CEIDS
大阪大学 OSAKA UNIVERSITY

CENTER FOR ENVIRONMENTAL INNOVATION DESIGN FOR SUSTAINABILITY, OSAKA UNIVERSITY

Newsletter

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Newsletter No. 4 of the Osaka University Center for Environmental Innovation Design for Sustainability (CEIDS) continues the series "CEIDS Research" and "Researcher Interview" that began in Newsletter No. 3. Among other happenings, the current issue also reports on the recent Totsukawa Village (Nara Prefecture) Commons Discovery Student Seminar, a Japan/China/South Korea Research Exchange Seminar, and the "Frontiers of Sustainability Science" joint educational program run by five universities. In these pages you will find information about a wide range of CEIDS research and educational initiatives, from regional partnerships to international research exchanges.

1. FY2013 Educational and Research Initiative "Totsukawa Village Commons Discovery Student Seminar"

The Center for Environmental Innovation Design for Sustainability (CEIDS) held the FY2013 educational and research initiative "Totsukawa Village Commons Discovery Student Seminar" based on research concerning regional safety and security and techniques for commons management. Participants included 16 students from multiple academic departments of Osaka University, 20 students from the Faculty of Economics of Hannan University, and 11 faculty members from three universities/research institutes (Osaka and Hannan universities and the Research Institute for Humanity and Nature). During the three-day and two-night event (September 17–19), participants rediscovered and reassessed the variety of resources in Totsukawa Village (Nara Prefecture) from the "commons" perspective. They spent time discovering the associated issues, creating visions for the future, and proposing methods for using those resources. In their research, the "commons" refers to ecosystem services (the functions performed by nature that are essential to life and economic activity), social capital (connections between citizens and industry), and so on as defined in the space known as Totsukawa Village. Totsukawa Village,

Totsukawa Village

1. FY2013 Educational and Research Initiative "Totsukawa Village Commons Discovery Student Seminar" (2)

Exchange session at Totsukawa Senior High School

Students stayed up until early morning preparing their presentations

Presentation session for final outcomes

located in the southernmost part of Nara Prefecture, is Japan's largest village in terms of area. It is heavily forested and includes part of the Kumano Sankeimichi pilgrimage route on the UNESCO World Heritage List. Historically, it was home to the Totsukawa Goshi and Tenchugumi samurai groups. It is also famous for its hot springs. Totsukawa Village sustained heavy damage from Severe Tropical Storm Talas in September 2011. The storm reduced tourism to the area and even led to a decline in population. The recent seminar therefore took as its theme "a vision of the future that grows the population of Totsukawa Village by rediscovering its attractions from a variety of angles." The 36 students broke into teams of six, and two teams worked on each of three sub-themes: 1) education, culture, and public welfare; 2) natural resources; and 3) tourism and the local community. By the oddest of coincidences, another storm (Typhoon Man-yi) had passed through Totsukawa Village just a day before the seminar. The storm caused part of National Route 168 leading to Totsukawa Village to collapse. The participants had to take a detour from the Wakayama Prefecture side of the peninsula. In other damage, a bridge leading to a facility the group planned to visit was underwater. In its place, they used an old suspension bridge ordinarily used only by locals, not tourists. For the students, just getting to the facility was memorable. The experience impressed on the group how much a storm can impact Totsukawa Village.

The group had visited CEIDS's Co-creative Design Laboratory for Sustainability as prior study. There, each team wrote out their seminar objectives,

Seminar schedule

	Education, culture, and public welfare		Natural resources		Tourism and the local community	
	Team A	Team B	Team A	Team B	Team A	Team B
Sept. 17 PM	Visit Totsukawa Village Office					
	Totsukawa Senior High School		Wood Processing and Distribution Center, recovery model home			
Sept. 18 AM	21st Century Forest / Kii Peninsula Forest Botanical Park Tamaki Shrine	Community near lodging Group home (Hiratani Akinosato)	Hot springs area (Totsukawa Onsen, Tosenji Onsen)	21st Century Forest / Kii Peninsula Forest Botanical Park Tamaki Shrine	Tourism association Roadside station Kumano Kodo pilgrimage routes (Hatenashi community)	21st Century Forest / Kii Peninsula Forest Botanical Park Tamaki Shrine
Sept. 18 PM	Totsukawa Junior High School Folk museum	Totsukawa Junior High School Folk museum	Wood Processing and Distribution Center Recovery model home Wood processing plant	Totsukawa Senior High School crafts class Public welfare association Special elderly nursing home (Takamori no Sato)	Hot springs area (Three public baths in Totsukawa Village)	Tourism association Community near lodging
Sept. 19 AM	Presentation session for final outcomes (Totsukawa Village Office)					

inquiries, methods, and plans. They then divided up topics of study to pursue in advance as they got ready for the seminar itself. On Day 1 of the seminar, students went to Totsukawa Village Office and listened to Mayor Saratani, General Affairs Department Director Higashi, Tourism Promotion Department Director Masutani, and Agriculture and Forestry Department Chief Clerk Chiba talk about the situation and problems in the village and the status of disaster recovery efforts there. A particularly memorable phrase for the students came up throughout Mayor Saratani's talk: "love and pride for Totsukawa Village." Afterwards, the teams taking on the sub-theme "education, culture, and public welfare" had a chance to interact with students from Totsukawa Senior High School. Many of the high school students made comments like "I want to stay in Totsukawa in the future" or "Even if I go to university or vocational school somewhere else, someday I want to come back here." This made the greatest impression on the visiting students. These students of different backgrounds (students going to a rural high school and seminar participants attending urban universities) must have had much to think about from their interaction. The teams studying the sub-themes "natural resources" and "tourism and the local community" visited the local Wood Processing and Distribution Center and a recovery model home. The Wood Processing and Distribution Center is a complex where timber cut in Totsukawa Village is brought and shipped out to other places. Workers here taught a variety of things to the visitors, including the fact that the forestry industry is the most important primary industry in Totsukawa (forested land makes up the greater part of the village). On Day 2, each team did field work based on its theme. Tourism Team A, for example, studied how to get more foreign tourists to the area. Based on statistical data that they had researched in advance, they evaluated Totsukawa's tourism resources, making observations and conducting local interviews. The team then looked for means to fully convey Totsukawa's attractions to foreign tourists. Natural Resources Team B, for their part, entitled their presentation "Nursing, Made in Totsukawa." Following this theme, they explored how to revitalize the village by using a public welfare industry taking advantage of Totsukawa's unique circumstances and natural environment. Having finished their field work, all the teams spent the second night getting ready to present their research at the presentation session for final outcomes. The students discussed their work late into the night in preparation for their presentations. One dedicated team stayed up past 3:00 the next morning talking about their presentation.

Group photo with Village Office officials

On the final day, the teams went to the village hall in Totsukawa Village Office to present their findings to employees there. Counselor General Kawata, General Affairs Department Director Higashi, Public Welfare Office Director Odama, Tourism Promotion Department Director Masutani, Forestry Promotion Office Director Yoshimoto, Disaster Recovery Office Director Kamatsuka, and Construction Section Manager Inui attended and offered critiques. The students, from their perspective as students and as outsiders, proposed a variety of means for achieving their visions for Totsukawa's future, based on the previously mentioned seminar themes. Totsukawa Village Office officials

noted that these proposals tied in with projects already under way by the Totsukawa government. Their critiques included points of agreement as well as some corrections and additional information. Finally, Counselor General Kawata gave his own critique of the presented content, and in addition gave some firm but warm advice about presentation format and how to create presentation materials. The students now look forward to applying that advice to their presentations and the faculty to their instruction and research activities in the future.

The proposals that the students came up with based on their rediscovery and reassessment may not, for the most part, have been particularly new or of immediate use to the village. However, in the process they actually visited a site of interest to see and consider the situation for themselves. They fashioned their observations and ideas into actual proposals. They presented those proposals to a crowd of working people. They collaborated with their peers from another school and other departments to accomplish these things. And by taking part in this seminar, they learned just how hard and interesting these things could be. While three days and two nights is a short time, the students and faculty both gained much in this seminar. CEIDS would like to thank Totsukawa Village Office officials, staff members of facilities visited, village citizens that sat down for interviews, and everyone who has helped to make Totsukawa Village the place it is.

(Yukari Fuchigami, Project Researcher, CEIDS)

2. International Workshop: "The 6th Workshop on Advanced Engineering Technology for Environment and Energy: Environment, Energy and Sustainable Development"

CEIDS and the Ike Lab of the Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering held the international workshop, the 6th Workshop on Advanced Engineering Technology for Environment and Energy — Environment, Energy and Sustainable Development in August 2013.

The purpose of the workshop was to exchange information on the themes of leading-edge water treatment technologies, sustainable energy production technologies, and low-carbon technologies, and to promote interaction between students and faculty in this manner. Through such exchange, the workshop sought to build friendly international relations to solve problems that require international cooperation, such as problems of the global environment and social sustainability.

The workshop has previously rotated between Kumamoto University (Japan), Pusan National University (South Korea), and Dalian University of Technology (China), with leadership from Kenji Furukawa (then Vice President, now Prof. Emeritus at Kumamoto University), Mr. Furukawa's close friend Prof. Changwon Kim (Pusan National University), and Prof. Xie Quan (Dalian University of Technology). Upon Prof. Furukawa's retirement, however, Prof. Ike of Osaka University became Japan's representative at the fifth workshop, held last fiscal year in Dalian. As a result, Osaka University hosted this year's event. Attendees this year included two faculty and five students from Pusan National University, three faculty and seven students from Dalian University of Technology, and from Osaka University, a number of teaching staff and students from CEIDS and the Ike Laboratory. There were another five students and three teaching staff including Prof. Kazunari Sei of Kitasato University. With about 60 participants altogether, it was a lively workshop.

Members gathered in Osaka on August 4, and jumped into the main event, the presentations of

2. International Workshop: "The 6th Workshop on Advanced Engineering Technology for Environment and Energy: Environment, Energy and Sustainable Development" (2)

research, the next day on August 5. At the presentation session, Prof. Ike gave a welcome speech and an introduction to Osaka University, and each professor also greeted the audience. The students from Japan, China, and South Korea presented their research and answered questions in English. Many of the students, having never attended an international conference before, were visibly nervous before their presentations. Each one, however, seemed to have done adequate preparation and practice. Once on the stage, they did not hesitate as they gave a confidence-inspiring presentation. During Q&A, this workshop allowed all members to answer the sharp but friendly questions eagerly. All 20 were able to complete their presentations in a relaxed atmosphere. The original plan called for selecting four individuals to receive "best presentation" awards, but the high quality of each presentation made it hard to judge. Ultimately, seven students received awards. At the awards ceremony, the crowd cheered loudly as each winner's name was read. With that rousing event, the presentation session came to a close.

On August 6, participants took a field trip to REMATEC Corporation's Sakai SC Plant and to CEIDS's Co-creative Design Laboratory for Sustainability. REMATEC's main business is recycling waste. When the group visited the Sakai SC Plant, they were able to see the company's subcritical water treatment equipment. Subcritical water treatment is a technology for treating waste with water that is under high pressure and high temperature but below the critical point. It promotes hydrolysis of substances contained in waste, making its molecules small. Unlike incineration, which completely breaks down substances to carbon dioxide, etc., subcritical water treatment converts substances into a recyclable form. Thus it is an eco-friendly technology that contributes to carbon reduction and resource circulation. Perhaps because there had been a presentation about this technology at the event the day before, the participants were very interested. Their questions ranged from the basics (such as case studies of the technology in use) to the highly specialized (e.g., materials used in the equipment).

The group then went to Co-creative Design Laboratory for Sustainability. There, Associate Professor Hara and Associate Professor Uwasu introduced them to CEIDS's research and education programs. Both the participating faculty and students were very excited to hear the talk about Meso-level research to close the gap between technological seeds and visions for society. Likewise, they took great interest in CEIDS's advanced Sustainability Science Educational Program, which teaches graduate students of different specialties the essence, approach, and methods relating to sustainable societies.

Overview of CEIDS initiatives at Co-creative Design Laboratory for Sustainability

Participants look cheerful after presentation session, August 5.

The farewell party took place that evening in the Senri Hankyu Hotel poolside beer garden. Having gotten to know each other during the two-day program, the students enjoyed talking about all sorts of things, from research to less serious topics. By all appearances, the workshop had achieved its greatest objective of helping to build friendly international relations. With the students urging each other to meet again in Pusan next year, the workshop came to a close. Strong ties between Japanese, Chinese, and South Korean researchers, forged by opportunities like this, will hopefully help create trilateral partnerships in the future for building sustainable societies.

(Masashi Kuroda, Assistant Professor, Graduate School of Engineering, Osaka University)

3. "Frontiers of Sustainability Science" Joint Educational Program of Five Universities

The Center for Environmental Innovation Design for Sustainability has held the "Frontiers of Sustainability Science" course since 2008. The graduate-level program links to the University of Tokyo, Kyoto University, Hokkaido University, and Ibaraki University through a teleconferencing system. For FY2013, the course took place on the three-day weekend of July 13–15. Major themes this year were global warming and climate change. Leading researchers in each of these fields gave lectures, and participants engaged in group work. More than 70 students from the five universities took part, including five students from Osaka University.

Experts from the universities specializing in the fields of meteorology, oceanography, coastal engineering, energy, environmental policy, and development gave lectures with a focus on the science of climate change, climate change's impacts, and how to mitigate them. From Osaka University CEIDS, associate professors Hara and Uwasu gave a basic overview of sustainability science and provided a framework for considering the problem of global warming. Assistant Professor Yohei Yamaguchi of the Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering, discussed energy demand in the context of global warming mitigation. Group work happened on Day 3. Based on information and knowledge from the lectures, each group wrote a "climate change and global warming policy brief* to the United Nations Secretary-General." Ten groups from the five universities then gave presentations. (*Policy brief: An expert summary of information necessary for policymakers to draft policy.) Discussions featured a lively question and answer exchange involving the five universities. This exchange included questions and comments that made some speakers flinch. At last, the three-day curriculum ended on a successful note.

From Osaka University alone, this year's event drew participation from students in majors as diverse as engineering, medicine, literature, and anthropology. Students and faculty from specialties not offered at Osaka University (agriculture and fisheries sciences from Hokkaido University, sustainability science and environmental studies at the University of Tokyo and Kyoto University, and education from Ibaraki University) also took part and joined in the discussions. Ensuring diversity is important for the study of sustainability and the environment. The discipline requires people with wide-ranging knowledge of the environment, society, and economics. The most effective way to bring together the variety of knowledge and use it to solve problems is to assemble people with different backgrounds and let them discuss the issues together. As part of the staff getting ready for the course, I had countless discussions with faculty of the five universities and a

3. "Frontiers of Sustainability Science" Joint Educational Program of Five Universities (2)

number of other challenges, but it was a very fruitful event for the students. Also, the cumulative knowledge and experience from holding the course continuously has helped to enrich the course content and deepen the faculty's understanding of sustainability. A smaller number of students participated this fiscal year, but I hope more will take part next year.

(Michinori Uwasu, Associate Professor, CEIDS)

Class conducted with help from Polycom teleconferencing system

Group work

Frontiers of Sustainability Science schedule

	July 13	July 14	July 15
1	Guidance and overview of sustainability science (Keishiro Hara and Michinori Uwasu, Osaka University)	Impacts of climate change and response strategy (Hiromune Yokoki, Ibaraki University)	Energy demand and related environmental and social challenges (Yohei Yamaguchi, Osaka University)
2	Sustainable fisheries co-management in Japan (Yasunori Sakurai, Hokkaido University)	Adaptation to the flood risk: the case of the Mississippi Delta in the United States (Yayoi Haraguchi, Ibaraki University)	Climate change and sustainable development concern in Africa (Masafumi Nagao, The University of Tokyo)
3	Application of weather and climate information for regional sustainability (Tomonori Sato, Hokkaido University)	New types of renewable energy: prospects, development and intermittency issues (Miguel Esteban, The University of Tokyo)	Intra-school discussion (13:45 - 15:30) Presentations, Q&A (15:30 - 17:25) Student ballots (17:25 - 17:45) Conclusion (17:45 - 18:00)
4	Advanced technology for sustainable development: Analysis of fusion from the sustainability (Satoshi Konishi, Kyoto University)	Policy options for decoupling economic growth and GHG emission reduction: Germany and Japan compared (Seiji Ikkatai, Kyoto University)	
5	Intra-school discussion	Intra-school discussion	

4. 21st CEIDS Research Seminar

The 21st CEIDS research seminar took place on August 6, 2013 at the CEIDS satellite office Co-creative Design Laboratory for Sustainability, in Grand Front Osaka. CEIDS holds the seminar regularly, inviting lecturers from within and beyond Osaka University to deepen knowledge of environmental innovation and sustainability science and promote interdisciplinary discussion and research exchange. In the 21st seminar, Associate Professor Damien Giurco of the Institute for Sustainable Futures (ISF), University of Technology, Sydney, Australia gave a lecture on "Sustainable Resource Futures." As research director for ISF, Prof. Giurco's specialties are mineral resources and energy. In this seminar, he discussed a wide range of research topics based on his knowledge. These included creating a vision for using Australia's mineral resources and a road map for implementing distributed energy such as solar or wind.

Thirteen persons from Osaka University and beyond took part in the seminar. These select few enjoyed a very free and easy Q&A session in the open atmosphere of Co-creative Design Laboratory for Sustainability. The seminar included more than just lectures. To further their understanding, participants joined in group work on the current hottest topic: the makeup of Japan's power supply in 2030. Participants discussed three scenarios of how much electric power Japan might get from nuclear power plants (0%, 15%, or 20-25%). Using the technique of Causal Layered Analysis, they debated what conditions would make each scenario acceptable. Through discussions like these, the participants gained a shared understanding that designing energy systems for the future requires more than technical knowledge. It also demands recognition of differences in personal values and consideration of policy, economic, and other perspectives.

The event was a reminder of the importance of continuously bringing people of different backgrounds together to exchange ideas through initiatives like this. Such gatherings are essential for promoting interdisciplinary research that spurs the environmental innovation that CEIDS seeks. The schedule for the next research seminar will be posted on the CEIDS web site (http://www.ceids.osaka-u.ac.jp/ [English version is http://www.ceids.osaka-u.ac.jp/english/ here and below.]) when it is available. We hope you will take part.

(Yusuke Kishita, Assistant Professor, CEIDS)

Lecture by Prof. Giurco of the University of Technology, Sydney

Seminar at Co-creative Design Laboratory for Sustainability

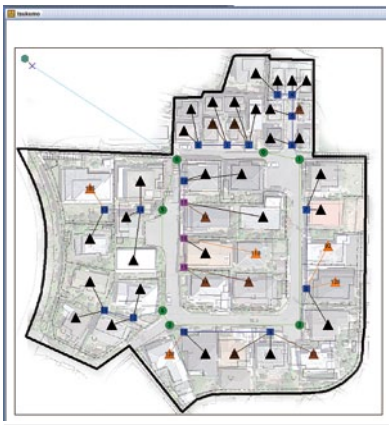
Participants doing group work

5. CEIDS Research 2: Basic Research towards Creating a Scenario for Spreading Distributed Energy: Targeting Suita City, Osaka

Following the Great East Japan Earthquake of March 2011 and the subsequent nuclear power problems, more people have grown interested in natural energy (such as solar) and distributed energy (such as gas cogeneration). One advantage of distributed energy is that it is low-carbon and less impacted by disaster. On the other hand, it is not sufficiently known how far distributed energy can spread and what impact that spread would have on regional power networks. The aim of this research was to create a scenario for spreading distributed energy by anticipating a number of different visions of the future, with a focus on Suita City, Osaka in the year 2030. The distributed energy addressed here was solar, the form of energy with the greatest abundance in Suita City.

In FY2012, CEIDS researchers clarified the problem to be solved, collected information to write the different scenarios, and then developed simulation model prototypes to predict the future under each one. First they collected information to assess the current situation, finding Suita City's population trends, energy usage, and abundance of new energy, etc. Next, to write out the multiple different future scenarios, they referred to the information collected and brainstormed factors that could have an impact on the spread of distributed energy equipment. Factors were listed and used to create a causal network. In addition, Suita City and Osaka University jointly conducted a survey of 4,000 citizens to add to the essential data (e.g., citizen environmental awareness and current spread of photovoltaic (PV) systems and energy-saving devices).

The problem of designing distributed energy spreading scenarios is related in complex ways with problems of stakeholder planning. These include planning of energy equipment and power generation facilities, planning for power transmission networks, planning for government subsidies, and planning for introduction of energy equipment by power users (local communities and individual households). This research sought to model the design problem by focusing on the behavior of multiple stakeholders and then simulate that behavior by computer. Multi-agent simulation (MAS) was used as the tool to do this. Based on the causal network analysis described above, the researchers identified multiple stakeholders and the relationships between them, and created a model of these. Following are examples of such relationships.



Simulation of PV system spread in 2030 in part of Tsukumodai area of Suita City

▲ (black): Household (no PV system)
▲ (brown): Household (5kW PV system)
▲ (orange): Household (10 kW PV system)
■ (blue): Low-voltage node
■ (purple): Low-voltage node (output limitations)
● : Pole transformer substation

- Power users decide whether to implement PV systems on the basis of economic means and values, considering initial cost, operational cost, and revenue from selling electricity.
- PV system implementation costs fall as systems become more widespread.
- The government decides on subsidies on the basis of the spread of PV systems and fiscal conditions.
- Electric utilities (those that generate and transmit electricity) establish electric power rates and transmission facilities (pole transformers, substations, etc.) on the basis of economic considerations and the spread of PV systems. The establishment of transmission facilities is affected by capacity to link to decentralized power and power users' decisions to implement PV systems.

As a case study, the researchers looked at part of the Tsukumodai area of Suita City. They modeled transmission facilities in the area and the decisions of power users there. Under the model, they built an MAS prototype system to simulate the spread of PV

systems. There were 42 houses in the subject area. Researchers imagined a transmission network of seven pole transformers and 19 low-voltage nodes. They used artisoc (a registered trademark of Kozo Keikaku Engineering Inc.) as the environment to implement and execute the simulation model. Seeking to foresee around the year 2030, they set the simulation period to 20 years. The figure shows part of the execution screen. The links between nodes represent transmission lines. The simulation shows the distribution of households implementing PV systems, the scale of their implementation, and places where there are limitations on PV output. In other words, it reveals places where there is room for the transmission network to be established.

Going forward, CEIDS researchers plan to expand the subject area and link the stakeholder planning problems into the MAS model they built. The simulations they then run will be reflected in scenario writing. They also plan to establish simulation parameters based on the survey of power user plans to implement systems and thus perform analysis based on actual conditions in Suita City.

[List of main research project members]
Yutaka Nomaguchi, Division of Mechanical Engineering, Graduate School of Engineering, Osaka University
Hiroki Tanaka, Division of Mechanical Engineering, Graduate School of Engineering, Osaka University
Masashi Kuroda, Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering, Osaka University
Michinori Uwasu, CEIDS
Keishiro Hara, CEIDS
Yusuke Kishita, CEIDS
Hiroyuki Takeda, CEIDS

(Yutaka Nomaguchi, Associate Professor, Division of Mechanical Engineering, Graduate School of Engineering, Osaka University)

6. Researcher Interview No. 2, "Exposure to Knowledge from Varied Fields"

Prof. **Yoshiyuki Shimoda** (Professor, Graduate School of Engineering, Osaka University)
Visited: August 5, 2013
Visited by: Keishiro Hara, Yukari Fuchigami

Hara: Tell us about your specialty, and how your research themes have changed over time.

I belonged to the Osaka University Department of Environmental Engineering from undergraduate level to graduate school, where I worked in a lab that was researching air conditioning. For my bachelor's degree thesis, I researched computational fluid dynamics. In graduate school, I wanted to get involved with environmental problems, so I focused on the heat island phenomenon, specifically, underground temperature fluctuation. At the time, the research was contracted by the Osaka Municipal Transportation Bureau, and we were studying the thermal environment of the subway. Soon after that, I had a chance to research thermal environmental planning for the opening of Tokyo's Oedo subway line. In the meantime, I was also evaluating unused energy and urban waste heat and studying how they might be used. The lab itself was led by a professor with a mechanical engineering background, but our endeavor was actually quite close to architecture. On the other hand, the field of environmental engineering often brought us into contact with government officials. So our research was also different from pure architecture.

After five years of the kinds of research I just described, I reached to a major turning point: I was transferred to Osaka University's new joint research

base, the Collaborative Research Center for Advanced Science and Technology. There I was involved in university–industry collaboration and collaborative research, and also a field of research that was completely new to me: recycling. During this period I was able to learn things from a different perspective than I had had before. Teachers in the materials field at the time let me participate in a recycling seminar, which broadened my own research.

Hara: How significant are university–industry collaboration and collaborative research, in your opinion?

At the time, there was not a lot of university–industry collaboration and collaborative research going on. They were not necessarily a major part of any university professor's work. In many cases, academics started to branch out from the research that they would have liked to do only because their collaborator asked them to. But in my experience, collaborative research allowed us to learn points of view and opinions that we had not been expecting. Often, papers resulting from collaborative research won higher praise than research following the individual's own ideas. Looked at that way, it seems that not only does academic research help industry develop products and solve problems, but the academic world finds new directions and perspectives from different external stimuli. Exposure to diverse ways of thinking changes the course of our research into unexpected directions. When that happens, researchers themselves find new inspiration.

Environmental problems are a typical example of problem-solving research. When you work with those issues, you have to engage in goal-oriented, problem-solving research. But even after a problem has been solved, it is not the end for university research. We have to bring something back to the university. That is, research has to lead to some stimulus for academia.

Hara: I hear that you have done some research at an overseas institute.

I went to the Lawrence Berkeley National

Laboratory (LBNL) for half a year in 2001. Ernest Lawrence, a famous physicist, established the lab, which brought together many basic science researchers. It includes the Energy and Environmental Technology Division (EETD), a group begun by a basic physics teacher. The group researches energy conservation technology. EETD alone has 200 staff members with a wide variety of backgrounds and specialties, from the humanities to the sciences. For example, a policy research team works next to a team creating energy simulation models for buildings. So the researchers assigned to each theme perform different analysis and evaluation tasks. For example, in a project to write energy conservation standards, some research the potential of a device to save energy and what it would cost. Others study how power supply and demand would change if the standards were changed. Still others figure out how much CO2 and air pollutant emissions would decline as a result of the standards. This organization tackles a wide range of energy conservation fields.

You can only address environmental problems if you bring the knowledge of many different fields together. Of course we need people who specialize in environmental problems, but we cannot solve such complex problems involved in environmental problems unless we also have new perspectives from other specialists. It is essential that individual researchers constantly expose themselves to knowledge from outside their fields.

I have been back in Japan for about 10 years, but most of the research I am doing at Osaka University

today, including energy demand forecasting, was conceived during my time at LBNL. So it was a great experience in that sense too.

Hara: So it seems that broad experience, including overseas, expanded your research perspective.

Perhaps education should incorporate study and experience outside our field. Learning and practicing outside our specialties can give us new points of view. Maybe we should require people to spend 10% of their effort on learning some different specialty. We can learn a lot from our failures and doing things that we never intended or imagined. Giving teachers and students other perspectives beyond their department or field is one of CEIDS's roles, is it not? It can indeed lead us to "design innovation."

Hara: Going forward, what will it take to solve environmental problems?

There are three important points. First, we cannot expect to solve environmental problems unless we expose ourselves to knowledge from a variety of fields. This is what we have been talking about. Second, the style of our approach to environmental problems is crucial. For example, university–industry collaboration has contributed much in the engineering field, where the ultimate goal is to create a product for the so-called industrial world. On the academic side, engineering is greatly stimulated by collaborating with the industrial world. But since solving environmental problems does not necessarily lead to products, the industrial world may not have a clear goal in such a partnership. As in the case with global warming, the problem itself has to be addressed from the field of natural sciences. When we address environmental problems, we need university–society collaboration, which is somewhat different from university–industry collaboration. Third, people trying to solve environmental problems often collaborate with academics from other fields. When we do collaborative research with specialists from fields close to basic research, we should give them new knowledge and research motivation. It is fairly obvious how the science technology and knowledge we get from them helps solve problems, but it is also important that the academics who provided the knowledge get something too. For example, if collaborative research becomes an opportunity to get ideas for subsequent research, there will be more cooperation between researchers beyond the framework of existing fields. If this point were better understood, we would see a lot more interdisciplinary research and cooperation at universities. Hopefully, CEIDS and its meso-level research will make a difference here.

Hara: Finally, I would like to ask if there is anything we should be focusing on to advance meso-level research.

We need to make the concept of meso-level research better known. At this time, only Osaka University is preaching the need for "meso" thinking. As is, we are telling the world what meso-level research is and why meso thinking is necessary, but it's a one-way conversation. Any further advancement of the meso concept and meso-level research will require the outside world to give us their criticism and input on these things. We have to try to make two things clearer: how the meso-level research concept is different from the current way of thinking, and how application of the meso-level research concept can concretely (or effectively) connect visions (objectives) and micro-level seeds (basic research). And it's critical to grow the number of followers and researchers advancing meso-level research. We need to establish the field as an attractive one that will bring in more researchers. That will require some examples of success. I hope to provide such examples by overcoming the issues we discussed earlier. Let us keep up the work.

(Keishiro Hara, Associate Professor, CEIDS;
Yukari Fuchigami, Project Researcher, CEIDS)

7. Announcements from CEIDS

1 CEIDS education and research featured in Osaka University 2013 Environmental Report

Each year, Osaka University publishes an Environmental Report covering the school's initiatives to solve environmental and energy problems. The 2013 edition reported on education and research at CEIDS. CEIDS conducts research to strategically tie different kinds of promising technical seeds, such as the use of solar energy and waste heat, to macro-level social visions (e.g., a low-carbon society) and social needs and promote environmental innovation thereby. While this research is both theoretical and practical, CEIDS always pursues it in a practical manner, focusing on specific "locales," such as Suita City. The Environmental Report specifically focused on variety of CEIDS's education and research programs for environmental innovation. These include CEIDS's "meso-domain research" in partnership with local governments and other parties, human resource development and related educational programs for environmental innovation leaders, and the practice of becoming an energy-saving, low-carbon campus. See page 16 of the 2013 Environmental Report, available at the Osaka University web site (http://www.osaka-u.ac.jp/ja/guide/information/environment [English version is "http://www.osaka-u.ac.jp/en/guide/information/environment/report"]).

2 Environmental innovation seminar with Shanghai Jiao Tong University researchers (October 23)

Osaka University periodically holds seminars with Shanghai Jiao Tong University to promote academic exchange. Osaka University will host this fiscal year's event, the 16th in the series, October 22–24. Research meetings on a variety of academic disciplines will take place during this period. Three researchers from the fields of environmental engineering and environmental law of Shanghai Jiao Tong University will attend the event, entitled "Environmental Innovation and Technologies for Sustainability." A research meeting will take place October 23 in the first-floor seminar room of Building A, Office for University-Industry Collaboration, Suita Campus. Six researchers from CEIDS and the university's graduate schools of Engineering and Pharmaceutical Sciences of Osaka University will also present topics. Participants can look forward to interdisciplinary discussions of a range of themes, including behavior analysis and proper treatment of environmental pollutants, effective use of resources and energy, and the impact of environmental policy on technical innovation. Program details will be uploaded to the CEIDS web site (http://www.ceids.osaka-u.ac.jp/) in early October. CEIDS values its international ties and will continue to use chances like these to strengthen these ties and academic exchange.

3 Osaka University CEIDS/Suita City joint symposium (November 12)

"The Frontiers of Innovative Research in a Creative Technological Society: What cooperative community research at CEIDS aims at"

When: 13:00 - 18:00, Tuesday, November 12

Where: Osaka University Suita Campus
Convention Center, 2nd Floor,
Conference Room 3

Co-hosts: Osaka University Center for Environmental Innovation Design for Sustainability (CEIDS),
Suita City (Osaka)

Participation is free

[Symposium inquiries, registration]

(Please tell us your name and affiliation)

Publisher
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