 emissions in an aim to realize "Japan's Leading Eco-School." For the plan, our school has implemented measures to realize a new eco-school- one that combines architectural technology with facility engineering in an aim to reduce CO2 emissions. Our measures are based on five pillars: "Plan that utilizes regional characteristics," "Use of natural energy," "Power reduction for contributing to demand cut," "Balance between regional contribution and energy conservation in the Event of a natural disaster," and "Environmental measures along with school activities."

Our program was chosen as "Leading Project for the Reduction of CO2 Emissions from Residential Buildings and other Large Buildings"(FY 2012) by the Ministry of Land, Infrastructure, Transport and Tourism.

Five Pillars for Realizing "Regenerative Campus" and our Measures



1.Plan that utilizes regional characteristics
- Architectural plans that facilitate natural ventilation through prevailing wind
- Plans for saving energy and natural resources through the use of well water
- Air induction from green space on eastern side of campus into quality cool tubes
- Rooftop and outdoor gardening for the purpose of balancing between the conservation of biodiversity and saving energy

3.Power demand reduction for contributing to peak cut
- Equipment for energy visualization (digital signage)
- Demand control through BEMS (Building Energy Management System)
- Solar power generation & rechargeable battery
- LED lighting
- Main use of gas as heat source for the purpose of power reduction (Gas heat pump air conditioners, absorption chillers)
- Night purging
- Cogeneration equipment

2.Use of Natural Energy

2-1 Zero Energy Atriums
- Measures for afternoon sun through cast aluminum louvers
- Appropriate placement of balanced natural ventilation windows
- Automated control through natural ventilation
- Cooling system that utilizes a well water sprinkler system with top-lighting
- Top-light electronic solar control blinds
- Natural lighting with top-lighting
- Atrium air conditioning that utilizes a wide range of air conditioning systems
- Introducing outside air and use of geothermal heat through cool tubes
- Use of sol-air temperature and geothermal heat
- Radiation panel that utilizes well water as heat source
- Use of solar water heating system
- Reusing air from main auditorium for ventilating atriums

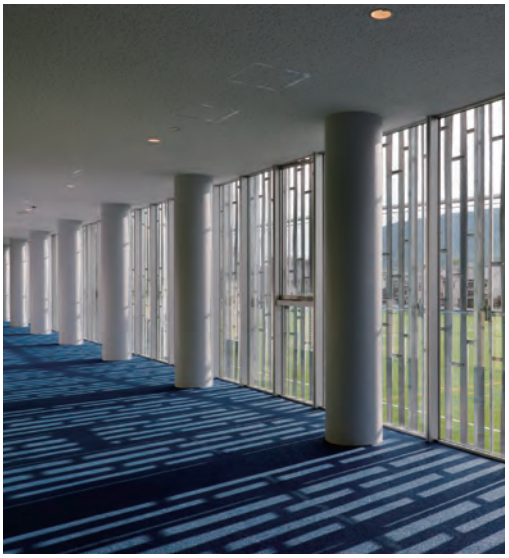
2-2 Measures in Classrooms
- Superinsulated window frame and glass
- GRC exterior thermal insulation panel
- Use of daylight through light shelf
- Light fitting with illuminance sensor
- Light duct
- Regulating capacity of gas heat pump (GHP) air conditioners (optimization of rotational frequency of engine)
- Outside air inflow control system (with CO2 detector) that utilizes total heat exchanger
- Using ventilated air from classrooms (throughout year)
- Using ventilated air for classrooms (wintertime)
- Night purging through a total heat exchanger
- Lighting control through a motion sensor
- Solar power generation equipment

2-3 Measures in the Gymnasium
- LED lighting
- Flooring radiant panel air conditioning
- Natural ventilation through multistory chimneys

4.Balance between regional contribution and energy conservation in the event of a natural disaster
- Cogeneration system that will operate even during a power outage
- Use of swimming pool as drinking water by filtrating
- Use of moderate pressure gas
- Solar power generation & rechargeable battery

5.Environmental Measures along with School Activities
- Visualization and testing of energy, Outcomes of environmental learning
- Energy conservation system that utilizes the timetable
- Sharing our Eco-campus with the world by holding JSSF
- Feedback to affiliated campuses through a management system

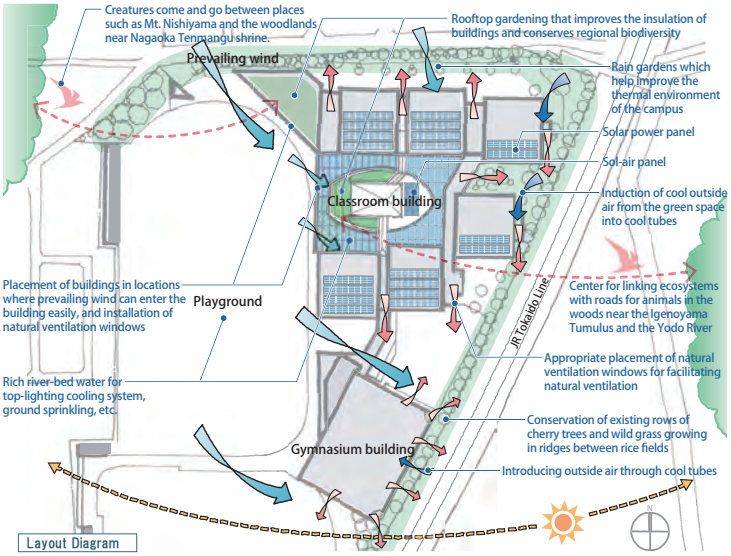
RITSUMEIKAN

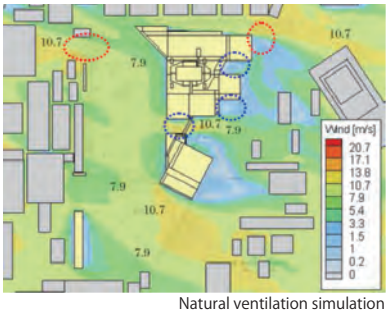


1.Plan that Utilizes Regional Characteristics

- We utilize natural energy. For instance, we place buildings in locations where prevailing wind can enter the building easily, natural ventilation windows, and well water for cooling systems inside buildings as well as a heat source.
- By creating rooftop gardens, we strive to conserve biodiversity as well as reduce the thermal load.

Our campus situated in an environment with a rich ecosystem





Natural ventilation simulation

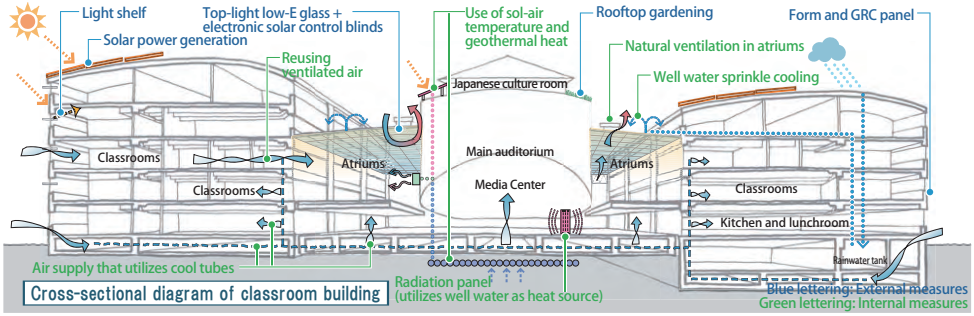
Balanced natural ventilation windows

Rooftop gardening, in which flora growing on campus were transplanted onto the roof

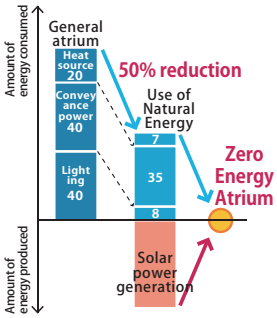
2.Use of Natural Energy

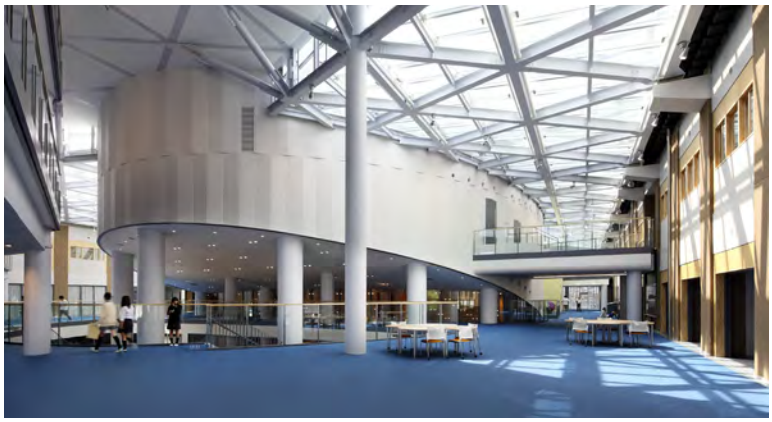
① Zero Energy Atriums

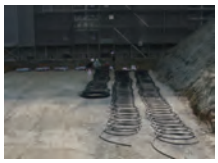
The atrium area, which is located in the center of our campus, serves as the symbol of our eco-school.
By utilizing the form of natural energy that is appropriate for each season as well as combining different architectural eco methods, we will aim to achieve an annual energy consumption total of zero in the atriums.



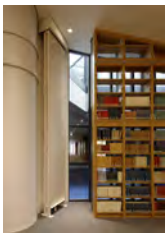
Cross-sectional diagram of classroom building







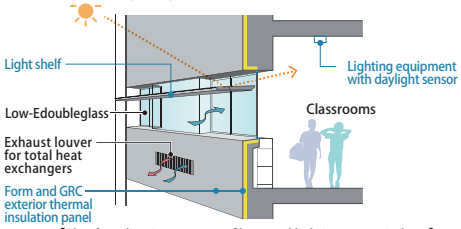
Sol-air panel and geothermal heat coil



Radiation panel al air conditioning

②Measures in Classrooms

- We have strived to conserve energy by adopting technologies which are suitable for the surrounding environment, such as utilization of daylight and super-insulated exteriors.
- We have installed reusing ventilated air in the atriums and class-rooms to help improve the thermal and air conditions of each.



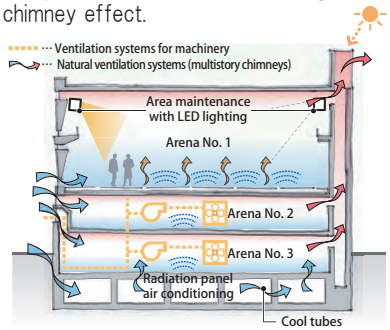
【Plan for adjusting amount of heat and lighting near windows】

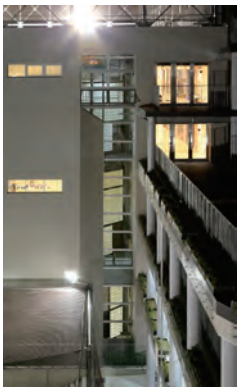

Area near windows of classrooms


Inside of classroom

③Measures in the Gymnasium

We have adopted methods which are appropriate for large spaces, such as a spot cooling system (which operates only in areas where there are people) inside the arenas, natural ventilation covering multiple floors that takes advantage of the chimney effect.



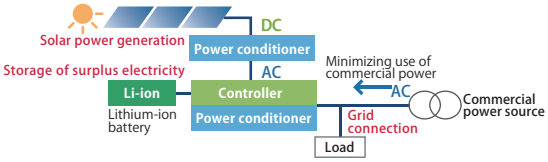



Natural ventilation shaft

Ritsumeikan Junior and Senior High School Nagaokakyo Campus

3.Power demand reduction for contributing to peak cut

- In adopting energy-saving technology, we strive to conserve energy at all times.
- We will reduce our power demand by producing energy through solar power and cogeneration, and storing energy through rechargeable batteries.

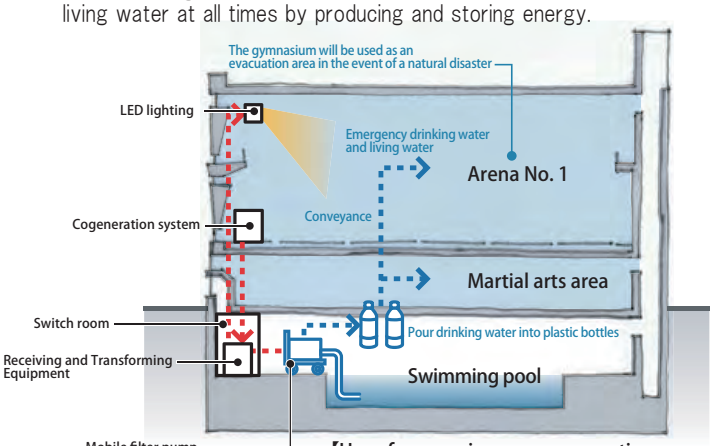


【Process of solar power use】


Solar power panel

4.Balance between regional contribution and energy conservation in the event of a natural disaster

- We plan to leave the gymnasium open as an evacuation area in the event of a natural disaster.
- We are aiming to make contributions to the local community by securing electricity and living water at all times by producing and storing energy.



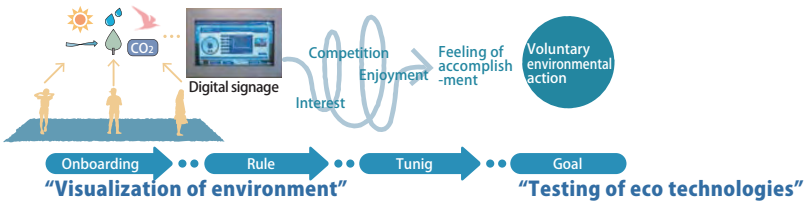
【Use of gymnasium as an evacuation area in the event of a natural disaster】


Arena No. 1


Swimming pool on first basement level

5.Environmental Measures along with School Activities

- Through visualization and testing of environment and eco technologies, we will make further reduction effect of CO2 emissions.
- We have implemented energy conservation measures that utilize the timetable by taking advantage of our school characteristics.




iPad available in each classroom

Conclusion

"Campus as a Textbook" and Sharing our Activities with the World

All our building can be thought of as a "textbook for environmental education" and we believe that our campus is based around environmental symbiosis, which is appropriate In addition to tangible measures, our school has played a leading role in sharing environmentally conscious measures with the world through activities such as JSSF (Japan Super Science Fair), an annual event in which high school students from around the world gather together.
We have also made contributions to developing human resources by experiencing the local natural environment; e.g., using bamboo, a local specialty product for the interior decor of our buildings.


Bamboo cutting with a local non-profit organization

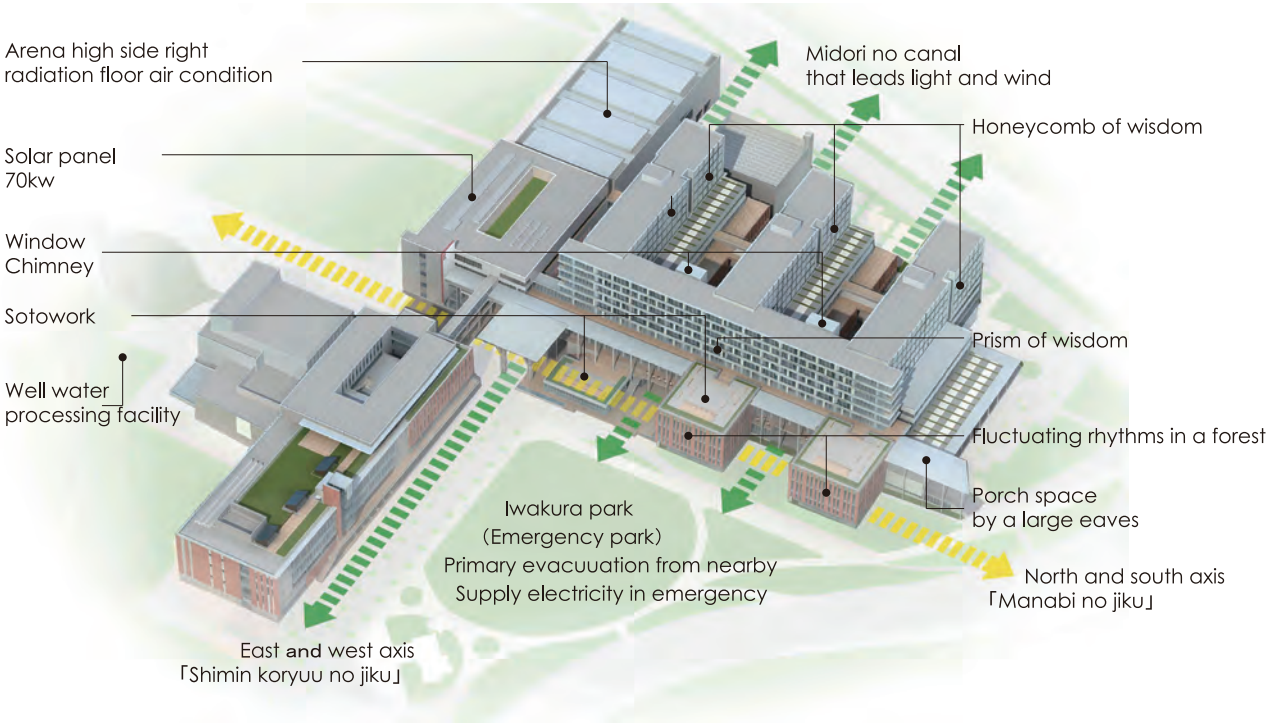

JSSF held

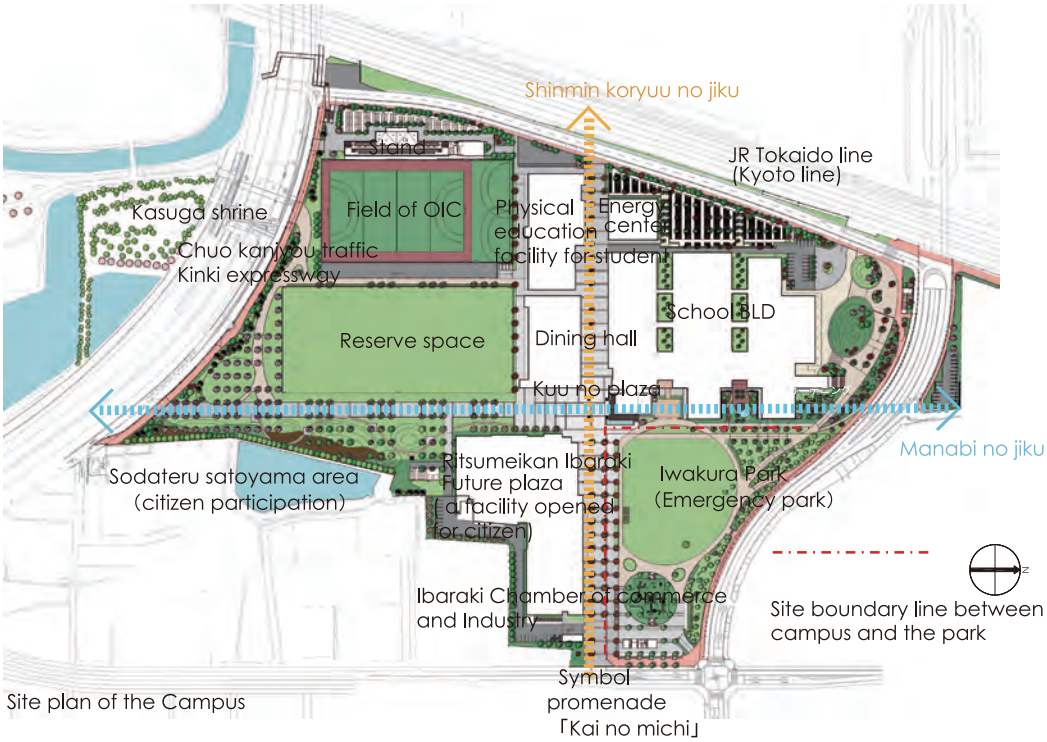
Sustainable Campus Award 2015-Year Prize (Department of Facility Steering)

A Campus Supporting Emergence of Eco-innovations and Seeking Connectedness with Local Community and Society;

Ritsumeikan University Osaka Ibaraki Campus

Opened in Spring 2015, the Osaka Ibaraki Campus is a new Ritsumeikan University facility catering for some 6,000 students plus faculty members of the university' s two colleges (undergraduate schools) and four postgraduate schools. The campus site hosts academic buildings, gymnasium, library, cafeteria and a 1,000-seat concert hall. In line with its three educational concepts -- Asia' s Gateway, Urban Co-creation and Regional Cooperation -- Ritsumeikan aims to develop Osaka Ibariki as a campus supporting emergence of eco-innovations in collaboration with the local community and society. The university is working to develop close links between the campus and the local community through such means as seeking integration with nearby facilities, including the adjacent disaster relief park and large commercial facilities in respect of environmental matters and disaster relief.





RITSUMEIKAN

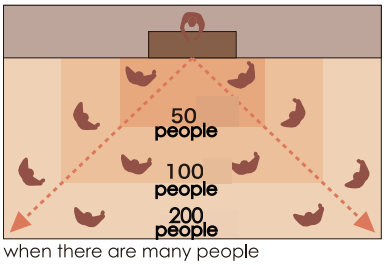
① A campus supporting eco-actions, stimulating interaction between facility users and the environment

Operation of equipment in the campus buildings is appropriately controlled taking account of user behavior. Moreover, as a further evolution of technology for "visualization" of environmental conditions, an effort is being made to develop a mechanism that naturally provokes "eco-actions" ; i.e., actions or physical behavior aimed at creating more comfortable environmental conditions (changing seating positions, using an outdoor space, opening/closing windows, etc.) in consideration of the particularities of given school facilities.

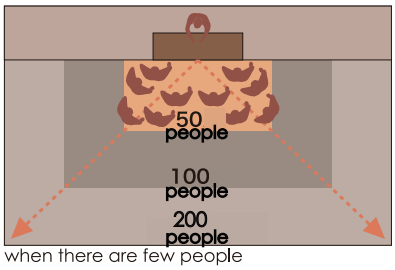
MOTTAINAI (anti-wastage) system

Lighting and air conditioning services are automatically optimized

Each large classroom is equipped with an ITV camera that captures an image of the current number of occupants. Analysis of the image triggers automatic control of lighting, air conditioning and ventilation to produce a more comfortable environment in the anterior part of the classroom. This both helps to create a more intimate spatial relationship between teachers and students during class and contributes to energy saving.



when there are many people



when there are few people

SOTOWORK

Promotes use of outdoor spaces by visualizing the level of comfort of the outdoor environment

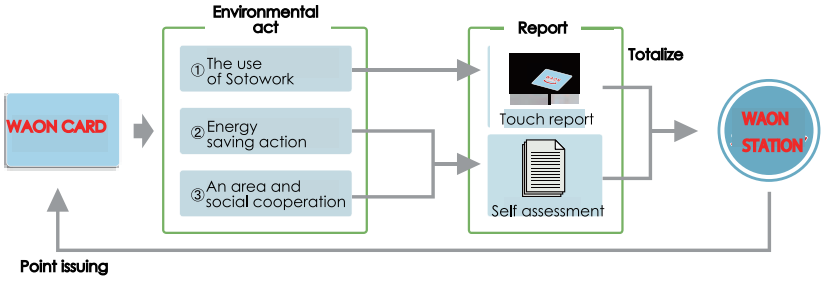
This system promotes the use of outdoor spaces by facility users (SOTOWORK = working outside) by numerically representing the level of comfort of the outdoor environment (in terms of weather, temperature, humidity, etc.). Working in a comfortable outdoor environment stimulates intellectual activity while contributing to reduction in energy consumption (by lighting, air conditioning, etc.) inside the buildings.

Display of Sotowork..It shows the comfort index from the number of 1 to 5.

Eco Action Points

Eco-friendly behavior is promoted through use of Eco Action Points

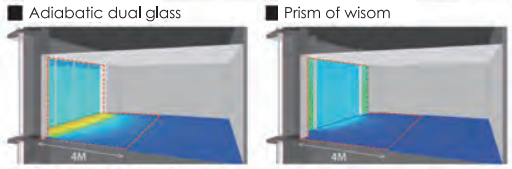
Eco-friendly behavior is rewarded by addition of points to a WAON card (electronic money system used throughout Japan). Thanks to collaboration with large commercial facilities neighboring the campus, not only eco-friendly behavior but also actions that contribute to society or to the regional community are promoted in the same manner.



② Highly versatile outer shell made of traditional construction material, contributing simultaneously to CO2 emissions reduction &seismic safety

Prism of wisdom
Innovations arise out of intermingling of wisdom

This refers to the eastern exterior wall structure facing the park. A perforated, earthquake-resistant wall is positioned inside glass panels. This structure offers visibility while regulating solar radiation. In winter, the wall works efficiently to help keep the indoor space warm. Through opening and closing of the multi-layered, heat-insulating sliding glass panels that sandwich the earthquake-resistant wall, the amount of solar radiation admitted is cut by about 17% compared to normal multi-layered, heat-insulated glass. This represents invention of a new mechanism that enables facility users to control the environment according to the season and/or the time of the day, or to the mood of the moment.

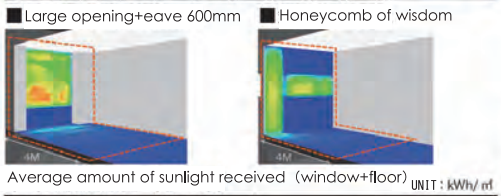


Average amount of sunlight received (window+floor) UNIT kWh/㎡

50.08kWh/㎡	41.36kWh/㎡
reduce by about 17%	

Honeycomb of wisdom
Accumulating the wisdom of researchers

This refers to the northern and southern exterior wall structures of the lecturers' offices. In consideration of the purposes of interior spaces, regulation of solar radiation and screening of views, the vertically high and horizontally long window shapes are optimally combined in a double-wall construction which provides additional heat-insulating and sound-proofing capabilities. The amount of solar radiation admitted is about 42% less than that with rectangular openings and short 600 mm eaves. This exterior wall structure represents fluctuation through its appearance, which changes from time to time depending on the viewing angle and the light direction.

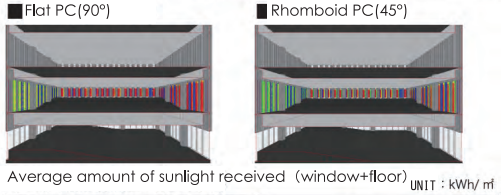


Average amount of sunlight received (window+floor) UNIT : kWh/㎡

4.6kWh/㎡	2.6kWh/㎡
reduce by about 42%	

Fluctuating rhythms in a forest
A place of learning where sunlight filters through trees

This refers to the north-eastern and southern exterior wall structures of the large lecture hall. Precast concrete blocks are assembled in a rhomboid configuration that changes with their orientation, minimizing direct solar radiation. As students face the podium, their field of vision is softly surrounded by natural indirect lighting, like sunlight filtering through trees, helping them to concentrate on the lesson. By using rhomboid precast concrete blocks instead of rectangular ones, the amount of solar radiation admitted was reduced by about 15%.



Average amount of sunlight received (window+floor) UNIT : kWh/㎡

5.4kWh/㎡	4.5kWh/㎡
reduce by about 15%	

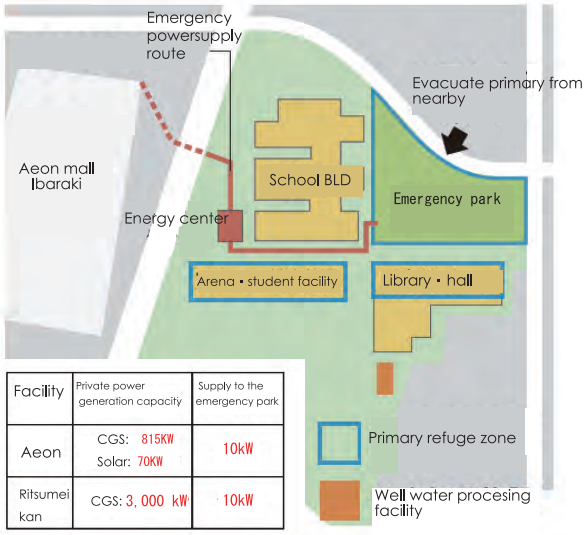
Ritsumeikan University Osaka Ibaraki Campus

③ Contributing to local community–building in environmental preservation and disaster prevention

Contributions to make a local community resistant to disaster

Energy exchange with nearby buildings

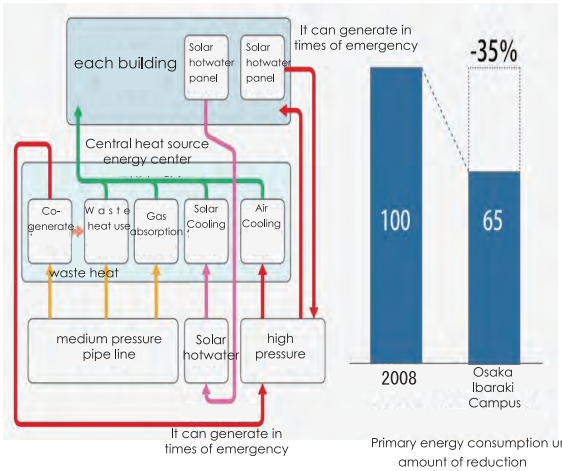
Through extending its network beyond the campus boundaries to existing adjacent large commercial facilities, Osaka Ibaraki Campus has helped to establish readiness to provide emergency power to the disaster relief park. The campus is prepared to host evacuees from nearby districts and allow them to use the gymnasium and cafeteria. Also available are an earthquake-resistant water reservoir tank, a warehouse storing provisions, toilet facilities for emergency use, well-water supply facilities, etc. Intelligently combining new facilities with existing ones, the campus is helping to enhance the disaster readiness of the whole community.



Facility	Private power generation capacity	Supply to the emergency park
Aeon	CGS: 815KW Solar: 70KW	10kW
Ritsumeikan	CGS: 3,000 kW	10kW

Energy optimization through interconnection of multiple buildings

The campus has an energy distribution center designed to achieve an optimal mix of heat and electricity (utilization of waste heat from power generation), solar cooling, renewable energy and an air-cooled chiller system. By optimizing energy demand and supply across multiple buildings and promoting "eco-actions" , the campus aims to attain a 35% reduction in energy consumption.



Building a new community

Collaboration with residents in development of the campus

As resident-collaboration projects, local people and students collaborate in landscaping projects within the campus site and participate in gardening activities and Ibaraki City' s satoyama restoration programs. In helping to establish a new kind of community without barriers between generations, the university is seeking to create, maintain and develop the campus with the participation of local residents.

Summary

By these environmental actions, regarding the school energy reduction aim of 25%,as a leading campus, our aim is to reduce the energy consumption by 34%,and to attain 1,458ton of CO2 emission reduction a year.

Ritsumeikan University global environment committee .By 2020 an annual energy consumption per 1㎡ compared with 2008

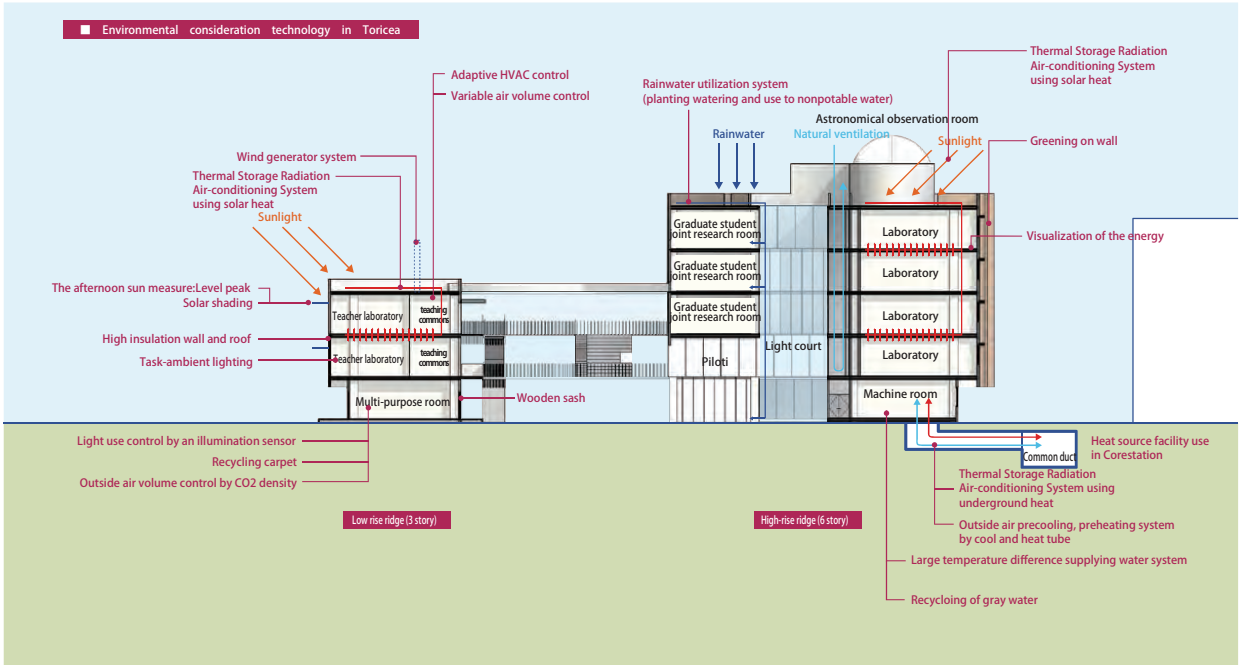
2013 Ministry of Land, Infrastructure and Transport houseguidance business adoption project saving the building CO2

Showroom, experiment space of environmental consideration technology, and place of environmental education practice

TRICEA, Biwako Kusatsu Campus, Ritsumeikan University

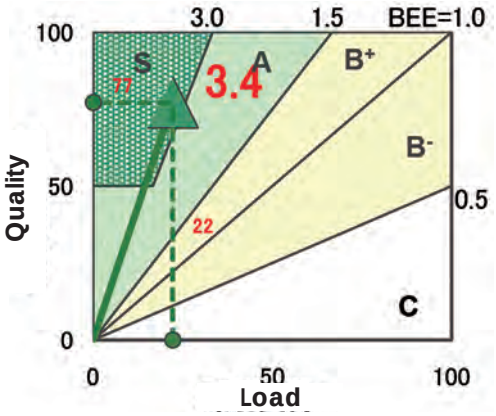
The approach is to receive the cooperation of the enterprise that has a variety of environmental consideration technologies, to introduce equipment and the construction material that conservation of energy, the negative environmental impact reduction technology or wants to experiment and proves aiming at practical use besides the technology that has already been established, and to verify the effect in an actual building. When executing it, Green Building Consortium is set up in the division of research. Information on study results is shared with the participating company and made public to the society widely.

Moreover, the facilities users (professors, students and visitors) experience, and evaluate the effect of the environmental consideration technology as a real experience.



Various environmental consideration technologies

Outside view



CASBEE result

Green Building Consortium

Participating companies and technologies

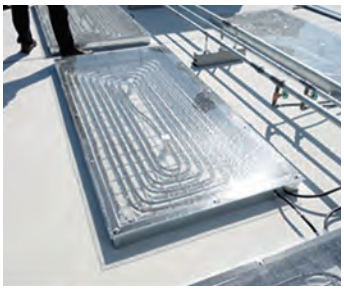
Island Profile Inc.	Wooden sash
Aleph Networks Corpolation	Air-conditioning control technology
IKUTA SANKIKOGYO Co.,Ltd.	Wind power generation
Isamu Paint Co., Ltd.	Deodorant paints
Win Gate Co., Ltd.	High insulation wall
OSAKA GAS Co., Ltd., Yasui Architects & Engineering, Inc.	Electric power independent GHP
OMI CERAMIC Co., Ltd., NOZAWA Corporation	Greening on wall
OTSUKA Corporation	Visualization of electric power
SINKO Industries Ltd.	Adaptive HVAC control
SUMINOE Co., Ltd.	Recycled carpet, Recycled deodorant carpet
SEKISUI AQUA SYSTEMS Co., Ltd.	Radiative Cooling and Heating, Micro hydro power generation
SEKISUI CHEMICAL Co., Ltd.	High insulation wall, Radiative cooling and heating
Tohata Architects & Engineers	Personal air - conditioning
TOHO-LEO Co.	Soil conditioner
TOLI Corporation	Wax unnecessary tile carpet
TOTO Ltd.	Hydrophilicity type toilet, Hydrotect type painting
Panasonic Corporation Eco Solutions Company	Light and HVAC control, LED lighting system
FUJI CLEAN Co., Ltd.	Recycling of gray water

Thermal Storage Radiation Air Conditioning System from the Concrete Slab that uses Underground Heat and Solar Heat Directly

Underground heat and the solar heat is introduced to indoor directly with only the pump, without heat pump. It lead to low cost and simple system.

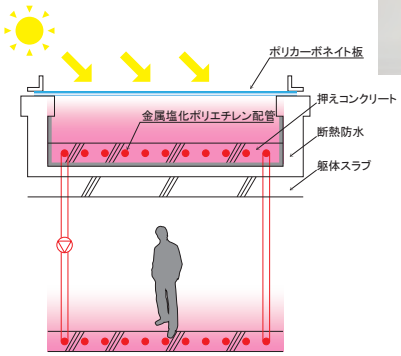
It applies to not only new building but also existing repair.

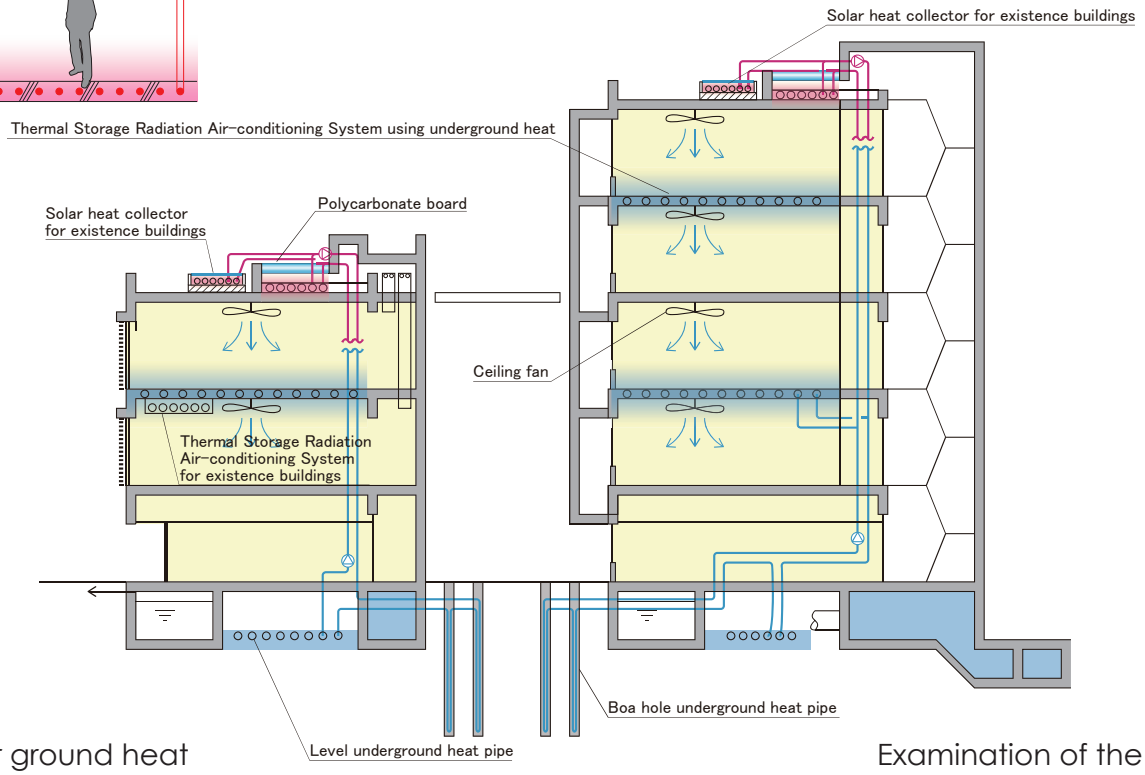
Solar heat collector in roof concrete slab



Heat radiation piping unit under the slab

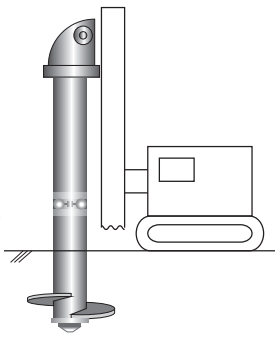
Solar heat collector on roof





Under ground heat collector with easy constraction

Stake borehole with wing that can repeatedly use



Examination of the best combinations of dehumidification methods

FCU air-conditioning, outer air processing air-conditioning unit, natural energy use decicant air-conditioning unit, and ceiling fan

Air-conditioning opening which can change the directive air supply and diffusive air supply

It is a personal air-conditioning system according to duty person's favor that can change freely at hand as for the directivity and the diffusive blow current of air.

The student of the cartoon society writes the cartoon, and the research is announced to public.

Cooling tile which uses traditional Shigaraki ware technology

This is a cooling tile on the outer wall. These tiles are made in Shigaraki. Sigaraki ware is very famous in pottery in Japan. These tiles are made by using traditional skills of Shigaraki ware.

If water is sprinkled by the vaporizer, water extends quickly. Therefore the thickness of the water film on the surface of the tile thins, and sprinkled water can evaporate easily. And then the surface temperature of the tile becomes low. The outside temperature around these tile becomes low. It will leads to calm the heat island phenomenon.

It also leads ivy to take root to the tile easily. If the ivy grow up and cover the wall, cooling loads will be decreased, and it will leads to energy saving.

Cartoon helps us understanding the function of this tile.

Environmental education at attached schools

Naruto University of Education

Naruto University of Education (NUE) announced the "Naruto University of Education Environmental Policy" in November 2010 and was certified and registered under the Eco Action 21 program in March 2012. NUE's attached schools were also certified and registered under this program in February 2013, and NUE subsequently launched various projects with the "development of environmentally aware human resources" as their primary goal, involving all its attached schools.

Eco-project: Reuse program promoted by the Family Education Support Committee of Hagukumi Parents Association

At the elementary school attached to NUE, parents, teachers and pupils have been working together to promote the reuse of school uniforms and other items for thirteen years.

This program asks parents to donate old school uniforms, sportswear, umbrellas, shoes and other items that no longer fit their children, and periodically sells the donated items to make effective use of them.

In this program, the principle of mottainai (recognizing the value of used things) has been practiced by both those who donate used items and those who purchase them for reuse, and such an attitude helps children increase their environmental awareness, and teaches them the importance of reducing waste and saving limited resources.

School education alone is not enough to instill an eco-conscious mindset in children, and the involvement of families and communities is essential. In this sense, programs like ours, carried out jointly by families and schools, will take on greater importance.

To ensure the success of eco-projects, we should continue to make small efforts day after day until eco-conscious behavior becomes a natural part of children's lives. At the same time, we should make children aware of the human hands that are behind everything they use to ensure that they handle their belongings with greater care and respect. With full awareness of the responsibility of the school, we are now considering what the committee can do to make the program more extensive.

鳴門教育大学

Used school items offered for reuse

Cleaning the school as part of an eco-project
Through our eco-project, various activities related to clothing, food and housing are done to deepen understanding of our daily lives, including cleaning the school grounds.

Creating a hands-on learning environment for children at Yu-yu-zai

The kindergarten attached to NUE implements its educational program centering on nurturing "desirable abilities" in its unique hands-on learning environment called Yu-yu-zai.

To develop an ability to learn from the wisdom of our ancestors, children are offered opportunities to do activities in a natural environment to recognize how interactions with nature can make our lives happier. They also learn about different aspects of Japanese life related to clothing, food and housing by engaging in various joint activities. Such hands-on experiences help children deepen their understanding that we are part of the natural world, that our ancestors endeavored to live in harmony with nature, and that nature is delicately balanced. In this way, our educational program instills an eco-conscious mindset in children – the future leaders of Japan.

Important lessons learned through growing corn

At the kindergarten, children grew corn from seeds and although they took very good care of it, a lot of the corn was eaten by crows before it was ready to be harvested. As the children discussed the implications of this incident, they were made aware of the fact that living things compete with each other for food, and some children expressed their dislike of crows, while others felt sorry for crows. When the children harvested the small amount of corn that escaped being damaged by the crows, however, all of them expressed their happiness saying, "We did it!" They also showed compassion for crows saying, "The crows left some of the corn for us," and "I am glad the hungry crows could eat the corn." In this way, children learn important lessons even from the ordinary experience of growing and harvesting crops.

We aim to create a welcoming environment where children can find things that interest them, develop feelings and make discoveries about their interests; become absorbed in playing and exploring the essence and appeal of such interests; and grow emotionally during the learning process. We named such an environment, Yu-yu-zai, which literally means "play, invitation, treasure." (Source: Yu-yu-zai No. 1)

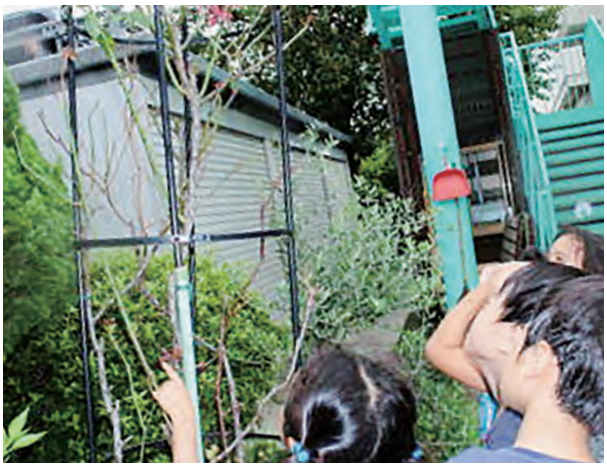
By "desirable abilities" we mean:

(1) The ability to find things that interest and excite us
(2) The ability to develop intellectual potential inherent in humans through physical activities
(3) The ability to learn from the wisdom of our ancestors
(4) The ability to understand how others feel and develop good personal relationships

(Research Bulletin of Naruto University of Education Attached Kindergarten, No. 47)

Naruto University of Education

We opted to plant roses and sudachi citrus trees in the area accessible by five-year-old children because they have prickles. We wanted to make the children aware that they could prick their fingers if they touched the roses and trees without thinking. Through such an experience, children learn to exercise caution when seeing or touching the trees and roses, leading them to naturally have consideration for others.



We also offer opportunities for children to learn about living things in a manner suited to their developmental stage. For example, the aquariums placed in the room for five-year-old children are provided with favorable conditions for the growth of waterweed and algae, so that they resemble natural water environments as much as possible. With killifishes, bitterlings, loaches, tanishi snails and other common aquatic organisms in them, these aquariums are installed to teach children the interdependence of organisms and cycle of nature, and are not just for ornamental purposes.

Summary

Naruto University of Education, a national university corporation, is committed to producing high-caliber teachers as a leading teacher training school in the region, and contributes to creating a sustainable society in the future by promoting research, educational and social contribution activities.

Promotion of interdisciplinary research in the energy sector and contribution to the community

Ehime University

Sustainable Energy Development Project (SEDP)

To realize a sustainable society in the future, it is important to use renewable energy such as solar power or geothermal heat. The waste oil and food residue contains a lot of hydrogen. "Hydrogen" will enable a low-carbon society and is a promising energy medium that solves environmental and natural resource problems. "Sustainable Energy Development Project at Ehime University (SEDP-Ehime)" is developing a new technology that enables us to extract the hydrogen from waste and promotes researches on a recycling-based and community-involved zero-emission society. In addition, we have started a cooperation with the local government to contribute to the community utilizing our research achievement.

Cooperation with community (1) Environmental education in elementary school

In order to realize a sustainable energy society, we should be aware of the efficient usage of energy. In particular, it is important to promote energy education to the younger generation who is responsible for the future.

Dr. Hatori, a member of our project, is committed to energy education in cooperation with an elementary school. He distributed electricity meter to 92 students at fifth grade, and let them to measure the electrical power consumption at home and to examine the actual situation of the electricity usage in each household. By sharing reports by students, they became familier with how much electricity they use and got awareness on the changes of power consumption by opening and closing the refrigerator. Some concrete power-saving method was proposed from student side; for example, weakening the air volume of the fan, or reducing time to use a dehumidifier. They also planned the power-saving action that can be at home, practiced the plan, and examined how their daily actions were changed.



Objectives of SEDP-Ehime

Green Innovation Research Center

Promotion of interdisciplinary research

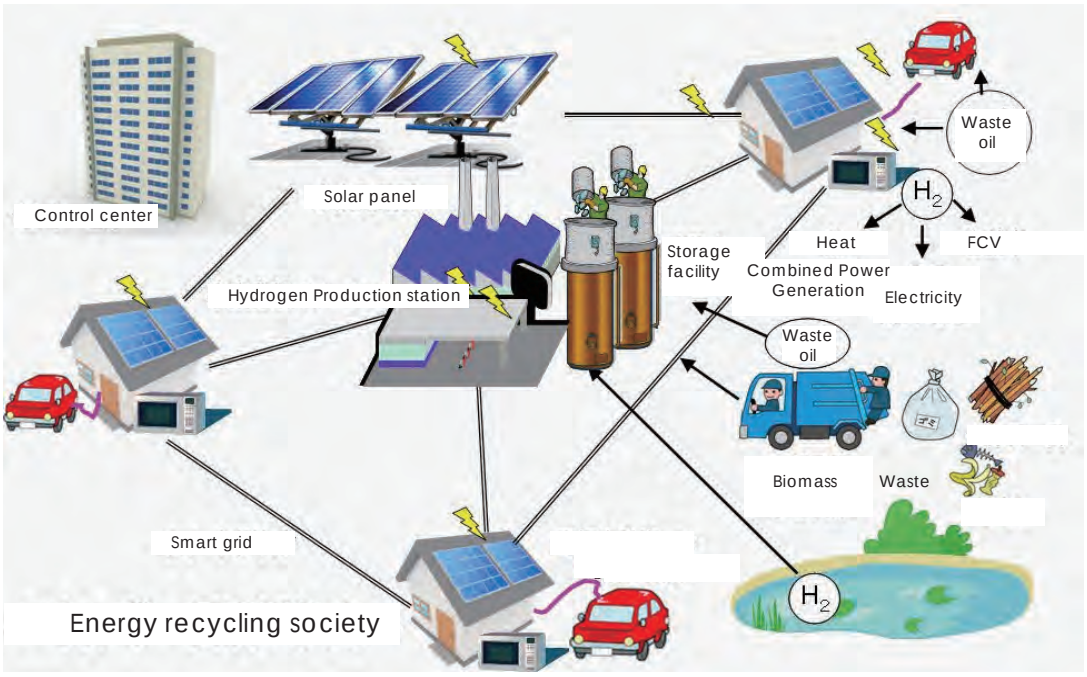
- Renewable energy
- Biomass and waste
- Hydrogen production, Fuel cell technology
- Smart grid, Intelligent Tansportation System
- Behavior modification

Contribution to community

- Technical support
- Cooperation with community

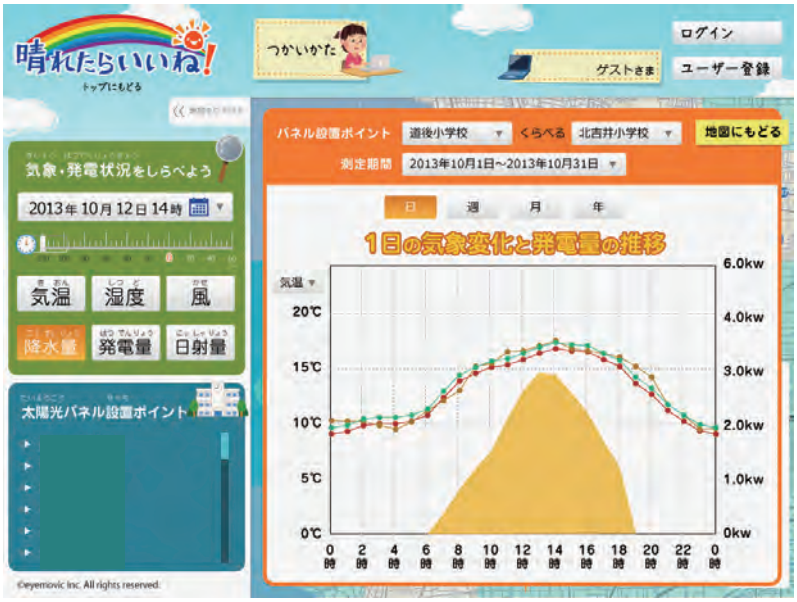
Propose energy recycling society

Image of Zero-Emission Society based on "Hydrogen"



Cooperation with community (2) "Smart environmental sensing" using solar panels of community

The solar panels has been installed in many elementary and junior high schools of Matsuyama city. The collection of power generation data enables us to monitor the state of the clouds in the region. This also enables us to provide precise weather forecast and/or power generation forecast in the area. Using these information, the people in the local community can optimize the use of electricity. Dr. Tsuzuki, a member of our project, is proceeding this project in cooperation with a local cable TV company, weather information company, web production company. Also, we are creating the education system to convey an easy-to-understand weather and power information for the elementary school students. It can also be applied to the development of educational content related to the environment and disaster prevention. This attempt provides a new social value to solar power, and we can expect further promotion of renewable energy.



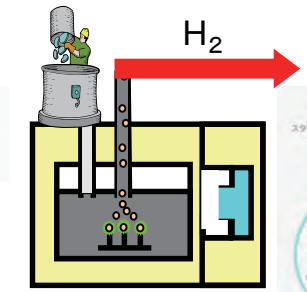
Cooperation with community (3) Social experiment to collect the "hydrogen" from wastes

- Social experiment at campus encourages the participation of faculty and students
- Production of the "hydrogen" from waste and biomass by using solar energy
- Measurement of awareness and behavior change for clean energy

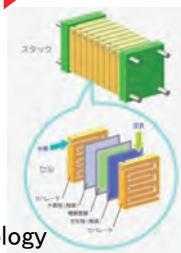
Wastes collected by student committee

Solar panels

4.66 kW



In-liquid plasma technology



Fuel cell

Christmas illuminations

For example,,, for retrieving plasma decomposition of waste (5kg) a day

Disposal amount (cellulose) 5 kg Hydrogen 5 Nm^3 → Mileage of FCV 10km

\+

Solar cell system 5kW Carbon 1kg

(Source) Nomura Shinfuku, 2013

We are planning to conduct a social experiment in the campus which consists of collecting wastes such as food residue and waste oil which are disposed of, producing the "hydrogen" by plasma decomposition technology, and illuminating our campus. The energy is generated from the wastes and solar power, and therefore it is "green hydrogen" and also is based on the concept of “local production for local consumption”. The experiments will be conducted in collaboration with the University Co-op and student organizations. Through providing information and questionnaires to participants, we aim to prompt the consciousness and spontaneous behavioral change for the energy recycling society, and also study the optimal communication method for the renewable energy spread.

Cooperation with community (4)　Regional consortium for the "energy recycling society"

To achieve "energy recycling society", we cooperate with stakeholders in the region. Matsuyama-city has been selected as the "Eco-Model City" and in order to promote the eco-friendly city planning, such as clean energy introduction, regional circulation system, compact city, and smart community, they have organized a “council” where industry, government and academia are participating. Niihama-city also formed a council to prepare for the arrival of the “hydrogen society". Members of our project are also participating in these councils, and we plan to adopt our state-of-the-art research outcomes to the activities in the community.

Summary

❶Promotion of interdisciplinary research in the field of renewable energy
❷Cooperation with the local community
❸Propose energy recycling society with a focus on hydrogen

Sustainable Energy Development Project aims to realize a smart community that is suitable for use of waste and energy together with mutual cooperation in campus among researchers, facilities department, student organizations, and Co-op and also with the cooperation in local communities.

Training Project on Regional Rehabilitation
for safer and more secure society in Fukushima without nuclear energy

National Institute of Technology, Fukushima College

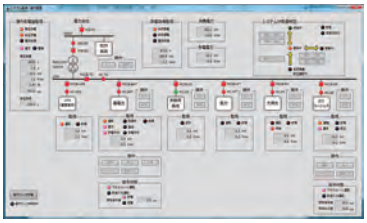
「A Real Scale Smart Grid Experimental System」 in National Institute of Technology, Fukushima College

Since the Great East_Japan Earthquake of March 11, 2011,a training project on regional rehabilitation for safer and secure society in Fukushima without nuclear energy was proposed in National Institute of Technology, Fukushima College from 2011 to 2015.

To enforce the engineering activity in the fields of renewable energy , a real scale smart grid experimental system was installed in the college and be used for education, research and community support.

"Real scale smart grid experimental system" consists of a distributed generation system, a uninterruptible power supply system (UPS), a bi-directional inverter for batteries, a supervisory control system and a simulator. The distributed generators include a gas engine co-generation system(35kW), a wind power generation system(3kW) and a solar power generation system(40kW). In normal operation, the whole electricity from the distributed generators is supplied to the load in the college. Exhausted heat from the gas-engine co-generation system is used to supply hot water to the student dormitory. When a black-out occurs in the utility power system, the system mode can automatically shift to the islanded operation mode to supply electricity to an important load of the main building through uninterrupted power supply system. The system has a simulator which can simulate the behavior of the real system. It can be used for an experiment and training of the students, and for R & D of new control functions of smart grid.

■Monitoring Operation Control system



■Graduation Study by Simulator

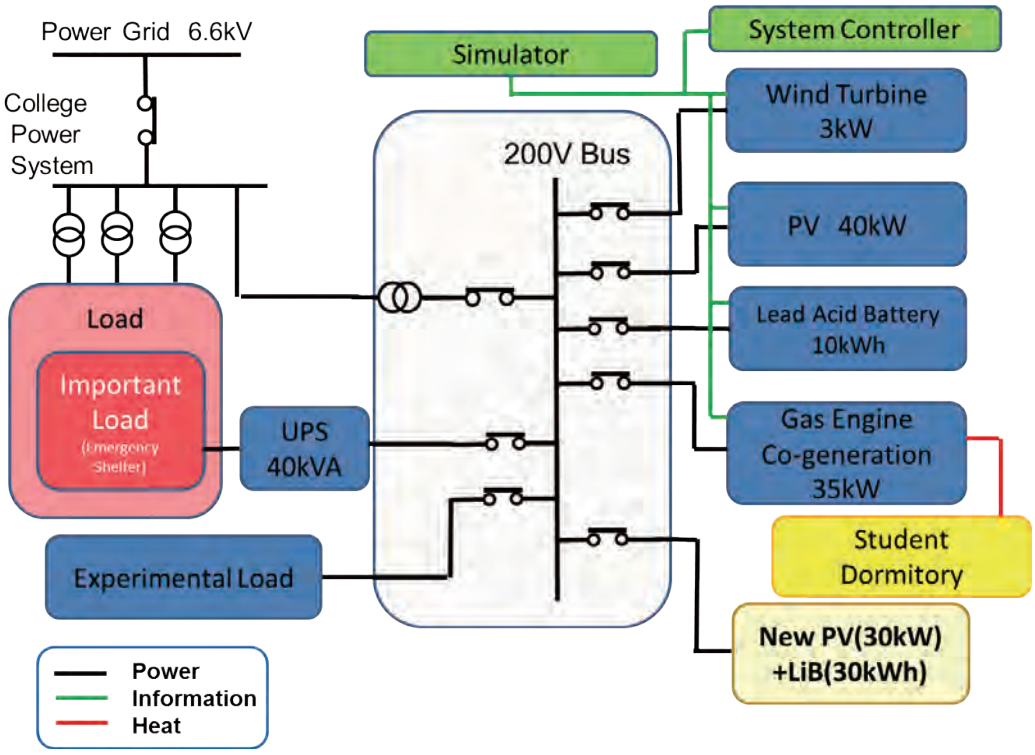
Purpose of the system

- To understand 'what is "Smart Grid", distributed generation and renewable energy?'
- To study energy saving technology and optimal operation technology of Smart Grid, distributed generation and renewable energy.

Purpose of System

- To develop such new technologies as intelligent control and intelligent operation of smart grid, smart community, smart house, etc.
- To supply power and heat to the college in normal operation, and to important loads of the college in emergency (blackout) situation.

Structure of the system



Structure of the System

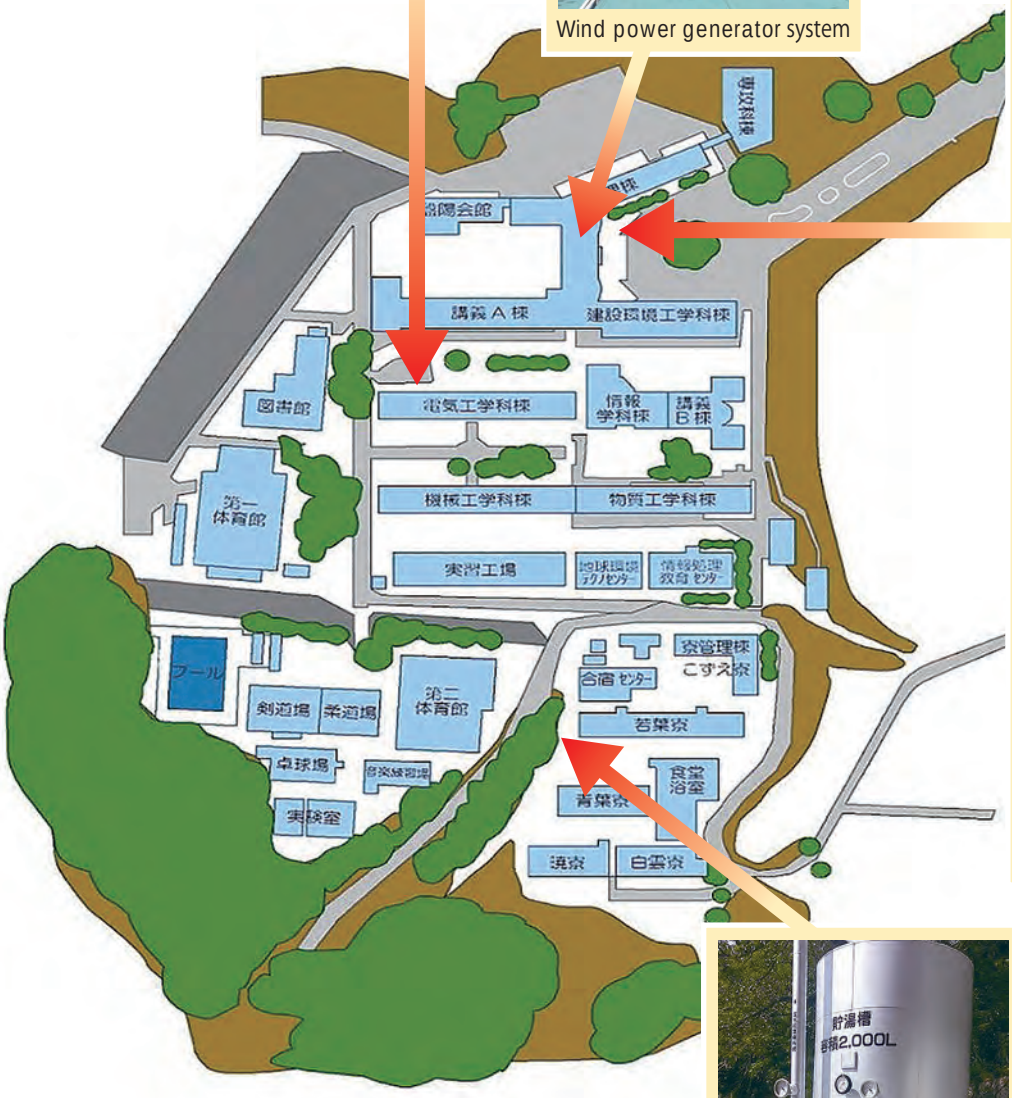
Solar power generator system

Wind power generator system

Control-system and simulator

Uninterruptible power supply system

Load connection panel for experiments



Gas engine Co-generation system

National Institute of Technology, Fukushima College

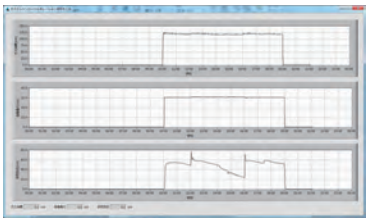
■New solar cell module

■New solar panel (32kw)

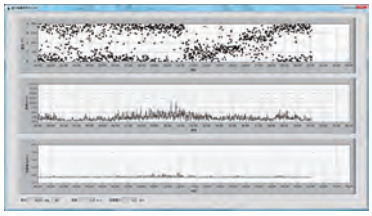
■Wind power generation system(3kw)

■Gas engine co-generation(35kw)

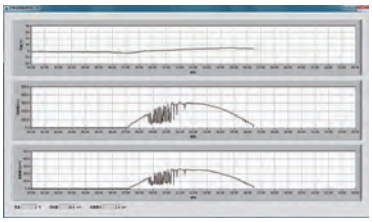
■Gas engine co-generation



■Wind power generation

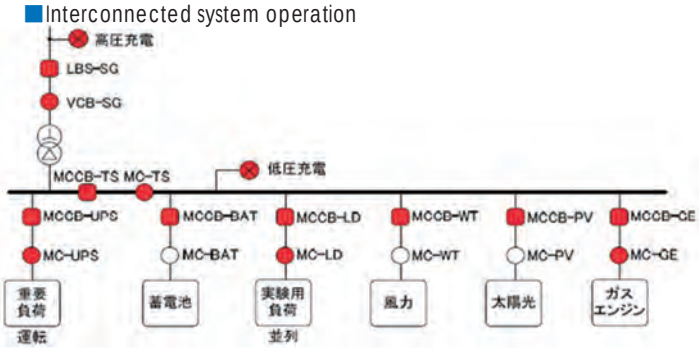


■Photovoltaic generation wave form

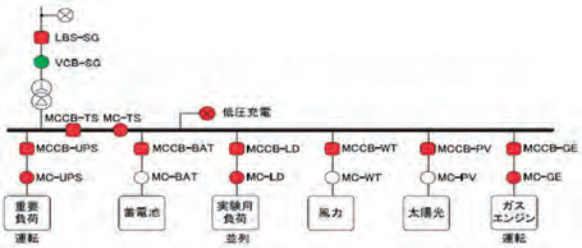


Operation of the system

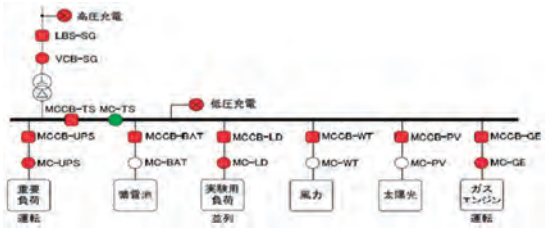
■Interconnected system operation



■Islanded operation



■experiments



Summary

- The real scale smart grid experimental system installed in Fukushima National College of Technology, Japan is illustrated.
- The purposes are education of students, a power supply at emergency conditions and demonstration of the system to expand the installation of the simulator system.
- Around three years operation of the system gave us some operating experiences and energy conservations in the college.

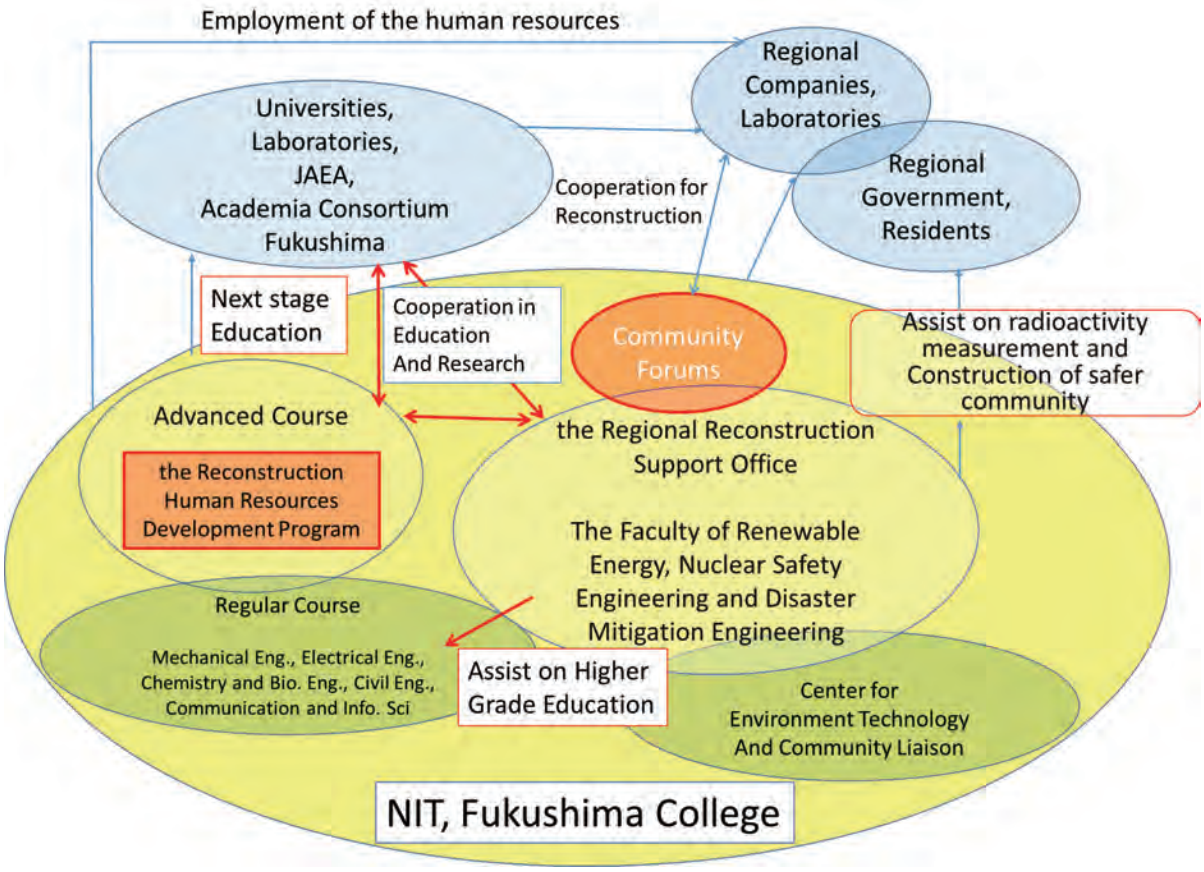
National Institute of Technology, Fukushima College

Training Project on Regional Rehabilitation for Safer and More Secure Society in Fukushima

NIT Fukushima College is conducting a program to assist the recovery from damages caused by the 2011 Great East Japan Earthquake. One of the targets of the program is to enforce the engineering activity in the fields of renewable energy, disaster mitigation and nuclear safety.

This project is mainly carried out by the Regional Reconstruction Support Office, which consists of newly hired Faculty of Renewable Energy, Nuclear Safety Engineering and Disaster Mitigation Engineering and around 40 members of related fields. In 2013, the Reconstruction Human Resources Development Program (quotas : 5) was launched in the advanced course. The students, who belong to different courses, take classes in the special course corresponding to the three fields mentioned above. In addition, we actively hold educational programs and community forums in order to support suffering small businesses and to contribute to the community.

Opening ceremony of the course

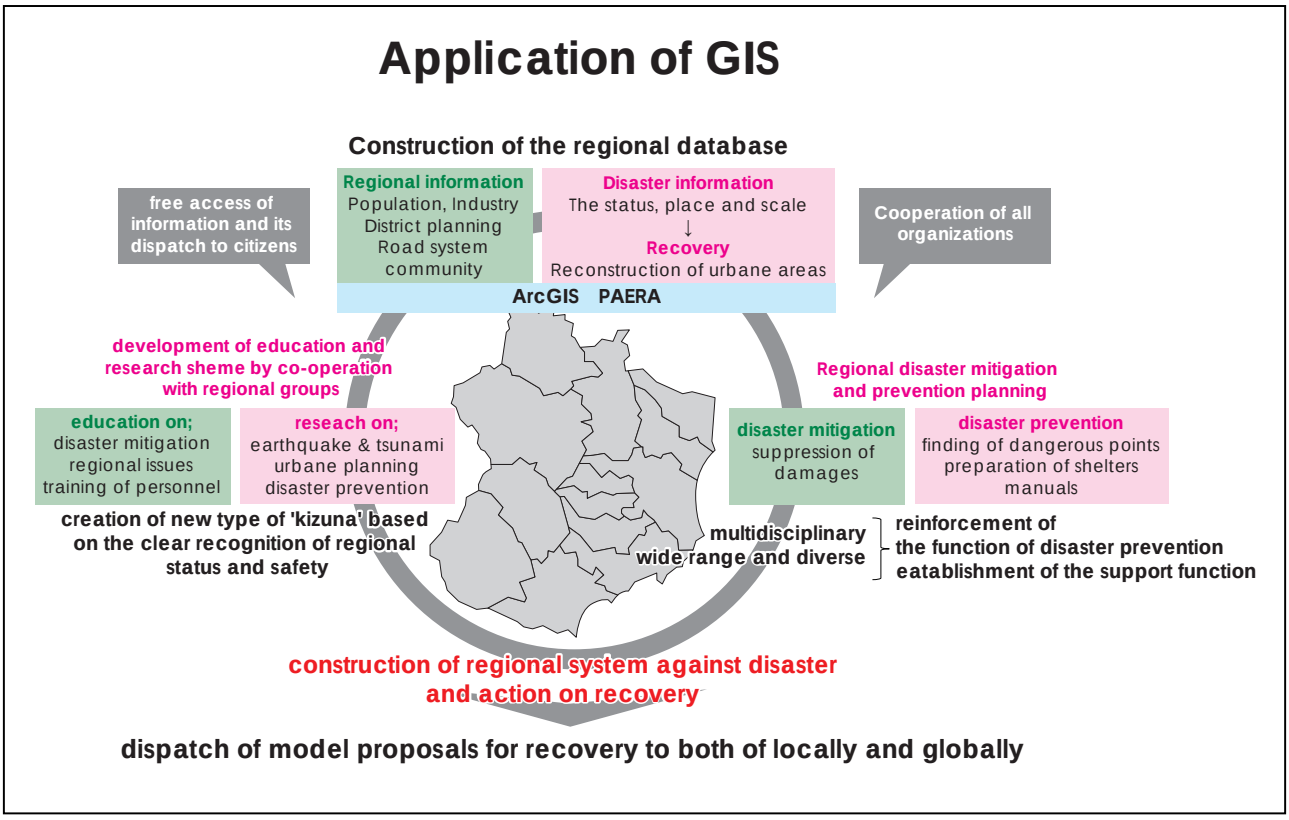


Scheme of the program in NIT, Fukushima College

The administration of the oath

Disaster mitigation

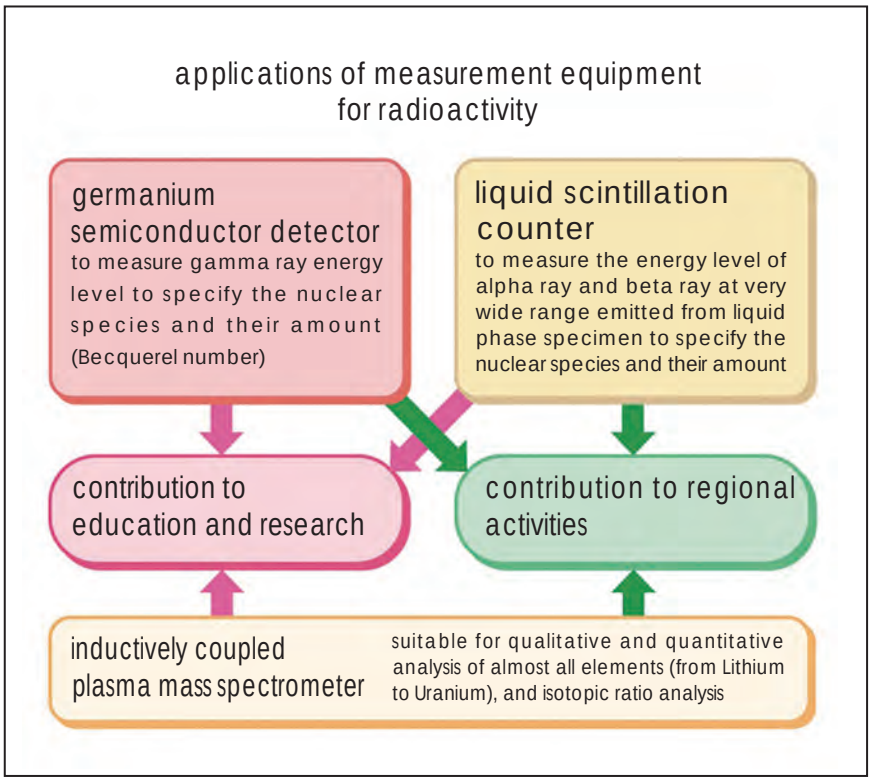
Education and research in NIT Fukushima College in the field of disaster mitigation, is undertaken.
In the teaching, prevention measures against damages resulted from natural disasters such as earthquake, tsunami, flood and landslide are lectured from the view point of town construction planning.
In the Great Earthquake, collapse of banks by the tsunami took a heavy toll of human lives, therefore such software approach as information transmission and evacuation plan of residents is recognized to be also important. It is expected that they who have attended the lecture will be able to make a good judgement, for instance, in administrative work on prevention of damage by disasters, when they encounter with disasters in the future, applying their knowledge.



lecture on leave

lecture for citizens

Activities on Nuclear Safety



A course of learning as a part of the Program for Nuclear Safety Engineering includes "Introduction to Radiation Safety", "Radiation Engineering", "Reactor Engineering", "Nuclear Safety Engineering" and "Experiment on radiation detection". Several research activities on the reactor decommissioning technology have been also carried out. The other part of the Program includes talks for such students as elementary school and junior high school and their teachers and parents, for workers for decontamination as well as general public who are interested in lifelong learning. We actively carried out educational programs and community forums in order to support smaller business and to contribute to the community. Among of these activities, the talks for primary education and several researches on the reactor decommissioning are introduced in the following.

技術者支援に向け
放射線基礎講座
福島高専

福島高専（奈良宏一校長）の社会人特別教育プログラム「技術者支援の放射線基礎講座」の開発の現状」の演題で、第2回講座が12日、同校東川資朗同校機械・電気システム工学専攻教授と日本原子力開発機構職員2人が出席。「原子炉の構造と廃炉に向けての研究」の天野治さんが講師を務めた。

講座には、市民ら約80人が出席。「原子炉の構造と廃炉に向けての研究」の天野治さんが講師を務めた。

東京電力福島第二原子力発電所の建設にかかわった天野さんは、東電福島第一原子力発電所の事故に至る経緯、現在の炉心の状況などに触れながら、廃炉に向けたプロセスを解説。スリーマイル島原子力発電所事故を例に、「圧力容器にたどり着くのに5年かかる。最終的な廃炉には30年は必要」などと述べた。

参加者は東川教授、天野さんの話に耳を傾けながら、廃炉に向けたプロセスと今後の課題について理解を深めた。

福島高専で開かれた放射線基礎講座

A newspaper article

lecture on leave for citizens

Summary

Engagement of NIT, Fukushima College for the recovery from the Great East Japan Earthquake;

- To raise the training project on regional rehabilitation, such as starting up of special educational course, the regional reconstruction support office and so on.
- To start educational program in the 'renewable energy technology', ' disaster mitigation technology' and 'nuclear safety technology', with the cooperation of the local government, schools, companies and regional organizations.
- To assist the regional efforts for the recovery by lectures, environmental assessment, cooperation in education and research and so forth.

Afterword

Vice Executive Director of CAS-Net Japan
Associate Professor of Hokkaido University
Takao Ozasa

This casebook is first booklet of collected good practices for sustainable campus in Japanese universities. This is one of important effort of CAS-Net Japan. This booklet will suggest direction of progress for university officials, and is expected supporting movement of creation of sustainable campus.

Looking at overseas, it can be seen that publishing movement of this casebook have been done by ISCN (International Sustainable Campus Network). ISCN is collecting good practices from member's universities both ISCN and GULF (World Economic Forum's Global University Leaders Forum) every year, and is publishing on own web site. This activity was started from 2013, and ISCN have published three times so far.

These contents are transforming every times, so this is very useful for us not only contents, but also change in purpose and aim of publishing. Until 2014, aim of booklet is only the collection and exposition good practices for university officials, especially on-site person in charge on operation of sustainable campus activities. But looking at 2015 booklet, aim of publishing changed to transmit the strong message which university's leader and university have to provide holistic way of thinking that is necessary when future leaders facing to worldwide sustainability issues. In this way, this suggests the purpose of publishing casebook is not only production of booklet, but also creating transmission medium which organization want to send it's strong messages.

It is great pleasure that this casebook has just been released only 3 years pass from CAS-Net Japan establishment. But looking at ISCN's effort, it is extremely important to continue progress. When so conceived, it is thought that collaboration with ASSC (Assessment System for Sustainable Campus) is important. ASSC is another important and characteristic activity of CAS-Net Japan. Universities are joining ASSC and are published having high score universities in the booklet. Accordingly, to be able to understand how to link high score with specific activities, participation for ASSC will be more promoting. I expect that this casebook will be further usefulness for collective progression of CAS-Net Japan's activities in the future.

Local Challenge, Global Network

Vice Executive Director of CAS-Net Japan
Professor of Chiba University
Takeshi Ueno

CAS-NET Japan as an information sharing and disseminating platform

One of the purposes of establishing CAS-Net Japan (Campus Sustainability Network in Japan) was for this network to become a platform where Japanese universities could share and disseminate information on various initiatives they are engaged in for creating sustainable campuses.
To this end, in this report, we have collected examples and stories that may assist the readers in resolving various sustainability-related challenges at their campuses. In gathering these stories, we not only focused on the physical aspects of sustainability for realizing an energy-saving green campus, but also organically tied the process of creating green campuses to the university's management system and to their mission: education, research and social engagement.

CAS-Net JAPAN Sustainable Campus Award

In addition to this report, to promote and accelerate the activities of CAS-Net JAPAN, we established an award in 2015. By the recommendation of CAS-Net Japan members, the awards are given to leading programs concerning campus sustainability in each of the following segments: University Administration, Architecture & Facilities, and Student Activities & Local Collaboration.
The recipients of the very first CAS-Net JAPAN Sustainable Campus Awards were announced at the 3rd Annual Conference held in November 2015. Following are the groups that received certificate of commendation and a plaque:

Campus Planning Office, Ritsumeikan University: For Osaka Ibaraki Campus's planning methods and thought processes on creating an Eco-Innovation Campus where the university and the local community could connect and come together.
Office for creating a sustainable campus, Hokkaido University: For their PDCA (Plan, Do, Check, Act) cycle to establish intra-campus communication as an essential component for creating a sustainable campus.
Student Committee for Environmental Management Systems, Chiba University : For student-driven activities for creating a sustainable campus and efforts to obtain and maintain ISO 14001 and 50001 certifications.

Each of these programs and activities is worthy of global attention and we have shared some of these stories in this report.

Local Challenge, Global Network

While each university tackles and deals with individual and local challenges based on their location and situations, their achieved results and solutions, if shared and disseminated over the network, could hold the potential to resolve global challenges.
Universities systematically develop their organizations, facilities, and surrounding environments over long time periods, and maintain a close relationship with the surrounding cities. In addition, universities provide spaces for life and economic activities in their city-like environments, while developing human resources through education and contributing to society through research outcome. They are also tasked to manage and develop their organizations and assets over time.
It is from this perspective that we see universities as miniature model cities with a potential to form an environment; and for this reason, we suggest rebuilding them into sustainable campuses. Would this act not greatly vitalize the cities themselves and make a significant contribution to realizing and creating sustainable local communities?

Toward the establishment of sustainable campus

Executive Director, CAS-Net JAPAN
President, National Institute of Technology, Fukushima College
Takayuki Nakamura

It was several years ago that I knew many prominent universities in the world were eager to establish sustainable campuses when I was the Director of Facilities Department of Hokkaido University in Japan. G8 University Summit was held in Sapporo in July 2008 and "Sapporo Sustainability Declaration" was adopted there. From the time on, higher education sectors in the world have been activating the movement of campus sustainability. In addition, the action of establishing a network in order to exchange the information on campus sustainability and influence one another has been occurring in the region of not only Europe and America but also Asia such as China and Korea.

In line with recognizing such kind of situation and visiting and discussing with the faculty members and staffs who are in charge of sustainable campus in European, American and Asian universities, I felt that the situation of Japanese universities on campus sustainability is behind and it is indispensable even in Japan to create a network on campus sustainability. Based on this motivation, Campus Sustainability Network in Japan (hereinafter CAS-Net JAPAN) was established in March 2014 under the collaboration with the faculty members and staffs of Hokkaido University, Kyoto University, Chiba University, etc. who had the same recognition with me. Annual conference and General meeting are held every year from the time of the establishment of CAS-Net JAPAN. As of November 2015, 34 universities or institutions and approximately 90 personal members join CAS-Net JAPAN.

It is an honorable thing for CAS-Net JAPAN to be able to publish this book consisting of good practices on campus sustainability of CAS-Net member universities. We expect this book is utilized in the world to disseminate good examples on campus sustainability at Japanese universities. Furthermore, it is very meaningful for us to be able to publish this book in the time when the globalization of higher education sectors in Japan is being emphasized.

A worldwide acknowledged notion of "Sustainable Development" is very important and the notion is explained as an idea describing the development, which satisfies the needs of both present generation and future generation. In short, "Environment" and "Development" don't compete each other but coexist, therefore it is needed to develop the notion adequately under the concept of environmental preservation. In this sense, it is critical that the movement of campus sustainability including not only faculty members and staffs but also students is enhanced in the world in order for us to contribute to the future generation in the field of sustainable development.