



Sustainability Report 2018

Toward a sustainable campus

Goal and Step



北海道大学
HOKKAIDO UNIVERSITY

Goal and Step

Hokkaido University developed its Campus Master Plan 2018 through a series of discussions based on the opinions of many, but the plan is a step rather than a goal.

We hope it will help all members of the university community to act with a vision of what kind of university we want and what kind of campus we hope.

CONTENTS

Message from the President	01
Hokkaido University Campus Master Plan 2018	03
“Zoom in!” Campus	07
Research and Education Topics	09
Initiatives by Students, Faculty and Administrative Staff	13
Movements toward the creation of a sustainable campus	17

Hokkaido University after of its New Campus Master

The Hokkaido University Campus Master Plan 2018
The president shares his thoughts about the plan and
for the campus, as well as his expectations for stu-

- This interview was conducted in June 2018.

The president's remarks have been edited by the Sustainable

◆ Improving the campus based on the ◆ Japanese maxim “*fueki-ryuko*”

We at Hokkaido University host numerous people from various overseas institutions, and many of them say that this is the campus they would like to come. After passing through the main gate of the campus, you'll find a verdant central lawn and then a museum area with a historical atmosphere. Continuing on past Ono Pond, you'll find yourself amidst modern buildings. Hokkaido University allows you to engage in cutting-edge scholarship in an environment that's distinguished by lush greenery and a touch of history. In fact, the campus is



the embodiment of *fueki-ryuko*—a Japanese concept often translated as “permanence and change”—as the university changes to meet advances in scholarship and the needs of society while protecting what must remain unchanged.

We recently formulated the Hokkaido University Campus Master Plan 2018 [hereinafter: “the CMP 2018”]. It's a blueprint for the future of our campus and encompasses our plans for research and education, medical care, and university management—not just for buildings and streets on campus.

One characteristic of the CMP 2018 is a clarification of the university's management strategy: adherence to our four basic philosophies and the implementation of the Future Strategy for the 150th Anniversary of Hokkaido University. The university's basic philosophies are “frontier spirit,” “global perspectives,” “all-round education,” and “practical learning,” which originated from the messages of Dr. William S. Clark, the first vice president of Sapporo Agricultural College, the university's predecessor. Dr. Clark said “Boys, be ambitious” and “Be gentleman.” You need a frontier spirit and

the Formulation Plan

was formulated in March 2018. his vision dents and staff of the university.

Campus Management Office.

global perspectives to be ambitious, and all-round education and practical learning are essential to understanding the nature of a true gentleman.

I believe what matters most to a university—the highest institution of learning—is a commitment to personnel development.

For this reason, the CMP 2018 was designed in keeping with the four basic philosophies such that we can foster professionals who are able to lead Japan towards a bright future and play active roles in the global arena to meet the needs of the times as we strive to achieve the five objectives of the Future Strategy with respect to research, education, social collaboration, university administration, and strategic marketing. While promoting world-leading research and education, we must also return the fruits of our academic pursuits to society as a whole, so I'm delighted that the CMP 2018 gives consideration to how the campus, which is widely open to the public, should be used as a public space.

◆ Comprehensive design with a focus on safety and security

Another characteristic of the CMP 2018 is quality-of-life (QOL) enhancement through comprehensive design. We must consider the QOL of users and ensure universal design so people of all ages can enjoy their time on campus while pursuing their aspirations for the future. Sustainability should also be central to campus development in view of global initiatives to achieve the United Nations Sustainable Development Goals (SDGs).

We must design our campus comprehensively, taking into account its resilience, comfort and future outlook, including the protection of intellectual property and personal information, rather than just making buildings safe and secure.

We've been developing campus spaces based on "axes": The Hokkaido University campus has, as its centerline, a main street extending north-south, which is



Toyoharu NAWA President, Hokkaido University

Graduated from the Department of Architectural Engineering, School of Engineering, Hokkaido University. Completed the Master's course of the Division of Architectural Engineering, Faculty of Engineering, Hokkaido University. Doctor of Engineering (Tokyo Institute of Technology). After working for the Central Laboratory of Chichibu Cement Co., Ltd. (Taiheiyo Cement Corp.) and the Central Cement Concrete Laboratory of Chichibu Onoda Cement Corp., he was hired as an assistant professor in the Graduate School of Engineering, Hokkaido University. He was promoted to his current position in April 2017 after holding the posts of professor in the Graduate School of Engineering, member of the Educational Research Council/deputy dean of the Faculty of Engineering and dean of the Faculty of Engineering/dean of the Graduate School of Engineering/dean of the School of Engineering at Hokkaido University. He specializes in building structures and materials, in civil engineering materials, construction and construction management, and in earth and resource systems engineering.

intersected with east-west axes: North 13 Street and North 18 Street. Along these and other axes are zones, each presenting a distinct atmosphere, such as a zone with buildings of historical significance, a zone for the relaxation of local residents, and a health-related zone.

◆ Striving to be an even more appealing university

The CMP 2018 is our vision of Hokkaido University in the mid-21st century. It's a framework plan based on our outlook for the campus 30 years from now. To ensure the plan's steadfast implementation, we've established a structure to promote campus management and decided to formulate an action plan every three years with specifics about campus improvements. If changing times create new situations where we're required to provide novel programs of research and education, we must respond flexibly, but it's also important to preserve what should remain unchanged.

What's important for us is people. Rather than seeking a higher position in the World University Rankings, we'll continuously work to enhance the appeal of our university to attract people. The aim is to make our university a magnet for people all over the world as a research and education hub. I expect that this will foster new research ideas leading to social innovations and that Hokkaido University will play a significant role in the global arena.

I hope that Hokkaido University will become an even more appealing institution as each of us academics ruminates on what roles universities should play in society and what is needed for such roles to be fulfilled.

Hokkaido University Campus Master Plan 2018

HOKKAIDO UNIVERSITY CAMPUS MASTER PLAN 2018

The Hokkaido University Campus Master Plan 2018, formulated in March 2018, offers a vision of the campus and a road map to achieving the vision comprehensively and systematically. Its outline is shown below, but students and staff are advised to read it in full on the website below.

■ <http://www.facility.hokudai.ac.jp/一般の皆様へ/キャンバスマスタープラン> (in Japanese only)



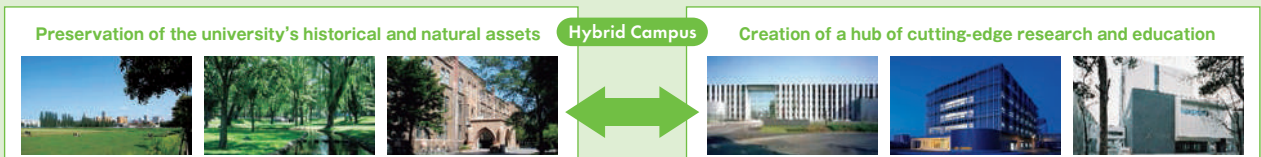
Characteristics of the Campus Master Plan 2018

1 Clarification of the university's management strategy: Adherence to our four basic philosophies and implementation of the Future Strategy for the 150th Anniversary of Hokkaido University



The CMP 2018 clearly defines planned objectives for campus spaces and lays out guidelines for the development, management and operation of facilities and other elements of the physical environment in order to give tangible form to the university's management strategy toward our 150th anniversary.

2 Creation of a sustainable hybrid campus: Preservation of the university's historical and natural assets, and the creation of a hub for cutting-edge research and education



The CMP 2018 presents a vision that guides the university in preserving its landscape, historic buildings and natural environment and in creating a hub of cutting-edge research and education.

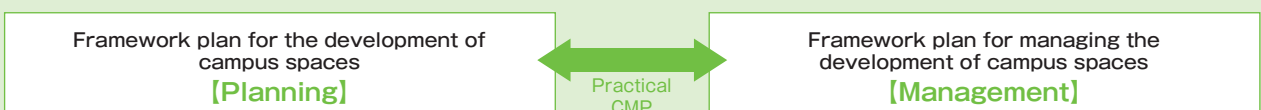
3 Quality-of-life (QOL) enhancement through comprehensive design: Comprehensive design that encompasses processes from conceptualization, planning and design to operation and management



The CMP 2018 is based on consistent, comprehensive design so as to meet the needs of education and research and to enhance quality of life in society.

4 Establishment of a practical long-term plan for the development of campus spaces: Framework plan that consists of Planning and Management for their implementation

Framework plan : Long-term plan for the coming 30 years

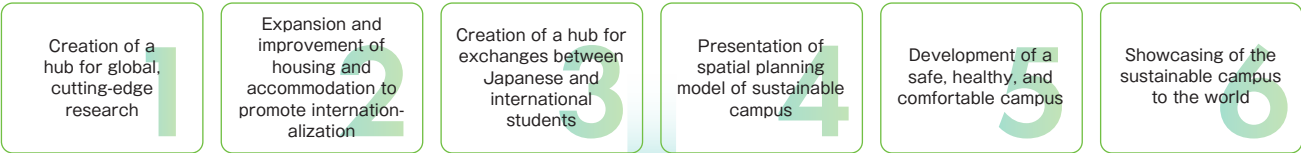


The CMP 2018 consists of Planning and Management for structures and systems that will ensure the effective implementation of those plans.



Basic objectives and concepts of the Campus Master Plan 2018

Challenges facing the implementation of the Future Strategy for the 150th Anniversary of Hokkaido University



Universal values and unique assets on campus that should be preserved

- ①The landscape created by farmland in the city and its surrounding elements
- ②Networks of natural and ecological environment elements
- ③Clusters of historic and cultural buildings
- ④Integration of buildings and their surrounding landscape created over the course of 140 years

Achievements and challenges regarding the campus development

- ①Restoration of the Sakushukotoni River through public-private partnership
- ②Integration of the southern and northern campuses through development of the Kanjo Street Elm Tunnel
- ③Promotion of industry-academia collaboration by leveraging the Northern Campus
- ④Development of active learning spaces to meet new educational needs
- ⑤Development of accommodations for international students to promote campus internationalization using private funds
- ⑥Equipment upgrades and functional expansion to promote advanced medical care for the community
- ⑦Environmental measures that reduce the number of vehicles on campus, and the creation of a safe, secure campus
- ⑧Initiatives to promote campus sustainability
- ⑨Establishment of task forces, the implementation of basic surveys, and the formulation of plans
- ⑩Outside evaluation of the campus
- ⑪Review and assessment of the CMP 2006

Priority issues in facility development and operation

- ①The need for goal setting for strategic investment and appropriate facility maintenance and development in line with the university's management policy
 - Excessive floor area owned by the university
 - Dwindling budgets while rising facility repair and operating expenses
- ②The need for flexible land use and facility development in line with a new framework
 - Small buildings crowding the campus
 - Lack of relatively large blocks of land for development
- ③The need for effective utilization of the university's real estate assets in line with its management strategy
- ④Issues identified using the Assessment System for Sustainable Campus (ASSC)
 - Promotion of education and research on sustainability
 - Conservation of ecological environments and cultivation of trees
 - Implementation of design guidelines for QOL enhancement
 - Introduction of renewable energy
- ⑤Contribution to community development in collaboration with the host city
 - Roles of exchange hubs with advanced urban functions (positioning in the 2nd Sapporo Urban Planning Master Plan)

Opinions and requests from university members

Interviews with Executive Office and department staff, and workshops for students, faculty and administrative staff

Basic objectives of the Campus Master Plan 2018
Creation of a sustainable hybrid campus
 where architectural and landscape assets are preserved and cutting-edge education and research can be sustained

Planning and management through comprehensive design

Concept behind the development of campus spaces

Eight elements of a sustainable hybrid campus

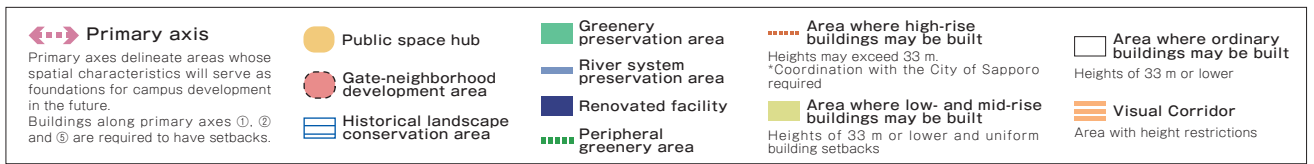
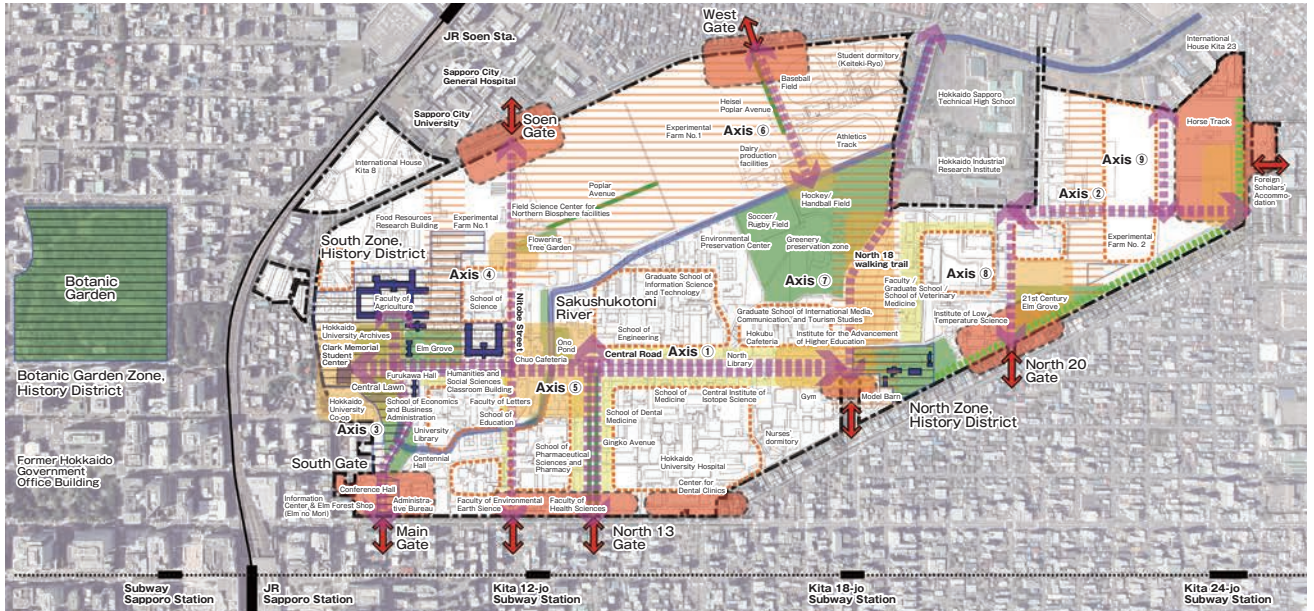
- ①Safety and security
- ②Healthiness and comfort
- ③Appeal as a source of pride
- ④Use of historical assets and ecosystems on campus
- ⑤Integration of architecture and landscape
- ⑥A cutting-edge education and research hub
- ⑦A hub for international activities and exchanges
- ⑧A hub that supports regional development and promotes collaboration with society domestically and internationally.

Concept behind managing the development of campus spaces

Four approaches to the creation of a sustainable hybrid campus

- ①Sharing and promotion of the concept and direction of a sustainable campus
- ②Facility and environmental management that will enhance the QOL of university members and improve university management
- ③Top-down and bottom-up consensus building
- ④Establishment and implementation of comprehensive methods for conceptualization, planning and design to improve the quality of campus spaces

Framework plan for the development of campus spaces



1. Preservation of the basic campus framework, and new east-west axes

The framework plan sets nine primary axes based on the existing north-south and east-west axes to develop human-oriented spaces with symbolic meaning, where architecture and landscape are integrated in a lush green environment.

2. Zoning in consideration of the campus landscape

The framework plan delineates green spaces, river systems and historical resources that are to be preserved for many years to come, in order to lay the foundations for sustainable campus development and to preserve the campus landscape.

3. Revitalization of public spaces and gate areas as hubs for diverse exchanges

The framework plan clarifies hubs for diverse exchanges and appealing activities, and areas that will be developed into safe, comfortable walking and lingering spaces with easy access to urban amenities.

4. Control of building heights and forms to meet development needs

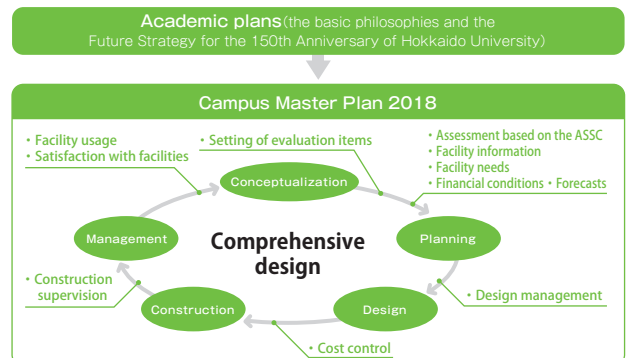
The framework plan promotes ideal campus development and facility improvement by controlling building heights and forms for each area through the conversion of buildings to high-rises, the combination of building uses and functions, and the consolidation of building lots as appropriate.

Campus management

Establishment of an organizational structure to promote campus management

- The Management Strategy Office, established in October 2017 to take charge of overall coordination for the Executive Office, is endowed with decision-making authority over all important matters regarding the promotion of the campus master plan.
- The Sustainable Campus Management (SCM) Office, a campus-wide organization established in April 2018, shares management information with the Management Strategy Office to draft specific plans and projects and plays a leading role in initiatives necessary for the promotion of a sustainable campus.
- The SCM Office is based on cross-sectoral collaboration of teaching and administrative staff and engages in the planning, drafting and implementation of various university-wide work.

Management cycle for the conceptualization and planning of campus management



Effective campus management requires planning from a comprehensive perspective, the implementation of the plan, and a review of the results. With this management cycle, we intend to improve the quality of the conceptualization and planning processes.



Development of the Hokkaido University campus based on the collective efforts of students and staff

Takao OZASA Associate professor, Faculty of Engineering

●A plan that reflects ideals and challenges

I'd like to explain characteristics of the Campus Master Plan 2018(CMP 2018). Let me begin with the first characteristic: "clarification of the university's management strategy." The CMP 2018 illustrates the university's management policies with the development of the campus environment as its goal, because the Future Strategy for the 150th Anniversary of Hokkaido University, developed in March 2014, made no mention of the development of such an environment. By putting that goal into writing, the master plan can get all the students and staff to pull in the same direction.

The second characteristic of the CMP 2018, "the creation of a sustainable hybrid campus," is not a buzzword; it's loaded with meaning: It means keeping our campus sustainable with a harmonious blend of old and new. While developing new facilities to stay at the forefront of research, we'll also preserve Poplar Avenue, the Sakushukotoni River, and plenty of historic buildings as part of our efforts to hand down our 140-year-old legacies for centuries to come. The mission of national universities is to foster professionals who can contribute to the development of Japan. Hokkaido University's predecessor, Sapporo Agricultural College, fostered professionals who engaged in Hokkaido's development. Since the mission remains unchanged despite the changing times, we'll create new facilities to fulfill that mission.

The third characteristic of the CMP 2018 is "quality-of-life(QOL)enhancement through comprehensive design." In campus development, it's essential for organizations such as the Sustainable Campus Management (SCM)Office to be involved early on, for example from the conceptualization and planning phases, in order to collect a variety of information and encourage campus users to improve the master plan, because that will ultimately enhance the quality of facilities, the environment, and the activities of us campus users.

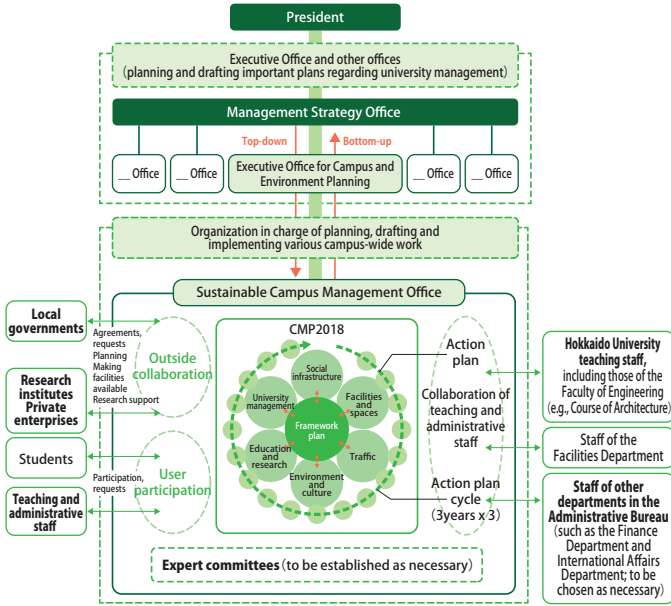
The fourth characteristic, the "establishment of a practical long-term plan for the development of campus spaces," puts a premium on both physical and soft(management)infrastructure due to multitudes of issues facing the university. These issues include the fact that facilities owned by the university occupy more area than required: They occupy 101.5% of the area required, which leaves the university with no grounds for applying to the Ministry of Education for a facility development grant. The issues also include repair costs that have remained high despite the dwindling amount of the man-

agement expenses grant; the crowding of the campus with small buildings, leaving little or no room for new construction; and the lack of dorms for international students. The university will squarely address these realities and strive to implement the plan.

●Action plan that meets the needs of the times

Unlike the CMP 2006, the CMP 2018 includes no action plan. Instead, it contains a framework plan(i.e., basic policy), and we'll develop a specific plan every three years so we can follow the "plan-do-check-act" cycle. For this purpose, we established the SCM Office. However, to develop a sustainable campus, all university members must have a shared vision of what direction they need to be going, so we'll have to build a participatory system under which all university members—students and staff alike—can share the objectives and freely voice their opinions. If there were a mountain ascent, I d feel as if we were halfway to the top. Since we've yet to work on the details of an action plan or to formulate a campus master plan for the Hakodate Campus, your kind cooperation is highly appreciated every step of the way.

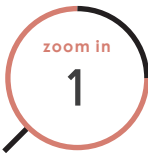
■Organizational structure for the promotion of campus management





“Zoom in!” Campus

This section highlights the appeal of the Hokkaido University campus, which is characterized by humans’ harmonious existence with nature as well as legacies and cutting-edge technologies.



Striving to become a global hub of research and education

1 New Civil Engineering Research Building completed

The Civil Engineering Research Building was completed in September 2017 as a cutting-edge research hub, replacing the School of Engineering’s decrepit Civil Engineering Building. Equipped with facilities for research and experimentation, the new building includes a hydraulic engineering zone and an infrastructure innovation research cluster area based on the concept of “creating an earth/space engineering field of study.” The building includes well-appointed student research rooms and open labs for researchers invited from abroad, as well as lounges conducive to lively communication and cross-cultural exchanges.

◎Some of the energy-saving measures taken

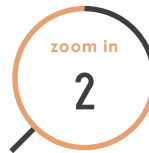
Building Energy required for cooling and heating is reduced by external heat insulation and enhanced airtightness(external walls: 100 mm-thick expanded polystyrene foam; roof: 100 mm-thick rigid urethane foam and 100 mm-thick extruded polystyrene foam; windows: aluminum and resin double sash windows; glass: low-emissivity glass).

Electrical installations Corridors and toilets are equipped with energy-efficient long-life LED lighting fixtures with light sensors and human detection sensors.

Mechanical equipment The air conditioning system features equipment for centralized operation and control, including operation scheduling, temperature-setting limits and a “smart stop” system. The building is also equipped with heat exchanger ventilation fans with a “night-purge” function.



Civil Engineering Research Building
 ■ Building area: 1,385 m² ■ Total floor area: 4,392 m²
 ■ Structure and No. of floors: 4-story reinforced concrete structure



Lab animals include cattle!

2 New facility for pathological education and research opens at the School of Veterinary Medicine



Chemical exposure and infectious disease experiment facility
 ■ Total floor area: 660 m²
 ■ Structure and No. of floors: 2-story reinforced concrete structure

A new chemical exposure and infectious disease experiment facility was opened in August 2017 in order to advance education and research in veterinary infectious diseases and environmental toxicology. The facility’s first floor includes a biosafety level-2 room for large animals such as cattle, and a pathological dissection room for the dissection of lab animals with infectious diseases and the diagnosis of wild animal diseases. On the second floor is a chemical exposure lab.

◎Some of the energy-saving measures taken

Electrical installations Corridors and restrooms are equipped with energy-efficient long-life LED lighting fixtures with light sensors and human detection sensors.

Mechanical equipment The air conditioning system features equipment for centralized operation and control, including operation scheduling, temperature-setting limits and a “smart stop” system. Unit air conditioners feature a variable air volume control device and an exhaust heat recovery heat exchanger. The building is also equipped with heat exchanger ventilation fans with a “night-purge” function.

zoom in

3

An urban oasis for humans and wildlife alike

Flow restoration on the Sakushukotoni River

The Sakushukotoni River, whose flow was restored in December 2003, is a valuable asset that's rich in ecological diversity. The river was dredged for the first time in September and October 2017 due to concerns about possible offensive odor generation and mosquito breeding. The effects of the dredging will be continuously monitored.

Dredging details

- Area: The roughly 750 m from the spring on the central lawn to the boardwalk on the south side of Ono Pond
- Compressed air was injected at the upper reaches to stir up mud and dead leaf deposition and sweep them down the river for removal. Approx. 65 m³ of deposition was removed.
- Stones were placed on the riverbed where rubber had been exposed, stepping stones were secured to the riverbed, and the banks were partially repaired.



zoom in

4

Let's work together!

Campus lawn rejuvenation

The overuse of the central lawn and the lawns near the School of Science / the School of Agriculture caused the ground beneath the grass to harden and become bare. To rejuvenate the grass, a contractor began work that included soil dressing, ground leveling, turf aeration, and seeding in June 2012. Thanks to the work, which cost approximately two million yen, the turf is being rejuvenated, but any acts that impose excessive burden on the turf, including the use of open fire, sports such as ball games, and bicycling, are still not allowed to ensure that the grass will take root firmly.



1 Highlights of Cutting-edge Research

Hokkaido University is conducting cutting-edge research in a wide range of areas. This section highlights some of such programs related to sustainability.

Inter-tillage weeding to produce high yields of rice without fertilizers and agricultural chemicals

Munehide ISHIGURO, professor, Research Faculty of Agriculture

The application of fertilizers and agricultural chemicals has increased crop yields, but has caused environmental degradation. To continue to enjoy the bounties of nature, we must ensure that farming doesn't adversely affect the material cycle and biodiversity. Professor Ishiguro and his colleagues have been researching a paddy rice farming method that enables efficient nutrient circulation—a method in which they till and weed between seedlings during about a month after transplanting. They aim to produce high-quality, high-yield rice while restoring and protecting biodiversity.

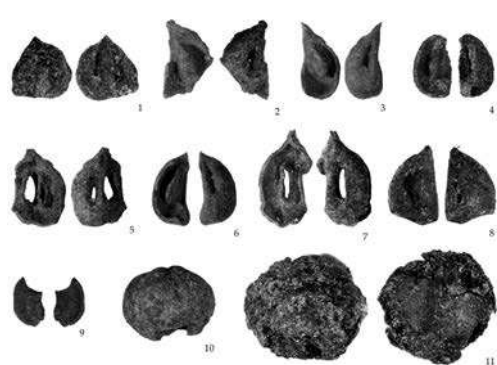


Inter-tillage weeding under way in a study field

Study on sustainable resource use in northern Japan based on archaeological records

Katsunori TAKASE, associate professor, Graduate School of Letters

Dr. Takase and his colleagues have been researching sustainable resource use in Hokkaido based on archaeological records such as seeds and animal bones. Their study on plants, fish bones and mammalian bones at 120 sites (150 analysis units) from the Initial Jomon period to the archaeological Ainu cultural period revealed that, with regard to plants, the use of acorns, grapes (*Vitis*) and other wild plants, as well as barnyard millets (*Echinochloa*), continued for 6,700 years, and that wild plants, salmon (*Salmonidae*) and Hokkaido sika deer were popular resources that were continuously used.

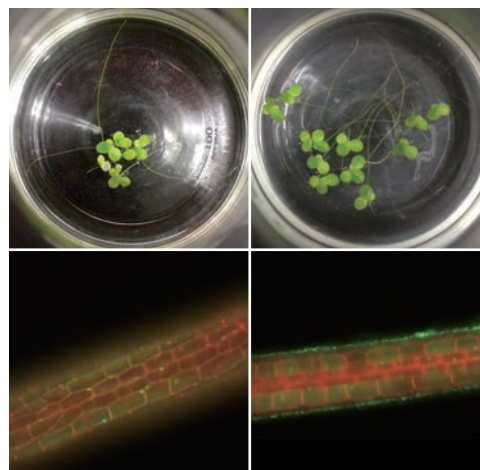


Carbonized seeds unearthed at archaeological sites in Hokkaido

Effective production of aquatic biomass using wastewater

Masaaki MORIKAWA, professor, Faculty of Environmental Earth Science

Duckweed, an aquatic plant, uptakes nitrogen and phosphorous from wastewater, and it is also a biomass feedstock for livestock feed and biofuel production. Professor Morikawa and his colleagues discovered bacteria that promote the growth of duckweed and are working to develop plant growth-promoting technology for application to hydroponic vegetable and crop culturing. The research is garnering high expectations for various purposes, including wastewater treatment at food factories, yield increases at “plant factories,” energy conservation,



Upper photos: Duckweed grown with symbiotic bacteria (right) grows more than twice as fast as duckweed grown without such bacteria (left). Lower photos: Symbiotic bacteria on the roots the green areas in the right-hand photo)

Resilience and adaptive capacity of Arctic marine systems under a changing climate

Sei-ichi SAITOH, director and specially appointed professor, Arctic Research Center

The extent of summer Arctic sea ice has been reduced to two-thirds over the last 35 years, causing concerns about global effects and expectations for the opening of new sea routes and the development of natural resources. In fact, there is insufficient scientific data to make sound judgments about the use of the Arctic region. Given this background, Dr. Saitoh and his colleagues are engaged in an Arctic research project known as the Arctic Challenge for Sustainability (ArCS), working to elucidate climate change, provide accurate future projections and do more.



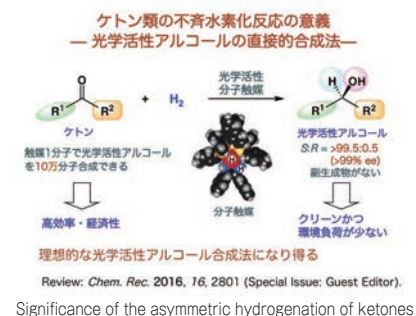
Ice melting caused by rising temperatures and dark ice

Development of catalytic organic reactions

Takeshi OHKUMA, professor, Faculty of Engineering, Director, Frontier Chemistry Center

Attracting attention as one of the world's best catalysts for the asymmetric hydrogenation of ketones is a novel molecular catalyst developed by Professor Ohkuma and members of his lab, the Synthetic Organic Chemistry Laboratory. Add this catalyst, which consists of ruthenium and organic molecules, to ketones and hydrogen, and you'll see a single molecule of catalyst produce 100,000 molecules of optically active alcohol at a high reaction rate—580 reactions per second. Professor Ohkuma and other

lab staff are working to efficiently supply medicines and functional materials in an environmentally benign manner.



Power-to-Heat (P2H)

Shiho ISHIKAWA, specially appointed assistant professor, Graduate School of Information Science and Technology

Solar and wind power generation is affected by weather conditions, so it requires facilities to store the power generated. However, storage batteries remain costly. In light of this, Dr. Ishikawa and her colleagues are studying the potential of power-to-heat (P2H) technology using biogas generator fueled by livestock manure and other organic wastes as well as a heat pump system that produces heat from electrical energy, both of which are installed at Rakuno Gakuen University. These researchers are also working to develop a monitor-

ing system that visualizes the state of energy use at agricultural and livestock facilities.

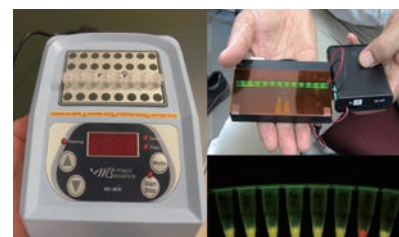


Biogas plant

Development and practical application of cost-effective genetic diagnostic techniques

Yasuhiko SUZUKI, professor, Research Center for Zoonosis Control

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae*, and the early diagnosis of symptomatic and asymptomatic infections is thought to contribute to reductions in the number of new cases. Human African trypanosomiasis (HAT), which is occurring in East Africa, is often misdiagnosed as malaria in the early stages. Professor Suzuki and his colleagues are working to control these diseases by developing affordable gene diagnostic kits for use in clinical settings.



Affordable genetic diagnostic kits

2 Education in Sustainability

Hokkaido University offers many courses relating to sustainability, including the PARE Program, which gives a comprehensive overview of the concept of sustainability. Offered as part of the Hokkaido Summer Institute (HSI), the PARE Program also improves the English proficiency of students and fosters their cross-cultural understanding.

Hokkaido University PARE Program



Hokkaido University PARE Program

The PARE Program aims to foster professionals who are capable of playing leading roles in the development of Asia by resolving challenges related to the Population-Activities-Resources-Environments (PARE) Program. The program consists of "Introduction to PARE" - subjects and a short program that's offered through the collaboration of Hokkaido University and its partner institutions in Indonesia and Thailand, held in Indo-

nesia or Thailand in spring and in Hokkaido in summer. The PARE Program, centered on practical learning, also includes field trips to relevant facilities; fieldwork, including sampling surveys at river banks; group discussions; and seminars on effective presentations and other topics. Lectures, practical training and seminars are given in English. PARE 2017 attracted 50 students from eight countries.

● PARE Program 2017

PARE Program 2017 provided multidisciplinary education on basic subjects in five fields: agriculture, engineering, environmental science, fishery science, and information science. Through lectures, discussions and

fieldwork, students deepened their understanding of challenges facing society. They also discussed communication skills and leadership—qualities required in a global society.

Hokkaido Summer Institute (HSI)



Hokkaido Summer Institute (HSI) is an educational program in which leading researchers invited from around the world provide courses in collaboration with Hokkaido University faculty members. Launched in 2016, HSI offers courses in English, including classes based on active learning as well as field training in the vastness of Hokkaido. In 2017, about 130 researchers from

around Japan and elsewhere gave 96 courses, including those involving archaeological fieldwork on Rebun Island and a case study on tourism in Biei. The program attracted more than 1,500 students, more than 250 of whom were international students from 25 countries.

● Example of HSI 2017

Concept of Sustainable Campus and University Campus Assessment

Lecturers: Maki IKEGAMI, specially appointed associate professor, Office for a Sustainable Campus, and other lecturers
*The affiliation is as of the beginning of the course.

This course focused on the relations between college campuses and living spaces for humans including such campuses, in order to help students understand societal roles played by campuses from various perspectives, including spatial design of living spaces for

humans; interactions between students, faculty and administrative staff, and local residents in such space; campus management designed to improve the quality of the space; and environmental impact reduction.

SUSTAINABLE DEVELOPMENT GOALS



Candle Night 2017 at Hokkaido University

- June 28, 2017
- Area from the Main Gate to Centennial Hall
- Host: Students Council for Sustainable Development (SCSD)
- Co-hosts: Office for a Sustainable Campus, Facilities Department

The Students Council for Sustainable Development (SCSD), a Hokkaido University student organization that promotes campus sustainability, has been hosting the Candle Night event since 2011 as part of the City of Sapporo's Candle Night event. Since 2016, the organizer has enlisted children from the local Horokita Kids' Hall to make drawings to decorate candle containers, in order to forge closer relations with the local community. The candle lighting at 7:20 PM was followed by musical performances from members of Hokkaido University's Guitar Ensemble Club and Jazz Society as well as the Hokkaido University branch of Study For Two (SFT). The event attracted 100 visitors, with some local residents sitting and relaxing on the picnic sheets. The candle light helped to raise public awareness of energy and global environmental issues.



SUSTAINABLE DEVELOPMENT GOALS



Vegetable cultivation open to all Hokkaido University students

- Organization: Hokkaido University Farm Club (student organization)

Despite being originally founded as Sapporo Agricultural College, until recently Hokkaido University hadn't offered any opportunities for students to grow vegetables on campus other than as part of the School of Agriculture's classes or research activities. This changed when a small group of students won first place in the university's Sustainable Campus Contest—an ideas competition for students to help create a sustainable campus—with a proposal for vegetable cultivation open to all students, not just those in the School of Agriculture, in order to raise awareness of food and environmental issues. This is how the Farm Club started. Since its establishment in November





2014, the Farm Club has attracted students from schools across the sciences and humanities. It has about 40 members today including those from Thailand and Finland. Every year, the members grow about 20 kinds of organic vegetables, including tomatoes, potatoes and onions, on two farms with a combined area of 400 m². The members are troubled by the same diseases every year and have some vegetables pecked at by crows just before harvest, but the fruits of their labor taste all the more wonderful after such problems are overcome. Today, the vegetables are for internal consumption only: The members appreciate them at what they call a “harvest festival.” But they aspire to sell them at the Hokudai Marché or elsewhere so that other people can also enjoy them. The members also set their hearts on raising funds to try their hand at cultivating seedlings and growing vegetables in greenhouses.

To join the club or visit their farms, contact them via Twitter or Facebook.



(Left) Representative Seiji Tamada (2nd year, School of Science).
(right) Koki Kikuchi (3rd year, School of Agriculture)
*The academic years are as of June 2018.

SUSTAINABLE DEVELOPMENT GOALS



Competing for the Hult Prize, known as the Nobel Prize for Students

■ **Supporters:** The Institute for the Promotion of Business-Regional Collaboration, the Front Office for Human Resource Education and Development (FOHRED)

The Hult Prize is an international student entrepreneurship competition initiated by a student in the United States in 2009. Today, students from more than 1,000 colleges and universities around the globe pitch their ideas annually to win on-campus and regional competitions to join the Hult Prize Accelerator Program. Six teams are then chosen to take part in the finals held at the UN headquarters. The team that wins the prize, known as the Nobel Prize for Students, receives one million US dollars in start-up capital and support to realize and scale up their enterprise.

The theme in 2017 was “harnessing the power of energy to improve the lives of 10 million people,” and on-campus competitions in Japan were held at more than 15 colleges and universities, including Hokkaido University, where 54 students—22 Japanese and 32 international students—took part with the support of the Institute for the Promotion of Business-Regional Collaboration and the Front Office for Human Resource Education and Development (FOHRED). On a related note, Hokkaido University established a consortium with other universities, including Tohoku University and Otaru University of Commerce, to launch an Entrepreneur Development Program to help students willing to tackle social issues by offering classes on relevant topics, including entrepreneurship and how to pitch ideas.



SUSTAINABLE DEVELOPMENT GOALS



Symposium on Sustainable Regional Development

Striving to make Sapporo the envy of the world

- June 16, 2017
- Hokkaido University Akira Suzuki Hall
- Organizers: Sapporo City, Ministry of the Environment (MOE), Hokkaido University, Ministry of the Environment's Environmental Partnership Office Hokkaido (EPO Hokkaido)

At the UN Sustainable Development Summit of September 2015, the 2030 Agenda for Sustainable Development was adopted, with the international community committed to achieving the Sustainable Development Goals (SDGs) by 2030 in the spirit of "leaving no one behind." Looking toward 2030, the City of Sapporo has also committed itself to the SDGs. Given this background, the city government and other organizations hosted this symposium to share information about regional issues, including economic and social challenges, and initiatives that have been taken to address such issues, and to discuss how private enterprises, local governments and citizen organizations should be involved in efforts to achieve sustainable regional development and how such involvement can produce positive results, such as enhanced corporate value.

Keynote speeches by guests, including Professor Norichika Kanie of Keio University and Mr. Kazutoshi Mitsui, the then director general of the City of Sapporo's Environmental Bureau, were followed by a panel discussion under the theme of "SDGs and Initiatives for the Future of Private Enterprises, Universities and Local Governments." Panelists including Mayor Katsuhiko Akimoto of Sapporo and President Toyoharu Nawa of Hokkaido University discussed how initiatives to help achieve the SDGs can enhance regional appeal.



SUSTAINABLE DEVELOPMENT GOALS



Development of Barrier-Free facilities

Following the enforcement of the "Act on Promotion of Smooth Transportation, etc. of Elderly Persons, Disabled Persons, etc." (the Barrier-Free Act) in December 2006 and the "Act for Eliminating Discrimination against Persons with Disabilities" in April 2016, Hokkaido University developed the Guidelines for University Staff on Promoting the Elimination of Discrimination against People with Disabilities. Based on the guidelines, the university installed accessible restrooms and elevators, but some of them have room for improvement. Accordingly, to clarify and solve issues with facilities and to systematically improve facility environments based on principles of universal design, the university formulated the Barrier-Free Facilities Environment Development Plan 2017.





Hokkaido University Barrier-Free Facilities Environment Development Plan 2017 (formulated in March 2018)

Purpose

The purpose of this plan is to illustrate the present situation and issues of the Hokkaido University campus and present basic directions for the systematic development of a barrier-free campus based on the concept of universal design—the design of products and built environments such that they are accessible to all, regardless of age, disability, or other factors.

Goals

- ① Formulation of a barrier-free campus development plan aimed at providing all students with equal access to education
- ② Development of design standards for buildings and building equipment to realize an accessible campus based on the concept of universal design

Steps toward the plan's implementation

- Accurate understanding of the present situation through the collection of opinions from students of various backgrounds, including those with visual or physical disabilities, chronically sick or medically fragile students, and international students
- Emphasis on steadfast facility development as the top priority, and repetition of the “plan-do-check-act” cycle
- Inauguration of the Universal Design and Barrier-Free Study Group Committee in FY 2017, where staff of the Institute for the Advancement of Higher Education, the Academic Affairs Department, and the Facilities Department are responsible for administrative duties

● Space survey for the establishment of a sustainable campus

- **Period:** February 26 - March 8, 2018 (approx. 64 hours in total)
- **Targets:** 118 accessible restrooms on the Sapporo Campus (excluding the 24 in the Hokkaido University Hospital)
- **Cooperation:** 7 students from the School of Engineering

To grasp the present situation of campus facilities, a fact-finding survey was conducted in which students checked for accessible restrooms on the Sapporo Campus under the guidance of the Universal Design and Barrier-Free Study Group. The survey covered 16 assessment criteria, including whether signs were installed nearby, the entrances were at least 80 cm wide, and non-slip floors were used. The survey results will be reflected in the Annual Barrier-Free Campus Development Plan.



■ The concept and evaluation of a sustainable campus

The concept of a sustainable campus

The concept of a sustainable campus has recently been broadened beyond the notion of an ecological campus with a low environmental impact. As shown in Fig.1, the concept includes the formation of a pleasant campus space that is in harmony with the local community, the creation of opportunities for partnership between the university and external organizations, the realization of a lifestyle with low environmental impact in cooperation with the government, and the solution of regional issues through education and research. A sustainable campus can be defined as “a platform for the university to become a driving force for the establishment of sustainable society.”

*Reference: Maki IKEGAMI and Takao OZASA, Sustainable Campus Assessment System: results and analysis for 2014 – Research on the Sustainable Campus Assessment System Part 4, Summaries of technical papers of the Annual Meeting 2015, Architectural Institute of Japan(selected summaries), pp. 763-766, 2015.

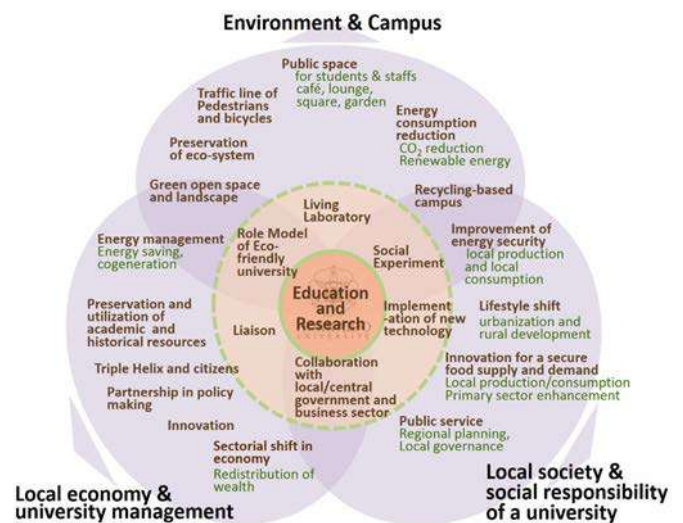


Fig. 1 The Image of Sustainable Campus (M.Ikegami, revised in 2014)

Overview of the Action Plan for Creating a Sustainable Campus

The Action Plan developed by Hokkaido University (official name: Action Plan for Creating a Sustainable Campus) is based on the university’s environmental policy and presents measures to be taken for creating a sustainable society. Since it is important to assess the progress of implementation of the Action Plan, the university’s Office for a Sustainable Campus has established the Comprehensive Assessment System for Environmental Efficiency based on the PDCA (plan, do, check and act) cycle. The system operates throughout the university, with the Sustainable Campus Management Office playing a central role.

The Action Plan 2012, developed in March 2012, was revised to the Action Plan 2016, and a new system for implementing the PDCA cycle was established.

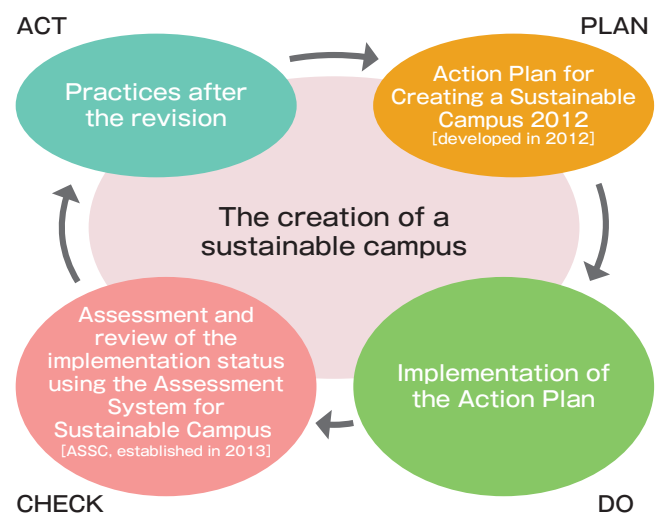


Fig. 2 Concept of the Comprehensive Assessment System for Environmental Efficiency

Assessment System for Sustainable Campus (ASSC)

As a method for assessment (“check”) in the PDCA cycle of the Action Plan, the Assessment System for Sustainable Campus (ASSC) was established in the university. The system covers the four fields of “management,” “education and research,” “environment” and “local community,” under which there are 170 evaluation criteria in total. Annual assessment is conducted for all of these criteria to assess the implementation status of the Action Plan every year. The

university has been assessed using the ASSC since FY 2013, which has enabled the university to effectively develop a detailed annual plan for each successive year. In addition, joint operation of the ASSC by Hokkaido University and the Campus Sustainability Network in Japan (CAS-Net JAPAN) has contributed to the development of strategies by domestic and international universities for the creation of a sustainable society.

ASSC assessment of Hokkaido University in FY 2017

The university’s score for the field of “education and research” in 2017 was higher than in 2016 because the increase in score due to the opening of sustainable campus courses at the Hokkaido Summer Institute (see p.12). Because of a lack of proposal-based projects, the score had dropped in 2016 compared to 2015. For the field of “environment,” the score

increased for “university-wide assessment guidelines (for building heights, density, etc.) in consideration of off-campus landscapes” because areas with building height restrictions were designated as Visual Corridors in the Campus Master Plan 2018 (see p. 05) to protect distant views out of campus.

Movements toward the creation of a sustainable campus

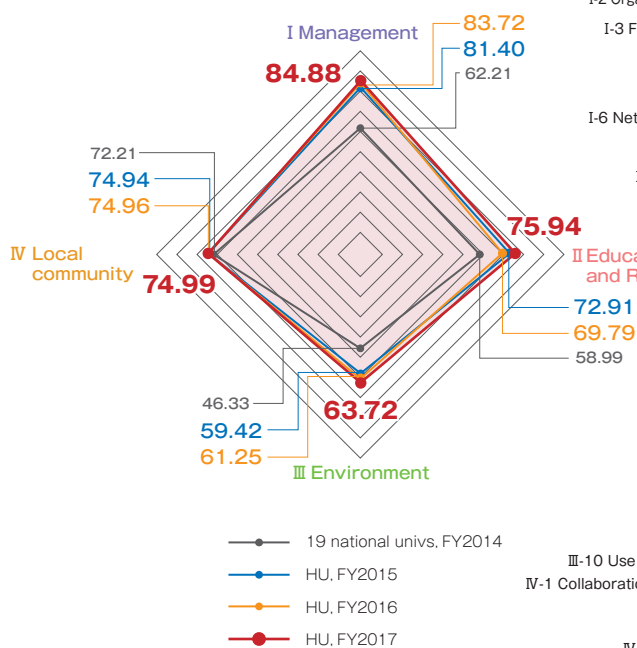


Fig. 3 Score percentages of Hokkaido University in four fields

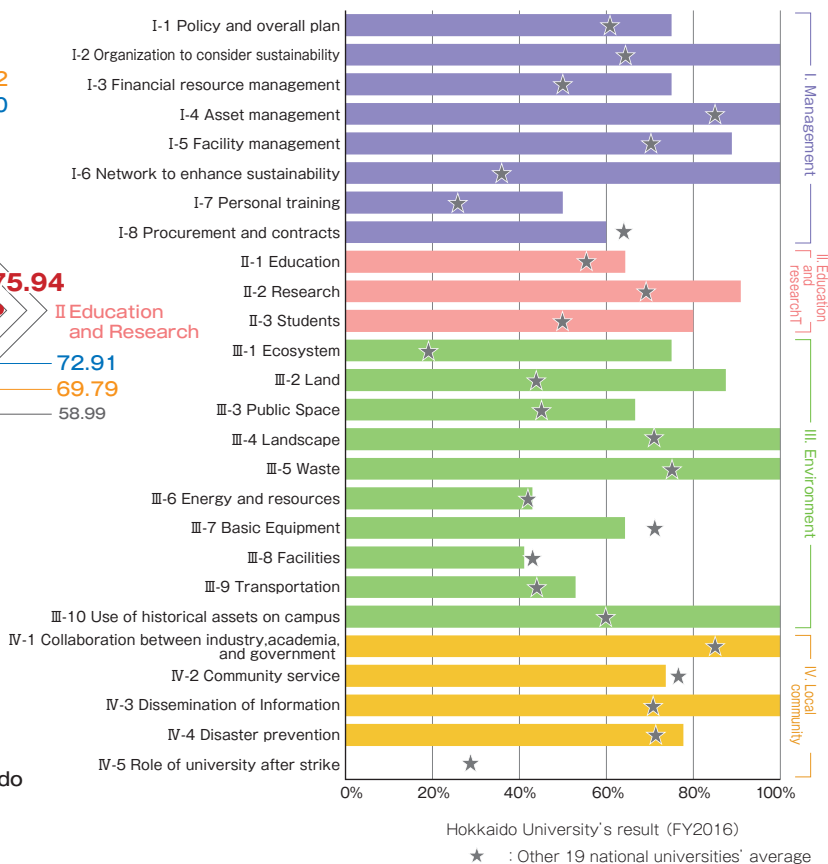
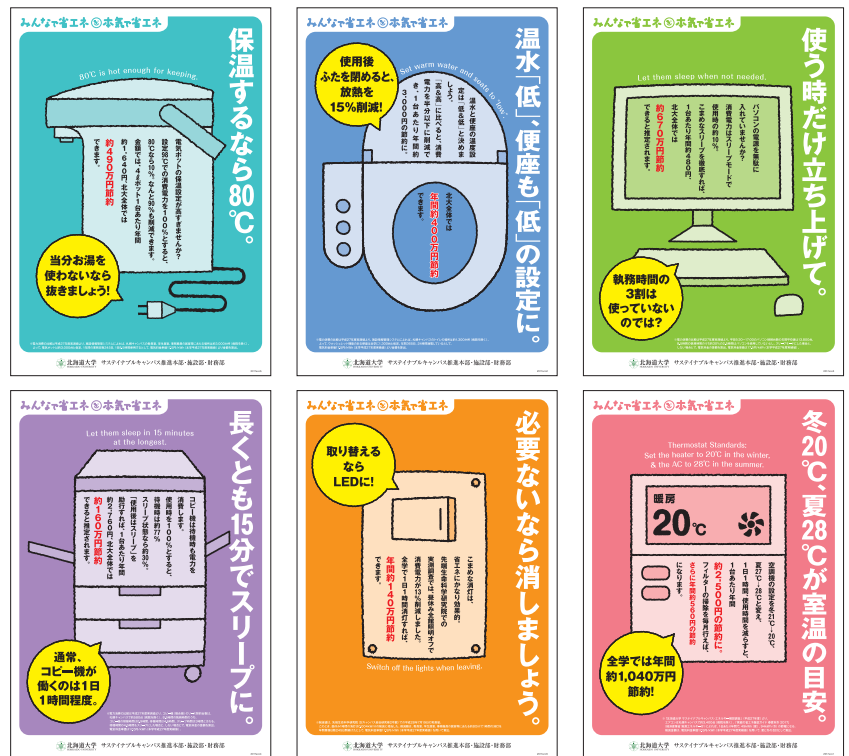


Fig. 4 Score percentages of Hokkaido University by assessment area

Efforts to reduce environmental burdens

Putting up energy saving posters

To ensure that everyone on campus is aware of the need for energy saving, the Sustainable Campus Management Office created posters and has displayed them since December 2017 across campus with the cooperation of all the departments. The posters, with the slogan “Energy-saving Efforts by All” and soft-toned illustrations, describe specific energy-saving effects based on actual measurement data, stressing how daily energy-saving behaviors can save the university significant operating costs. Your cooperation with the university’s energy-saving efforts is highly appreciated—especially if you have considered such behaviors a bother or if you don’t think they’ll make any difference.



Fewer vehicles on campus for CO₂ emissions reductions

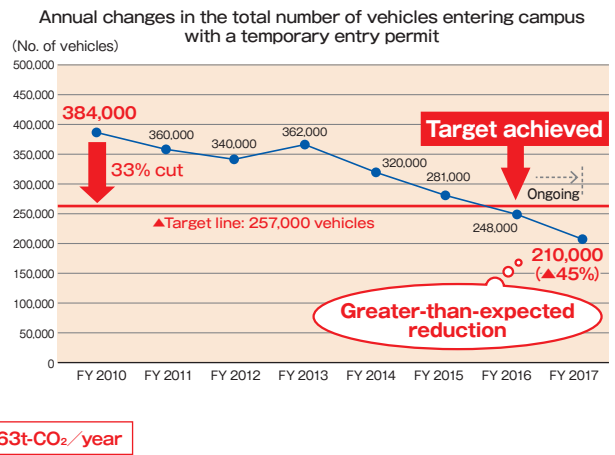
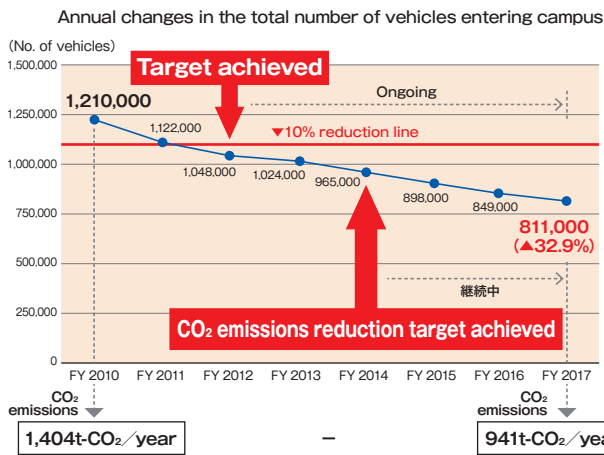
Hokkaido University launched a project to reduce the number of vehicles on campus in December 2008 with the aims of making its campus safer and more secure and of helping to preserve the global environment. The project is four-pronged and covers the following: ① the processing of applications and granting of entry per-

mits, ② the charging of entry fees on vehicles with a temporary entry permit, ③ the operation of loop buses (a means of transport on campus), and ④ the management of vehicle control gates. As shown below, CO₂ emissions fell by approximately 463 t-CO₂ per year from the amount before the start of the project.

Targets and results of the on-campus vehicle reduction project (as of FY 2017)

	Reduction target	Results
Reduction of the number of vehicles entering campus with a regular entry permit	10%	Reduction rate: approx. 32.9% (399,000 vehicles) [Target achieved]
Reduction of the number of vehicles entering campus with a temporary entry permit	33%	Reduction rate: approx. 45% (174,000 vehicles) [Target achieved]
CO ₂ emissions reductions by lowering the number of vehicles entering campus	287t-CO ₂ /year	Reduction: approx. 463t-CO ₂ /year [Target achieved]

■ Annual changes in the number of vehicles entering campus



CO₂ emissions = Annual number of vehicles entering campus x 2.32 (CO₂ emissions per liter of gasoline) x 0.5 (gasoline consumption per vehicle while driving on campus)

*CO₂ emissions per liter of gasoline were calculated based on Article 3 of the Order for Enforcement of the Act on Promotion of Global Warming Countermeasures.

Primary energy consumption (the combined total for the Sapporo and Hakodate campuses)

Primary energy consumption recovered its downward trend, posting a year-on-year decrease of 3% in FY 2017 after a year-on-year increase of 5% in FY 2016 following continuous declines from FY 2013 to FY 2015. Primary energy consumption per total floor area in FY 2017 was virtually the same as in FY 2015. To achieve the goal of annual primary energy consumption reduction of 1.5% per total floor area for

each year until the end of FY 2021 as outlined in the Action Plan for Creating a Sustainable Campus 2016, Hokkaido University must step up its efforts, implementing daily power-saving measures and adopting energy-saving building design standards, because the university failed to achieve that goal in FY 2016 and FY 2017.

Carbon dioxide emissions (the combined total for the Sapporo and Hakodate campuses)

Carbon dioxide (CO₂) emissions from Hokkaido University decreased because the CO₂ emission coefficient of electricity generally stopped rising in FY 2013 and the university's primary energy consumption also fell continuously from FY 2013 to FY 2015. In 2016, however, the university saw an increase in its primary energy consumption again, resulting in a year-on-year rise of CO₂ emissions by 0.5%. In FY 2017, primary

energy consumption fell again, so CO₂ emissions are estimated to fall 2.2% from the 2015 level if the CO₂ emission coefficient of electricity remains the same as that of FY 2016. In FY 2017, electricity accounted for 69% of the university's primary energy consumption, indicating close relations between the university's CO₂ emissions and the CO₂ emission coefficient of electricity.

General and other waste generation

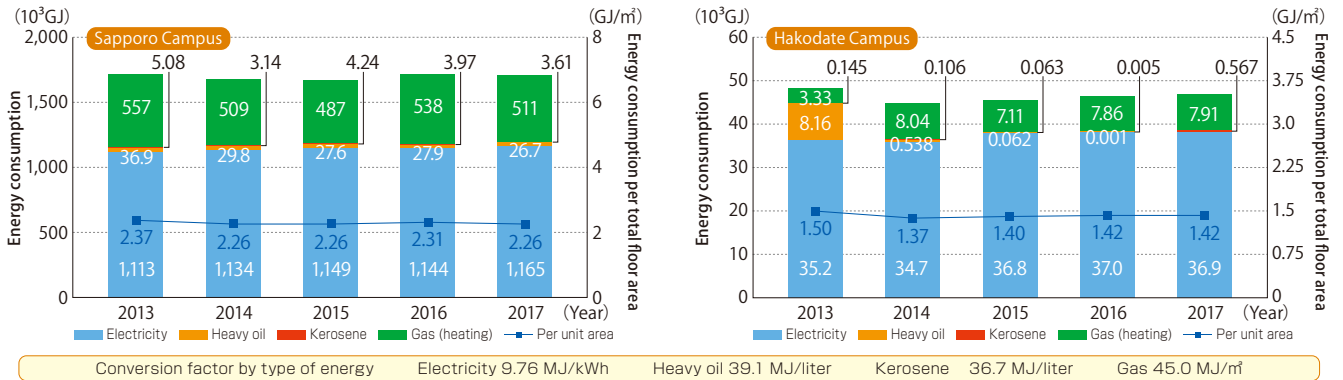
The university's waste segregation policy is paying off. The amount of general (non-industrial) waste (i.e., the total of general waste and waste for fuel) on the Sapporo Campus dropped 16% from FY 2013 to FY 2016, although it edged up 1% in FY 2017 over the previous year. Our future task is to segregate general waste and waste for fuel, because while the total amount of general (non-industrial) waste has been

decreasing, the general waste's share of the total rose from 69% to 87% from FY 2013 to FY 2017.

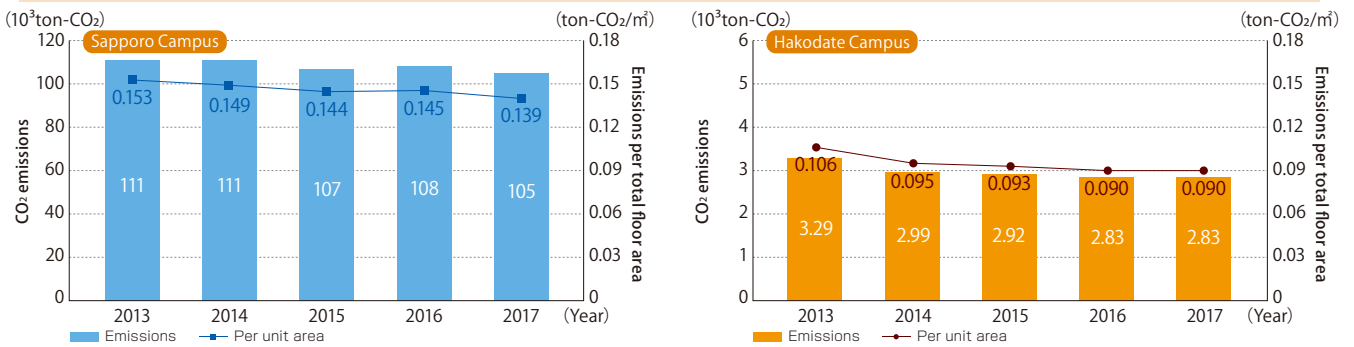
On the Hakodate Campus, the amount of general and other waste (the total of burnable waste, non-burnable waste, plastic waste, bottles, and other waste) increased in FY 2013 and FY 2014 before plummeting in FY 2015, and it has continuously been decreasing as of FY 2017.

Changes in environmental data

Primary energy consumption

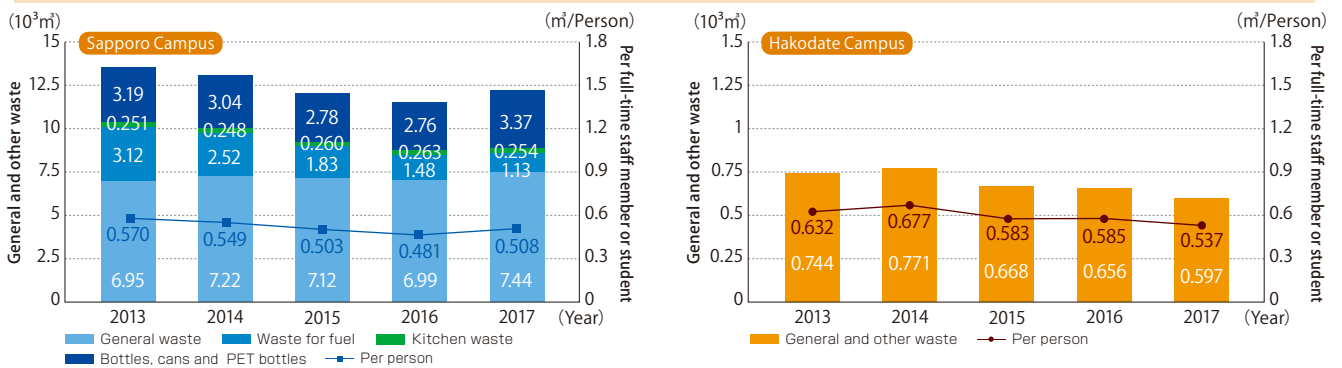


Greenhouse Gas Emissions



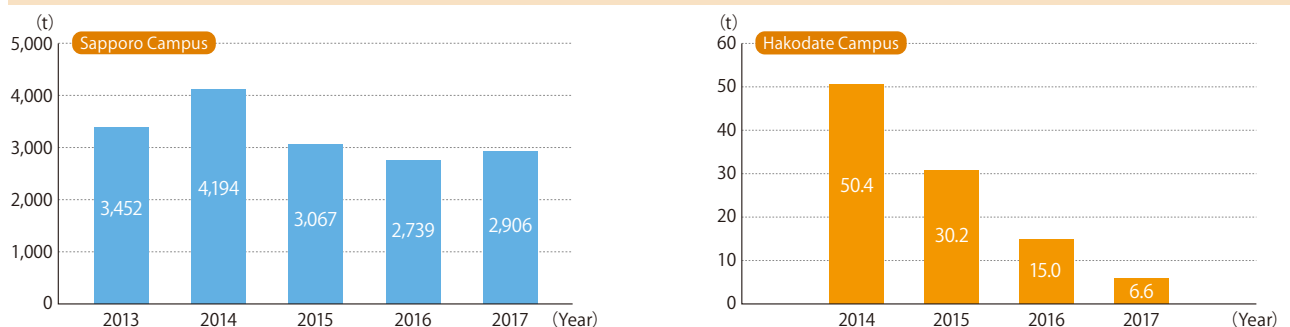
Note: The adjusted emission factor [kg-CO₂/kWh] used for calculation was 0.688 in FY 2012, 0.678 in FY 2013, 0.683 in FY 2014, 0.676 in FY 2015, and 0.640 in FY 2016. Since the value for FY 2017 has not been revealed, the value of FY 2016 was used for FY 2017.

General and Other Waste Generation



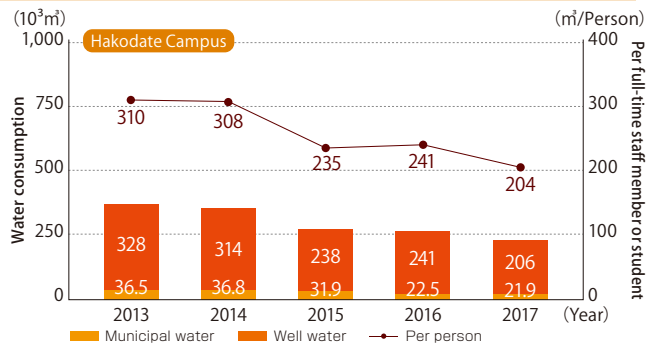
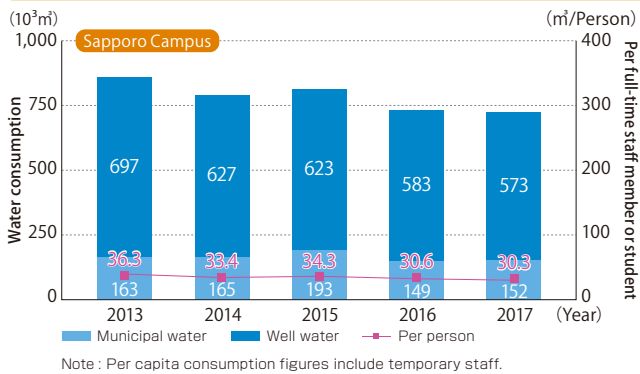
Note 1: "Kitchen waste" refers only to that generated by the university hospital's food preparation facilities.
 Note 2: Per capita generation figures include temporary staff.

Industrial Waste Generation



Note: The figures for the Sapporo Campus exclude waste disposed by individual faculties (e.g., electrical appliances). The figures for the Hakodate Campus include electrical appliances, but exclude plastic waste and mixed waste, which are measured per cubic meter, and infectious waste, which is measured per liter.

Water Consumption



Material balance *Sapporo = Sapporo Campus, Hakodate = Hakodate Campus

Input



Primary energy

- **Electricity** **1,201,666GJ** ([Sapporo] 1,164,761GJ+[Hakodate] 36,905GJ)
- **Heavy oil** **26,705GJ** ([Sapporo] 26,705GJ+[Hakodate] 0GJ)
- **Kerosene** **3,606GJ** ([Sapporo] 3,605GJ+[Hakodate] 0.6GJ)
- **Gas** **519,329GJ** ([Sapporo] 511,414GJ+[Hakodate] 7,915GJ)



Office supplies

- **Paper** **259tons** ([Sapporo]+[Hakodate])
- **“Green purchase” items** **158items** ([Sapporo]+[Hakodate])



Amounts of chemicals handled

- **Chemicals controlled under the PRTR notifications** [Sapporo] **39,247kg** ※none in Hakodate



Water

- **Municipal water** **174,323m³** ([Sapporo] 152,461m³+ [Hakodate] 21,862m³)
- **Well water** **779,159m³** ([Sapporo] 573,471m³+ [Hakodate] 205,688m³)

Output



Greenhouse gas

- **Carbon dioxide** **107,482t-CO₂** ([Sapporo] 104,657t-CO₂+ [Hakodate] 2,825t-CO₂)
*Since the carbon dioxide emission factor of electricity in FY 2017 has not been revealed, the value for FY 2016 (0.640 kg-CO₂/kWh) was used.



Waste

- **Non-industrial waste** **12,789m³** ([Sapporo] 12,192m³+ [Hakodate] 597m³)
[Sapporo] **general waste 7,436m³/waste to be converted to fuel 1,129m³ kitchen waste 254m³/bottles, cans and PET bottles 3,373m³**
- **Waste paper** **568.5tons** ([Sapporo] 556.3+ [Hakodate] 12.3tons)
- **Industrial waste (other than infectious waste)** **2,638tons** ([Sapporo] 2,631+ [Hakodate] 6.6tons)
- **Infectious waste** [Sapporo] **276tons** + [Hakodate] **170liters**



Liquid waste from experimental facilities

- **Inorganic liquid waste** **18,852liters** ([Sapporo] 18,162liters+ [Hakodate] 690liters)
- **Organic liquid waste** **126,880liters** ([Sapporo] 120,400liters+ [Hakodate] 6,480liters)



Kita 8, Nishi 5, Kita-ku, Sapporo 060-0808
Tel.: +81-(0)11-716-2111
URL: <https://www.hokudai.ac.jp/>

Sustainability Report Compilation

Editorial Policy

This Sustainability Report was compiled in line with the Law Concerning the Promotion of Business Activities with Environmental Consideration by Specified Corporation, etc., by Facilitating Access to Environmental Information, and Other Measures (also known as the Environmental Consideration Act) with reference to the Japanese Ministry of the Environment's Environmental Report Guidelines 2012 and 2018.

Organizations Involved

Hokkaido University
Sapporo Campus (incl. contracted commercial operators on campus)
Hakodate Campus

Period

April 2017 - March 2018

Field

Environment

Published

September 2018 (next issue scheduled for September 2019)

Inquiries

Sustainable Campus Management Office
Tel.: +81-(0)11-706-3660
Fax: +81-(0)11-706-4884
E-mail: osc@osc.hokudai.ac.jp

This Sustainability Report is available on Sustainable Campus Management Office website.

 <https://www.osc.hokudai.ac.jp/>



Printed with environmentally friendly vegetable oil ink.