

Sustainability Report 2020

Open up New Frontiers

Sustainability Report 2020



北海道大学
HOKKAIDO UNIVERSITY

Open up New Frontiers

Hokkaido University will fulfill its social responsibilities in order to continue to be a valuable entity based on its four basic philosophies.

In addition, through research and educational activities that look to the future, the university will demonstrate leadership toward the realization of a sustainable society.



Hokkaido University × SDGs Take on the Challenge of Building a Sustainable Society

Yoshinori MURATA

Executive Director, Sustainable Campus Management Office

Executive of Hokkaido University since July 2020. He is responsible for labor management, safety/disaster prevention, facilities/environment management, information, harassment, and the elimination of discrimination against persons with disabilities. He is also the Director of the Executive Office for Campus and Environment Planning, and oversees the planning, improvement and maintenance of campuses and facilities.

Hokkaido University was established as Sapporo Agricultural College in 1876. Under the basic philosophies of “frontier spirit,” “global perspectives,” “all-round education” and “practical learning,” the university has supported the development of Hokkaido through research on agriculture, forestry and fisheries,

In addition to the Sapporo and Hakodate campuses, Hokkaido University has bases inside and outside Hokkaido, including seven research forests, research farms/ranches, and aquatic laboratories, with a total area of approximately 66,000 hectares. We have a wealth of knowledge and experience in conserving research forests, with a total area of over 65,000 hectares under our care.

Meanwhile, the Sapporo Campus is located in the center of Sapporo City, and has a rich ecological environment with vast farmland and diverse vegetation in grounds spread over roughly 1.8 million m². It is a campus where a natural ecosystem and research/educational activities coexist. The Hakodate Campus was established in 1935, when Japan’s only higher education institute for fisheries was relocated to Hakodate.

In a century where environmental concerns take center stage, the university established the Environmental Policy in 2005 and expressed its intention to protect the environment and build a sustainable society through all activities as a national university that supports the foundation of “knowledge” in the

21st century. In addition, since the establishment of the Hokkaido University Initiative on Sustainable Development in 2005, the university has been working to contribute to the creation of a sustainable society through research and education, and at the same time, to serve as a model for sustainability using the campus as experimental venues.

Meanwhile, as a global trend, the Sustainable Development Goals (SDGs) were adopted at the 2015 United Nations Sustainable Development Summit, aiming to enable everyone to enjoy peace and affluence.

This Sustainability Report features a section titled “Hokkaido University x SDGs: Take on the Challenge of Building a Sustainable Society.” This is designed to inform people of the activities and contributions of the university.

It also features the Master Plan for the Hakodate Campus, which was formulated for the first time for the Hakodate Campus.

Practical learning is one of the basic philosophies of the university. If education and research that promote sustainability are the mission of the university, returning the results to the real world is also the university’s mission.

Hokkaido University X SDGs

Special Feature

Challenge to Building of a Sustainable Society

Hokkaido University has continued various efforts in different fields in order to contribute to building of a sustainable society.

Such efforts, of course, are in line with the SDGs (Sustainable Development Goals) adopted by the United Nations Summit 2015, and the accumulation of the efforts has led to global acclaim in 2019 to 2020.

We will consider the history, the present and the future of sustainability of the university.



THE University Impact Rankings 2020
Highly rated for sustainable agriculture and other initiatives



In THE University Impact Rankings 2020 published by the British magazine Times Higher Education in April 2020, Hokkaido University ranked top in Japan (76th in the world) in the overall ranking. This ranking uses the framework of the SDGs to evaluate the degree of the social contribution of universities, and this was its second time the ranking had been conducted. It is attracting a great deal of attention as a ranking alongside THE World University Rankings, which rank high research and educational capabilities.

The university ranked 10th in the world in SDG 2. Zero

Hunger, which was a factor that greatly raised the overall ranking.

In SDG 3. Good Health and Well-being, the university was valued for cooperation with health organizations around the world and regions. In addition, the university was highly evaluated for its longstanding efforts to realize a sustainable society, and made the top 100 in the world in six SDGs: SDG9. Industry, Innovation and Infrastructure; SDG 12. Responsible Consumption and Production; SDG 14. Life Below Water; SDG 15. Life on Land; and SDG17. Partnerships for the Goals.



The Leading Seminar on Science and Technology for Robust Agriculture, Forestry and Fisheries Industry started in FY 2018 for world-class research promotion and social implementation for the realization of a sustainable society. Robotization of agricultural vehicles and machines is one of the research seeds.



In November 2011, the Research Center for Zoonosis Control was designated as the world's first WHO Collaborating Centre for Zoonoses Control. The Unit of Risk Analysis and Management was established.

THE University Impact Rankings 2020 overall ranking (Japanese universities)

Ranking	University	Overall score	2019 ranking
76 th	Hokkaido University	85.3	101 st – 200 th
77 th tie	University of Tokyo	85.1	52 nd
97 th	Tohoku University	83.7	First time to be ranked
101 st – 200 th	Hiroshima University	75.4 – 83.3	201 st – 300 th
101 st – 200 th	Kyoto University	75.4 – 83.3	48 th



International Green Gown Awards 2019

The only Japanese university selected as a finalist in the Sustainability Institution of the Year division



The university was selected as the only finalist in Japan in the Sustainability Institution of the Year division of the International Green Gown Awards 2019. This award is given to higher education institutions for outstanding sustainability efforts.

With the theme of Co-creating Sustainability on Campus: Collaborative Scheme of Faculty, Staff and Students through Actions Triggered by Assessment System for Sustainable Campus (ASSC)*, the university was highly evaluated for the development of ASSC.



With the announcement of the award-winning universities, the award ceremony was held at the United Nations High-Level Political Forum on Sustainable Development in New York on July 10, 2019.



International Green Gown Awards application examples

*Assessment System for a Sustainable Campus (ASSC), see page 19



10th Hult Prize Tokyo Regional Summit

Hokkaido University's "Aquamou"

team won the Regional Summit as the first Japanese team



At the Hult Prize Regional Summit in April 2019, the university's student team "Aquamou" was the first ever winner from Japan. The Hult Prize is the world's largest student entrepreneurship idea competition, and is referred to as the "Nobel Prize for students." Aquamou proposed a freshwater fish farming business using the university's development technology with the aim of solving youth employment and food problems in Africa.

Ms. Ratnayake Sangeetha (2nd year doctoral student, Graduate School of Information Science and Technology) and Mr. Takahiro Nakamura (1st year master's student, Graduate School of Information Science and Technol-

ogy), campus directors of "the Hokkaido University Hult Prize On Campus Program" said, "What we gained at this competition were encounters with friends who have an awareness of the current issues."



A member of Aquamou who devised a business plan utilizing the technology of "super fish," which produces more fast-growing individuals; he holds Nile tilapia in his hands (left) Aquamou members, Hult Prize Director and judges at the Tokyo Regional Summit (right)

Efforts for Sustainability: Achievements and History

The university's efforts began with the establishment of the Hokkaido University Initiative on Sustainable Development in 2005. Since 2007, Sustainability Weeks have been held to promote research and education that contribute to the realization of a sustainable society. The university served as the host at the G8 University Summit in Sapporo in 2008. The Office for a Sustainable Campus

was established in 2010. Then, the university made a major move in 2014 with the Future Strategy 150 to resolve various issues related to the SDGs and achieve goals through educational and research activities. The SDGs Working Group was launched in August 2019 to consolidate, systematize and visualize the university's efforts and to develop strategic activities.



High school and university students from all over the world exchanged opinions at GiFT.

- Joining the International Sustainable Campus Network (ISCN)
- Opening of the Nitobe College special education program
- Development of the Assessment System for a Sustainable Campus (ASSC)
- Transformation of the negative link between population, activities, resources and the environment
- Start of the Graduate Program for Fostering Frontiers of Practical Solutions in a Population-Activities-Resources-Environments Chain (PARE program)
- Formulation of the Action Plan 2012 for Building a Sustainable Campus (SCAP 2012)
- Start of the Sustainable Campus International Symposium (until 2016)

Establishment of the Office for a Sustainable Campus

- Establishment of the Center for Environmental and Health Sciences
- Certification of the Research Center for Zoonosis Control as a joint use/research center
- Start of the GiFT Internet forum in the wake of the Great East Japan Earthquake (until 2016)



In the Sapporo Sustainability Declaration, 27 universities and institutions around the world pledged that universities would be the driving force for the realization of a sustainable society.

- World's first G8 University Summit (host school: Hokkaido University), adoption of the Sapporo Sustainability Declaration



北海道大学
サステナビリティ・ウィーク
Hokkaido University Sustainability Weeks

In SW, symposiums and workshops were held intensively over a short period of time on issues facing humankind. In 10 years, 339 events were conducted and attended by approximately 180,000 people.

SUSTAINABLE DEVELOPMENT GOALS

2030

Hokkaido University contributing to the resolution of global issues

- Selected as a finalist for the International Green Gown Award 2019
 - A Hokkaido University team won the Hult Prize Tokyo Regional Summit
 - Start of SDGs Working Group activities
 - Formulation of the Hokkaido University Campus Master Plan 2018 (CMP 2018)
- The Office for a Sustainable Campus was reorganized into the Sustainable Campus Management Office.**
- Establishment of the Institute for Chemical Reaction Design and Discovery (ICReDD)
 - Formulation of the Action Plan 2016 for Building a Sustainable Campus (SCAP 2016)
 - Start of the STSI program (Inter-university Exchange Project)



2019

2018

2017

2016

2015

2014

Adoption of the SDGs (Sustainable Development Goals) at the UN Summit

- Winner of the Sustainable Campus Award sponsored by CAS-Net JAPAN
- Establishment of the Arctic Research Center
- Establishment of the Innovative Food and Healthcare Master as a COI site
- Formulation of the Future Strategy for the 150th Anniversary of Hokkaido University (Future Strategy 150)
- Establishment of the Global Institution for Collaborative Research and Education (GI-CoRE)
- Start of the East Russia-Japan Expert Education Program (RJE3)
- Establishment of the Campus Sustainability Network in Japan (CAS-Net JAPAN) (incorporator: Hokkaido University)



2020

2026

- Hokkaido University x SDGs website <https://sdgs.oeic.hokudai.ac.jp/>



北海道大学 × SDGs

- Formulation of the Hokkaido University Master Plan for the Hakodate Campus (Hakodate CMP)
- Top in Japan in THE University Impact Rankings 2020 Overall Ranking



HOKKAIDO SUMMER INSTITUTE



Various lectures related to the SDGs are given at the Hokkaido Summer Institute, which is attended by many students from all over the world.

The SDGs are a common language that connects different fields and cultures

Makoto DEMURA, Chair of the SDGs Working Group, Professor at the Faculty of Advanced Life Science

Five years have already passed of the implementation period of the SDGs from 2016. The SDGs become a global standard for each country. work on sustainable development. In THE University Impact Rankings 2020 (SDGs version), Hokkaido University ranked first in Japan, and it can be said that this evaluation was thanks to our efforts over the years toward sustainable development. The university currently has a vision of "Hokkaido University that contributes to the resolution of global issues." The Future Strategy 150 describes a commitment to realize it and its primary goal is to promote world-class research that resolves various issues to create a sustainable society for the next

generation. Hokkaido University set the goal of resolving issues for a sustainable society in 2014 ahead of other universities. This was because we had taken various measures (global strategy, environmental measures, outreach, etc.) and had conducted education and research related to sustainable development since 2005.

A Future SDGs University is where the SDGs are used as a common language and as a communication tool for resolving issues of interdisciplinary/cross-cultural exchanges. We hope that Hokkaido University will be such a university.

Toward the Realization of a Smart Agri-city

In 2022, the Smart Agriculture Education and Research Center (tentative name) will be established at the university. This center will consolidate aging and dispersed experimental buildings and be equipped with research facilities for engineering and information science. Professor Noboru Noguchi, a leading researcher in smart agriculture, spoke about characteristics of the center and the university's initiatives.



Noboru NOGUCHI

Vice Dean/Professor
Research Faculty of
Agriculture

After completing the doctoral course at the Graduate School of Agriculture, Hokkaido University, Professor Noguchi worked as assistant professor and associate professor at the school, then assumed his current position in 2004. He developed the first agricultural robot in 1992, acquired automatic driving technology using GPS at the University of Illinois in the United States in 1998. After returning to Japan, succeeded in developing the world's first full-scale agricultural robot with a Japanese agricultural machinery manufacturer.

Good accessibility

One of the features of the new Smart Agriculture Education and Research Center (tentative name) will be its accessibility. The latest equipment will be available near Sapporo Station, and experimental farms will be right next to the center. That is a rare environment in the middle of a city. It will be a great attraction for students studying here and those who are involved in collaborative research, as well as being a convenient location for those who wish to come and see the research results.

Robotic agricultural machinery goes to the next stage after social implementation

Robotic agricultural machinery has already been put into practical use. Future challenges will be utilization in meso-mountainous regions, realization of high-level work such as the pruning and harvesting of fruit trees, and remote monitoring. In our laboratory, we have been working with the NTT Group to make AI driven unmanned tractors smarter and to put remote monitoring with 5G into practi-

cal use. We are also working on the electrification of agricultural robots.

My thought in 30 years of research experience at Hokkaido University

I feel that we are very fortunate to be able to research cutting-edge agricultural technology at a university located in Hokkaido, a food base of Japan. Above all, people in the region is enthusiastic, understanding, and supportive about the research. It is also wonderful that farmers come to see our experiments and that we can hear their opinions directly. I think these are not only the advantages, but also rewards that Hokkaido University has in tackling smart agriculture. The research farms on campus made our achievement. So, along with the new center, I would like to keep the fundamental facilities like farms.

Smart agricultural technology contributes to the SDGs

Currently, we are involved in introducing smart agricultural technology as national project targeting rice cultivation in Iwamizawa area with the aim of reducing production costs by 50% and increasing farm income by 20%. The labor shortage is the same in Japan and overseas. As food shortages are becoming more serious due to climate change, global warming and population growth, now the world's challenge is how to produce food efficiently with consideration for the environment. In that context, I believe that the innovative technology of smart agriculture will play a major role. We aim to realize a smart agri-city utilizing IoT and AI, and I believe this will contribute to globally supporting the lives of people.



Collaborative tillage work of four unmanned tractors. Collaborative work of multiple tractors is a system inspired by the ideas of farmers (left). The farms attract many visitors from Japan and overseas (right).

Dialog with Stakeholders

Evaluation and Expectation on Hokkaido University's Smart Agriculture.

Contribution: Kayoko YAMAMOTO, editorial writer, the Nikkan Kogyo Shimbun. Yamamoto wrote an article about the center in February 2020.



Kayoko YAMAMOTO

Editorial Writer and Editorial
Board Member
Science and Technology Division
The Nikkan Kogyo Shimbun

After graduating from the Faculty of Science at Ochanomizu University and completing the Interdisciplinary Graduate School of Science and Engineering at Tokyo Institute of Technology, Ms. Yamamoto joined the Nikkan Kogyo Shimbun in 1990. Having covered university-industry-academia collaboration since 2003, she entered Tokyo University of Agriculture and Technology with the theme of industry-academia-government collaboration and obtained a doctorate (academic). She is permanently stationed in the Ministry of Education, Culture, Sports, Science and Technology Press Club.

As a journalist specializing in university-industry-academia collaboration, I have been covering universities for nearly 20 years. University reform in the midst of tight national finances requires both highlighting the aspects of new activities to public and a solid policy to promote such activities at the same time, based on a common understanding of the characteristics and directions of the university. The smart agriculture of Hokkaido University, which I covered earlier, is a good example. A new research/education facility for smart agriculture that makes heavy use of robots, large amounts of data (big data) and the Internet of Things (IoT) is planned to open in FY 2022. 4K images of crop diseases and pests are taken

with an unmanned robotic agricultural machine, transmitted without delay by 5th generation communication (5G) and analyzed by artificial intelligence (AI). Pesticides and fertilizers are sprinkled with a robotic agricultural machine. Hearing about these plans, I wrote an article with excitement.

Meanwhile, what I felt to be sensible is that the new two-story facility with a total floor area of 3,000 m² will be a "consolidation" of four buildings to be demolished, including small, old experimental buildings. Although it will be a space for researchers from the Field Science Center for Northern Biosphere and the School of Agriculture as well as engineering and information fields, the area of the new building is planned to be about 80% of the total area of the conventional buildings. The space used by only few researchers will be reduced, and space efficiency will be promoted through shared use to curb maintenance costs. I was impressed that it is a sustainable initiative that values public funds and various resources.

In addition, Hokkaido University ranked first overall in Japan in THE University Impact Rankings 2020 (see page 3). Although individual departments are highly independent at large-scale universities and their activities tend to be disjointed, Hokkaido University's awareness as a whole of sustainability is a strength. I hope it will be cherished in the future.

Cultural assets and cutting-edge technology on the farms of Hokkaido University

Tetsuya AIKOH, Advisor to the President (Executive Office for Campus and Environment Planning),

Associate Professor, Research Faculty of Agriculture

Member, Steering Committee/Campus Management Committee, Sustainable Campus Management Office

We would like to address of thanks to Ms. Yamamoto for her valuable opinions and compliments.

On the north side of the campus, there is the Model Barn, a group of buildings designated as an Important Cultural Property. Dr. Clark ordered the construction as a model for the modernization of Japanese agriculture. Our campus and farms have developed as a place to research the latest science and technology while cherishing the aged, traditional facilities.

Agriculture has many roles to play in a sustainable

society. Meanwhile, the number of farmers is decreasing and the population is aging, and underuse of Satoyama landscape, village-vicinity mountains is one of the causes of animal damage and biodiversity deterioration. Smart agricultural technology is expected to develop in various perspective. The farms of Hokkaido University, which have long conveyed the cutting edge of Japanese agriculture, will confront the various issues to be solved, as well as new initiatives to mark a new history.



University Campus to be Developed with Users

Users, including students, faculty and staff, take the initiative in thinking about what the campus should be and taking action. Such new initiatives have begun in various parts of the university. Here are two examples that have the characteristics unique to our university.



01 Faculty of Engineering + Sustainable Campus Management Office Advanced Studio on Architectural and Urban Design I

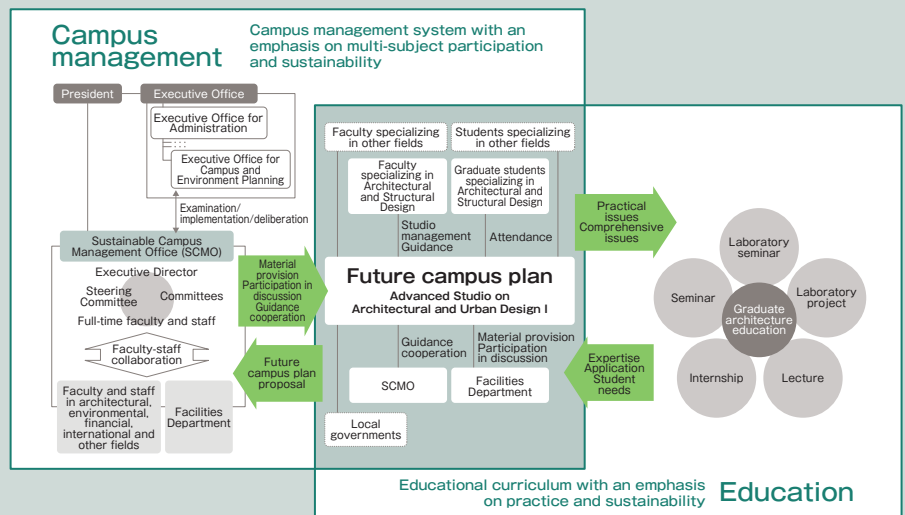
Educational program through collaboration between the graduate school and the campus management organization

In April 2018, the university established the Sustainable Campus Management Office (SCMO) to promote university-wide campus management through collaboration between faculty and staff. Taking advantage of this faculty-staff collaborative system, we devised a new educational program referred to as the "Future campus plan which students and the university create together."

Since FY 2018, this plan has been implemented as Advanced Studio on Architectural and Urban Design I (3 credits) in the Division of Architectural and Structural Design at the Faculty of Engineering in collaboration with the SCMO and the Facilities Department.

The subject of the seminar is an actual project that was considered in the Campus Master Plan 2018 (CMP2018). The purpose of the seminar is to develop effective planning and design skills.

Studio implementation system





The results of the studio are fed back to campus management

A major feature of the studio is that it has both an educational effect, such as students gaining practical experience, and an effect on campus management, such as being able to reflect the opinions of students in the plan.

In the 2019 studio, students considered a future campus plan for the areas for "the Institute for the Advancement of Higher Education" and "the Schools of Letters/Edu-

cation/Law/Economics and Business" based on the data of the facilities shown in "Hokkaido University plan for Extending the Service Life of Infrastructure" (see page 17). The results are proposed and reported to the SCMO, and then used for concrete planning. In the future, planning will be made in collaboration with more stakeholders, including related departments, local governments and residents.

Effects on graduate education

- Experience of practical discussions with actual stakeholders
- Equivalent to practical training as an internship-related subject
- Formulation of practical-level plans using actual management data
- Practical comprehensive planning from conception to planning and design

Effects on campus management

- Increase of examination time and personnel
- Re-verification of individual plans of CMP2018
- Improvement in the quality of campus planning with user involvement
- Embodiment of the future vision for the campus at the basic concept stage

Campus facility reorganization plan created in FY 2019 (rolling plan)

The Institute for the Advancement of Higher Education



The Schools of Letters/Education/Law/Economics and Business



The problems included a high-density building area due to a lack of land for buildings and a lack of control due to temporary and individual expansion and renovation, so after the investigation of the use of facilities, flow lines and common spaces, a rolling plan was formulated.

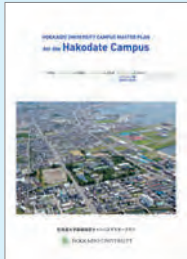
Winner of the Sustainable Campus Award 2019!

For the initiative of the seminar, the university won the Sustainable Campus Award 2019 sponsored by the Campus Sustainability Network in Japan (CAS-Net JAPAN) in November 2019. The award has been given annually since its inception in 2015 to outstanding initiatives to build a sustainable campus.



Sustainable Campus Award 2019 ceremony

02 Campus Master Plan for the Hakodate Campus



The Sustainable Campus Management Office and the Executive Office for Campus and Environment Planning formulated "Hokkaido University Campus Master Plan for the Hakodate Campus" in March 2020. This is the first master plan for the Hakodate Campus. While following the basic goals of the Campus Master Plan 2018, discussions were held with students, faculty and staff, related parties and local residents to formulate a concrete plan based on the actual conditions of the Hakodate Campus.

Details are shown on the website below.

http://www.facility.hokudai.ac.jp/wp-content/uploads/2020/04/2020-2026hakodate_cmp.pdf
(Only in Japanese)

Taking advantage of the small scale, it reflects the user's voice more

Associate Professor,
Faculty of Engineering

Takao OZASA

Member, Campus Management
Committee,
Sustainable Campus
Management Office
Campus Master Plan Formulation
/Realization Working Group



The university formulated the campus master plan in 1996 ahead of other national universities in Japan, and began to operate the third Campus Master Plan in 2018 (CMP2018) after the second plan in 2006. In the previous two plans, there was almost no thought given to the Hakodate Campus, but to solve this problem, it took approximately two years to examine and formulate CMP2018.

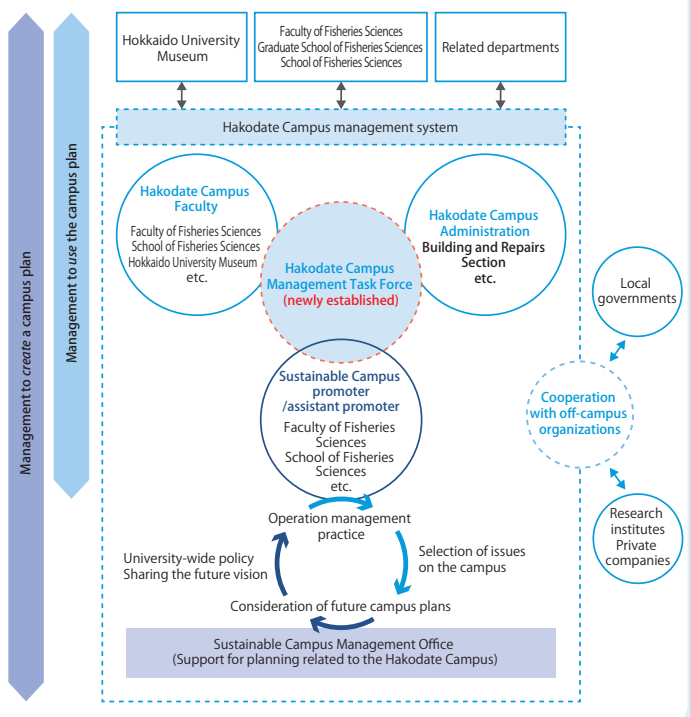
The purpose of a campus master plan is not just to create a plan, but to know how to operate the plan and how to achieve the plan's goals. Therefore, in order to reflect the voices of users more than in CMP2018, we took advantage of the small scale of the Hakodate Campus to conduct on-site hearings, questionnaires, workshops, opinion exchange meetings with users, including students, faculty and staff, and thoroughly examined what kind of issues there are and what we need to achieve.

While various issues were highlighted and the awareness of the issues was shared, the establishment of the Hakodate Campus Manage-

ment Task Force, an organization that embodies plans, was a major step. In the future, it is hoped that Hakodate and Sapporo will work together to implement this master plan.

Hakodate Campus management system

The daily management (management to use the campus plan) of the Hakodate Campus will be led by the newly established "Hakodate Campus Management Task Force", which will build an implementation system through collaboration between faculty and staff while reflecting the requests of students, faculty and staff.



Framework Plan for Space Development

Based on the “concept of space development,” which follows CMP 2018, the characteristics of the Hakodate Campus and the priority planning issues, this skeletal structure and land use plan is intended to be realized over a long period of 30 years.

- 1 Establishment of guidelines for campus skeleton formation
- 2 Establishment of zoning hubs that help to create order in land use
- 3 Establishment of facilities to be updated preferentially and areas to be developed
- 4 Reorganization of public spaces connected to the community and gate-neighborhood areas
- 5 Positioning of natural assets that form the basis of the scenery unique to the Hakodate Campus



Cherry blossom trees in front of the lecture building

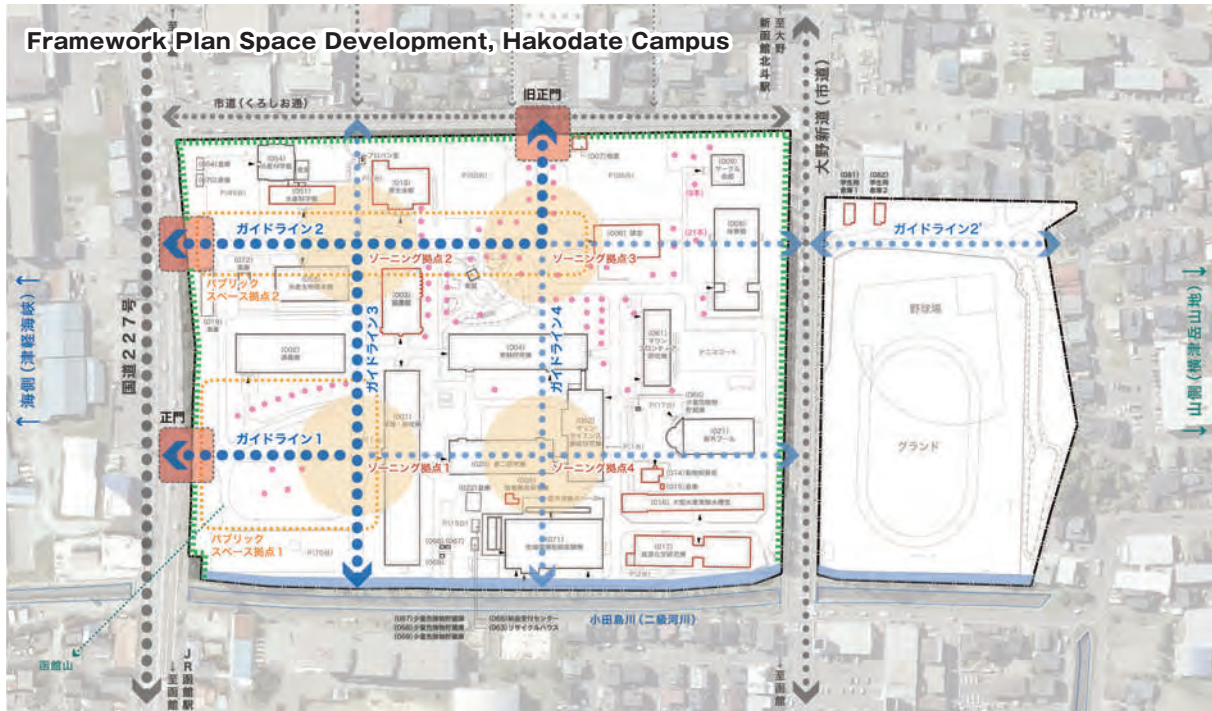


Odajima River, which is also a habitat for waterfowl



Green space to commune with water on the north side of the experimental training building

Framework Plan Space Development, Hakodate Campus



A3 : S=1/1500



Research and Education Topics

Awards, Certification and Establishment

Winner of the 6th World OMOSIROI Award

Yoshitsugu KOBAYASHI, Professor, Hokkaido University Museum

Professor Yoshitsugu Kobayashi, a well-known dinosaur hunter, won the World OMOSIROI Award in 2019. This is an award held by Knowledge Capital, an institution for the creation and interchange of ideas, to showcase "interesting and fun" around the world. Professor Kobayashi studies dinosaurs in Alaska in the United States, the Gobi Desert in Mongolia, and in Japan. In recent years, he has unearthed the complete dinosaur skeleton from Hobetsu, Mukawa Town, Hokkaido, and named it *Kamuy-saurus japonicus* (the god of dinosaurs in Japan).



Complete skeletal structure of Kamuy-saurus

Selected as a Researcher with Nice Step

Motohiro SATO, Professor, Faculty of Engineering,

Professor Motohiro Sato was selected as a researcher who has made a significant contribution to science and technology (Researcher with Nice Step) in 2019 by the National Institute of Science and Technology Policy (NISTEP) of the Ministry of Education, Culture, Sports, Science and Technology. He was recognized for his study that has clarified the reason why bamboo is stiff yet lightweight Professor Sato focused on the spatial distribution of the vascular bundles in wild bamboo, and clarified the secret of its flexural rigidity proving its optimal design with structural mechanics by using the linear elasticity theory.



Measurement in bamboo forest

Acquisition of the European Association of Establishments for Veterinary Education certification

In December 2019, the Cooperative Veterinary Education Program provided by the School of Veterinary Medicine at Hokkaido University and Obihiro University of Agriculture and Veterinary Medicine was certified by the European Association of Establishments for Veterinary Education (EAEVE). This certification means that the veterinary education is of European standard and has international applicability. The two universities started the cooperative veterinary education program in FY 2012. Hokkaido University is characterized by education and research on companion animal clinical practice/infectious diseases and life sciences, while Obihiro University of Agriculture and Veterinary Medicine is characterized by education and research on industrial animal clinical practice and food hygiene.



At the press conference on the acquisition of the EAEVE certification at the Ministry of Education, Culture, Sports, Science and Technology in December 2019

Development and Continuation of Education

Learning with researchers who are active on the front lines of the world

Hokkaido University launched the Hokkaido Summer Institute (HSI) in FY 2016. This is a program in which world-leading researchers with excellent educational and research achievements provide education at Hokkaido University in collaboration with the university's faculty members. During the period, students can attend many cutting-edge and attractive classes that contribute to global human resource development, such as active learning-type classes and field training that makes the best use of the advantages of Hokkaido.



Courses offered

Please check the course page for a list of course subjects.

*In HIS 2020, some courses have been canceled due to the spread of COVID-19.



<https://hokkaidosummerinstitute.oia.hokudai.ac.jp/>

Report of the Hokkaido Summer Institute 2019

University's challenges for the realization of a sustainable society

Learning about sustainable campus initiatives through the planning, operation and implementation of university campuses

Lectures were given on concepts related to sustainability issues, in which students learned about the interdependence of social factors that form sustainability issues, such as green space maintenance and farm roles. In addition, students experienced how to find solutions to social issues through discussions and presenting their thoughts.

The universities where the students are enrolled were diverse, such as in the United States, China, Hungary, and Indonesia, and their majors included engineering, economics, and psychology.



Maki IKEGAMI, Specially Appointed Associate Professor
Sustainable Campus Management Office, Hokkaido University

Ariane KÖNIG, Senior Researcher
University of Luxembourg

Tomohiro MITANI, Associate Professor
Field Science Center for Northern Biosphere, Hokkaido University

Takao OZASA, Associate Professor
Faculty of Engineering, Hokkaido University

Chiori ITO, Director
Chiori design

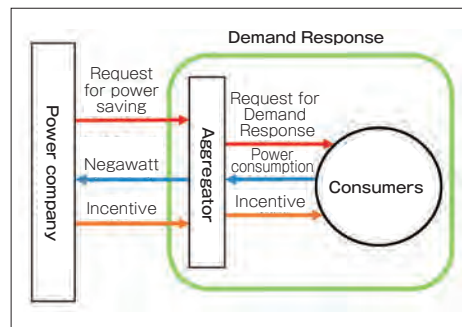
Highlights of Cutting-edge Research

Adjusting electricity usage to maximize its economic value



Koichi KOBAYASHI
Associate Professor
Faculty of
Information Science
and Technology

Associate Professor Koichi Kobayashi and his group have successfully developed demand response analysis/control technology. Demand response means controlling the electricity usage of end-use consumers in order to balance the demand (consumption) and supply (power generation) of electricity. Specifically, it ensures a stable supply of electricity by setting the electricity rate for each time zone and other methods. Associate Professor Kobayashi, et al. have developed a demand response control technology that considers both power generation costs and adjustment costs using a method referred to as "model predictive control." In the future, consideration will be given to the fusion of demand response and the utilization of electric vehicles and storage batteries.



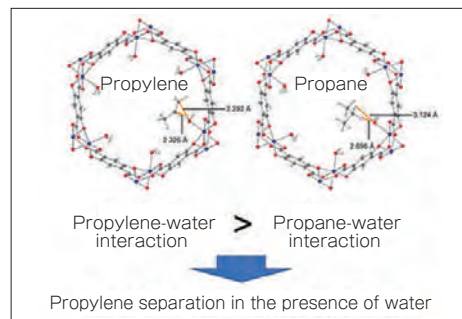
Aggregators in energy management systems

Expected as a new energy-saving hydrocarbon gas separation method



Shinichiro NORO
Professor
Faculty of
Environmental Earth
Science

Professor Shinichiro Noro and his group have clarified that hydrocarbon gas can be separated even if water molecules coexist. To refine hydrocarbon gas with an intramolecular double bond, such as propylene, it is necessary to separate the gas from other kinds of hydrocarbon gas. It is currently refined by a costly distillation method. Professor Noro et al. conducted experiments with water in a porous material capable of selectively separating propylene, and demonstrated for the first time in the world that propylene separation performance was almost maintained even in the presence of water.



Selective separation of propylene

Development of a strong adhesive that can be used repeatedly in seawater



GONG Jian Ping
Professor
Faculty of Advanced
Life Science

Professor Gong Jian Ping and her group have developed an adhesive that can adhere quickly and strongly in seawater and can be used repeatedly. Most artificial adhesives cannot be used in water, but organisms such as mussels and barnacles can adhere firmly to rocks in seawater by secreting adhesive proteins. Professor Gong Jian Ping et al. designed the chemical structure with reference to the adhesive protein of the marine periphyton and developed the world's first strong adhesive that can be used repeatedly in seawater.



Novel gel-like adhesive obtained in this study, which has high strength and elasticity

The guidelines led by Hokkaido University are issued as new international standards



Yuichi HIRATA
Associate Professor
Central Institute of
Isotope Science

Radiotherapy systems for pinpoint irradiation to cancer cells have long been developed. However, there had not been global standards that ensure their safety, hence, the establishment of new standards was required. Professor Hiroki Shirato, Associate Professor Yuichi Hirata and their group received support from the Ministry of Economy, Trade and Industry in 2011 and began to formulate standards to improve the safety of real-time tracking of radiation therapy systems at the International Electrotechnical Commission (IEC). The international standards were compiled as guidelines for real-time adaptive radiotherapy systems and received 100% approval in an international vote in October 2018.



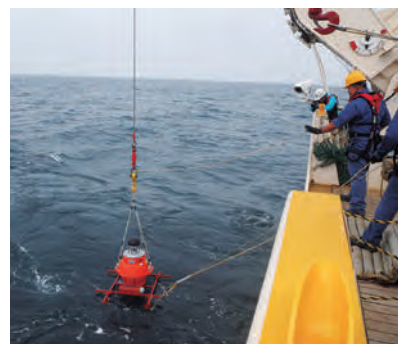
Associate Professor Hirata at the Industrial Standardization Project Awards ceremony

Observing crustal movements on the seafloor with equipment installed in the Kuril Trench



Hiroaki TAKAHASHI
Professor
Institute of Seismology
and Volcanology,
Faculty of Science

In cooperation with a Tohoku University group, Professor Hiroaki Takahashi and his group have successfully installed a submarine reference station that directly measures the accumulation of strain, which causes earthquakes, in the waters off Nemuro, Tokachi in the southern part of the Kuril Trench. There is some possibility that huge tsunami will seriously damage this coastal area. In the future, the group will clarify the accumulation status of strain by measuring about once a year and acquiring the data, which is expected to contribute to disaster prevention measures such as predicting earthquakes and flooding from tsunamis.



Equipment for observing crustal movements is being lowered from the ship

Predicting the effects of global warming on the distribution of kelp in northern Japan



Masahiro NAKAOKA
Professor
Field Science Center
for Northern Biosphere

Professor Masahiro Nakaoka, Postdoctoral Fellow Kenji Sudo and their group have clarified that the distribution area of kelp in northern Japan will decrease significantly in the future, and that multiple species are likely to disappear from the waters of Japan. The research group collected distribution information on 11 major kelp species distributed in northern Japan in different periods in time using the existing biodiversity database, estimated the distribution area before global warming became a significant threat, and predicted distribution change over the next few decades. It was predicted that the distribution area of all species may move northward significantly or the suitable habitat may disappear.



Kenji SUDO
Postdoctoral Fellow
Field Science Center
for Northern Biosphere



Kelp seaweed bed on the coast of Akkeshi Bay in Hokkaido



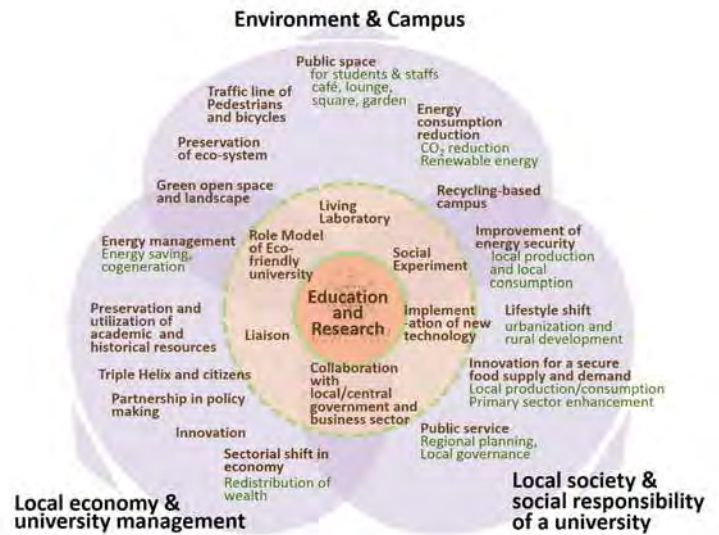
Movements toward the Creation of a Sustainable Campus

Campus Management that Contributes to a Sustainable Society

Sustainable campus concept

On April 1, 2018, the Sustainable Campus Management Office (SCMO) was established at Hokkaido University. SCMO promotes efforts to build a sustainable campus in conjunction with the Hokkaido University Campus Master Plan 2018 (CMP2018).

A sustainable campus means a university that contributes to the construction of a sustainable society through education, research, social collaboration and campus development. It refers to supporting the well-being of society in a practical and multifaceted manner by developing education and research rooted in social issues and implementing campus development in harmony with the surrounding area.



Visual representation of sustainable campus (Ikegami, SCMO, revised in 2014)

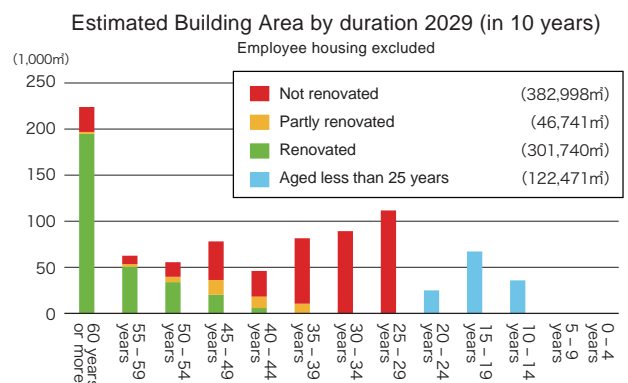
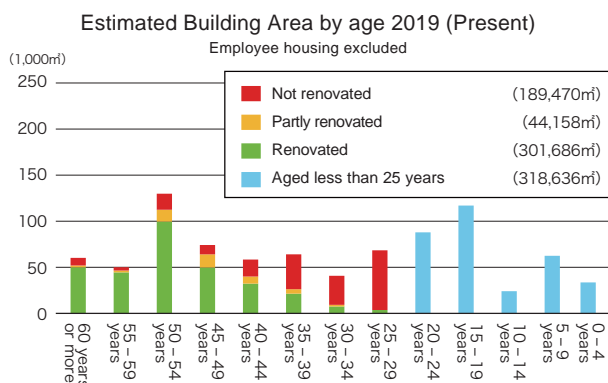
Formulation of the Plan for Extending the Service Life of Infrastructure (CMP2018 action plan)

Tradition and aging - opposite sides of the same coin

In Hokkaido University, which boasts a tradition of 150 years, approximately 20% of all the facilities were 25 years or older and needed to be renovated as of 2019, and most buildings will be 60 years or older by 2029. As a focus of medium- to long-term efforts to accurately understand the current status of the university's infrastructure (buildings and core facilities) and steadily promote maintenance and renewal, the Plan for Extending the Service Life of Infrastructure (action plan) was formulated in March

2018, and the Plan for Extending the Service Life of Infrastructure (individual facility plan), which shows specific measures for individual facilities, was formulated in March 2019. With the three pillars of "building maintenance cycle" "reduction/leveling of total costs", and "promotional system for extending the life of infrastructure", educational and research facilities are maintained so that students, faculty and staff can use them without worry.

Estimated building area of Hokkaido University by age



Formulation of “Policy on Ecosystem Preservation and Management” (CMP2018 action plan)

In February 2020, “Policy on Ecosystem Preservation and Management” was established as an initiative for the management, preservation and utilization of the ecological

environment on the Sapporo Campus. It specifies the following four basic policies:

<Basic policies>

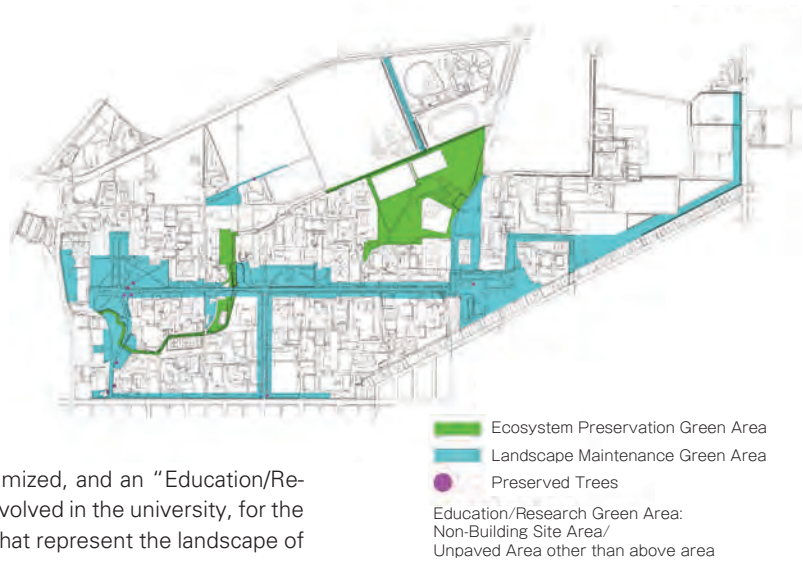
- 1) Preservation and management according to the zoning of ecosystem and its management policy
- 2) Preservation of ecosystem and effort on educational/research activities that take advantage of ecosystem
- 3) Maintenance of the green area on campus as comfortable and safe places for leisure activities
- 4) Enhancement of the planning and management system for ecosystem and green area

<Zoning of the ecological environment>

The campus was divided into an “Ecosystem Preservation Green Area” which is preserved for the future by prohibiting development activities, a “Landscape Maintenance Green Area” where the impact on the current landscape should be minimized, and an “Education/Research Green Area” which is mainly used by those involved in the university, for the preservation and management of ecosystem Trees that represent the landscape of the university, highly rare trees, and venerable trees are designated as “Preserved Trees”

Zoning of green area by “Policy on Ecosystem Preservation and Management”

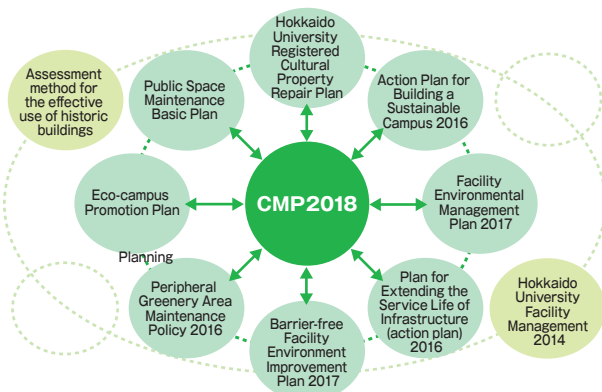
January 20, 2020



Results and issues of campus development after the formulation of CMP2018

Positioning of action plans

The action plans of CMP2018 are designed to embody the framework plan of CMP2018, and for each field and each plan content, an action plan is formulated and implemented during the scheduled period of 9 years (2018 to 2026).



Action plan formulation items until FY 2019

Year	Category	Item	Description
2018	Facilities /spaces	Element planning	District Plan to Promote High Density and High Rise Structures
	University management	Element planning	Plan for Extending the Service Life of Infrastructure (individual facility plan)
	University management	Project	Aseismatic renovation of Small Buildings
2019	Facilities /spaces	Element planning	Consulting Facility Development Planning Guide for Enhancing Design Management Facility Quality to Improve QOL - (tentative name)
	Traffic	Element planning	On-campus Traffic Flow Reorganization Plan
	Ecology /culture	Element planning	Historic Building Preservation and Utilization Plan
	University management	Element planning	Plan for Extending the Service Life of Infrastructure (individual facility plan) *revised
	Ecology /culture	Project	Maintenance, Management and Preservation of the Natural and Ecological Environment (formulation of the Policy on Ecosystem Preservation and Management)
	Facilities /spaces	Element planning	Thorough University-wide Energy Management

Movements toward the Creation of a Sustainable Campus



Assessment of Hokkaido University in FY 2019 using ASSC Assessment System for Sustainable Campus

Assessment System for a Sustainable Campus (ASSC), developed by Hokkaido University in 2013, is a questionnaire-type system to evaluate the foundation necessary to realize campus sustainability.

In FY 2019, the score rate increased from FY 2018 in all four categories, and the total score rate reached 82.1%, which was equivalent to "gold" certification. The university has been awarded "gold" every year since FY 2016. In the management category, the educational program through collaboration between the graduate

school and the campus management organization was highly evaluated. In the environment category, scored for the formulation of the Policy on Ecological Environment Preservation and Management (February 2020) and Campus Master Plan for the Hakodate Campus (March 2020).

As seen from the gradual upward trend in the radar chart below, campus management has been reviewed and improved based on the assessment.

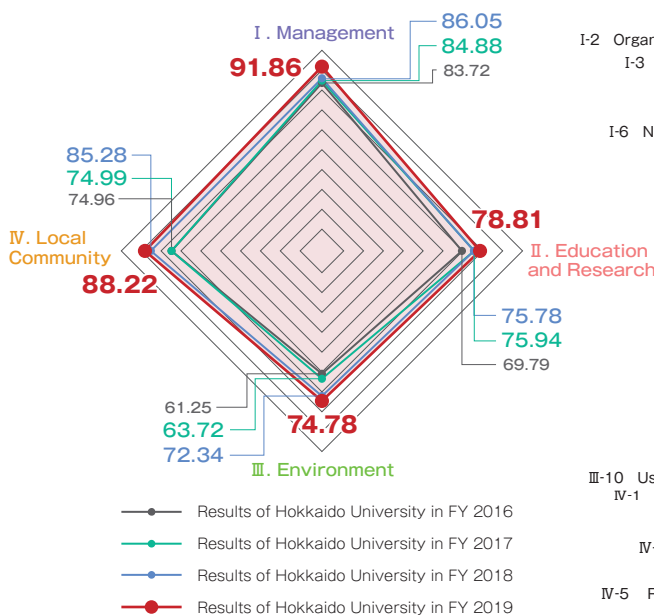


Figure 1. Score rates of Hokkaido University in the four categories

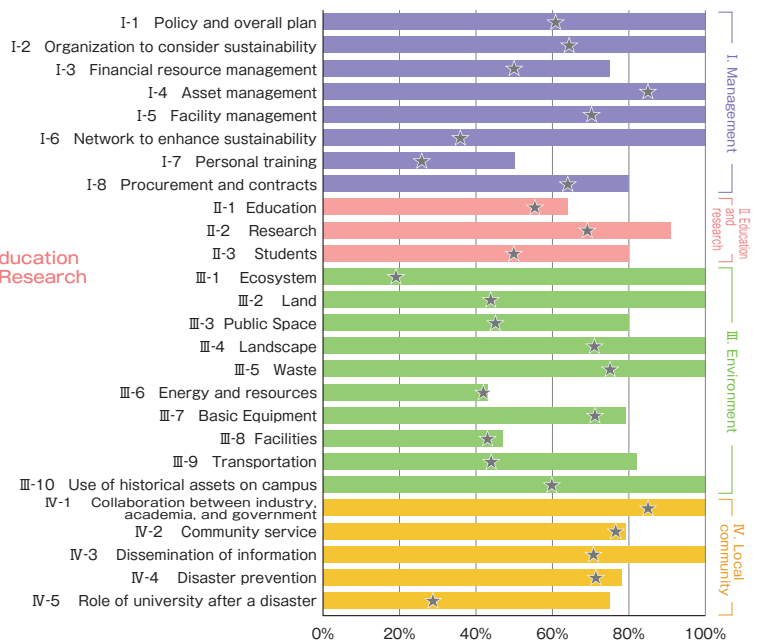


Figure 2. Score rates of Hokkaido University by assessment area
Bar graph indicating the results of HU in FY 2019
★ Average of 19 national universities in FY 2014

*Goals associated with the selection of finalists at the International Green Gown Award 2019

Asian Sustainable Campus Network (ASCN) launched

ASCN is a "multinational network which consists of national networks" that was established in 2015 with the aim of promoting sustainable campuses in Asia (ACCS at the time of its establishment). The 1st ASCN Annual Conference was held at Tongji University in Shanghai from June 12 to 14, 2019, when CAS-Net JAPAN (Japan), the China Green University Network (China), the Korea Association for Green Campus Initiative (South Korea) and the Sustainable University Network of Thailand (Thailand) signed MOU (Basic Agreement), and ASCN was officially launched as an organization. Hokkaido University Sustainable Campus Management Office has since contributed to ASCN in addition to CAS-Net JAPAN.



Signed by Japan, China, South Korea, and Thailand

Efforts for Energy Saving and Environmental Impact Reduction

Two energy-saving projects in research and educational activities were adopted

[Adopted project 1]

Efficient sample storage and energy saving by installing a large freezer at FSC

At the Field Science Center for Northern Biosphere (FSC), individual laboratories used their own old-fashioned freezers, which took up space and led to enormous costs and environmental impacts for sample collection and analysis. Therefore, a single large freezer was installed instead of the old-fashioned freezers to reduce costs and allow efficient access to samples.



Introduced large freezer (right)



Before introduction: Old-fashioned freezers owned by individual laboratories took up space

<Environmental effect>

The internal volume of the new freezer is 21,108 L against a total of 1,416 L for all the five old freezers, and the amount of electricity used per volume for nine days was 0.006 kW for the new freezer and 0.065 kW for the old freezers, meaning at least 1/10 energy saving.

[Adopted project 2]

Blocking cold air inflow at the Hokkaido University Museum

After the reopening of the Hokkaido University Museum in July 2016, the cold on the first floor in winter was a problem due to cold air gusting in from the entrance. When the air flow in the museum was surveyed in FY 2018, it was found that air was flowing from the passage connected to Faculty of Science building. Therefore, a new interior door was installed in the connecting passage.



Newly installed interior door

<Effects of installing a blocking device>

- The room temperature on the first floor of the Hokkaido University Museum in winter has risen by 4 to 5 °C.
- The amount of electricity used from December 2019 to February 2020 reduced by 8.7% compared to the previous year.

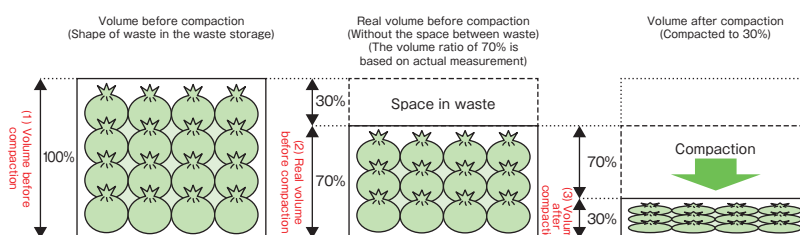


Measurement of the environmental effect using various measuring instruments

Reduction in waste disposal costs and generation by waste compaction

The disposal cost of general waste (burnable/RDF) generated from the Sapporo Campus is calculated according to the volume (m³). The university introduced waste compaction on a trial basis in 2015.

As a result of waste compaction at five departments in 2019, the amount of waste was reduced by 21.7% (compared to FY 2015), and the disposal cost after subtracting the compaction cost was reduced by about 3.2 million yen.



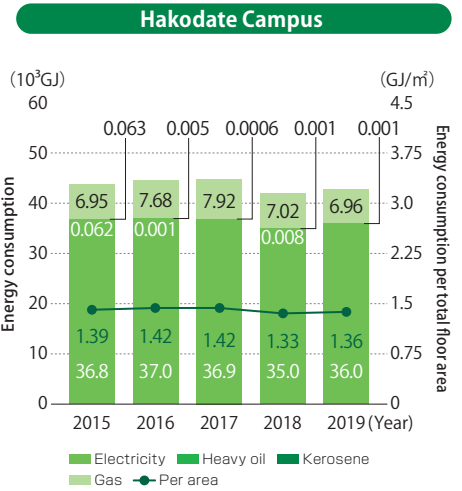
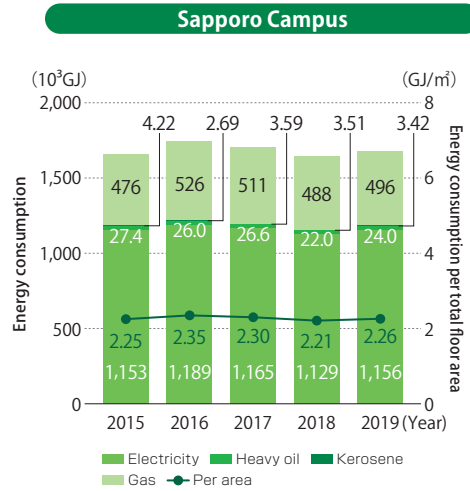
Visual representation of waste compaction

Changes in Environmental Data

Primary energy consumption



Electricity ... **1,191,961GJ**
 Heavy oil **24,017GJ**
 Kerosene **3,425GJ**
 Gas **502,935GJ**



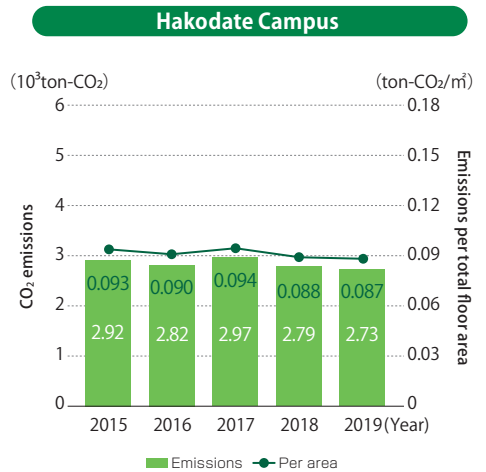
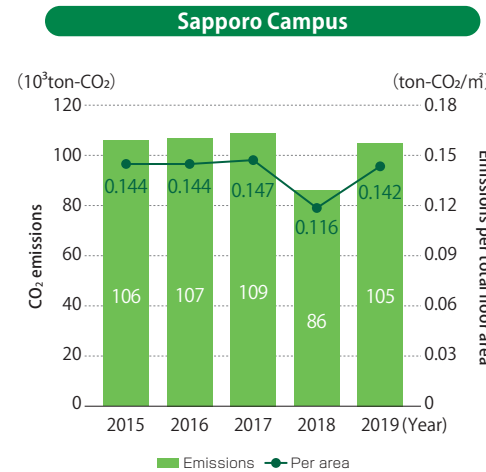
Conversion factor by type of energy Electricity: 9.76 MJ/kWh Heavy oil: 38.9 MJ/ℓ Kerosene: 36.49MJ/ℓ Gas: 45.0MJ/m³

Note) 2018: Usage decreased due to the impact of the Hokkaido Eastern Iburu Earthquake

Greenhouse gas emissions



Carbon dioxide
108,059t-CO₂



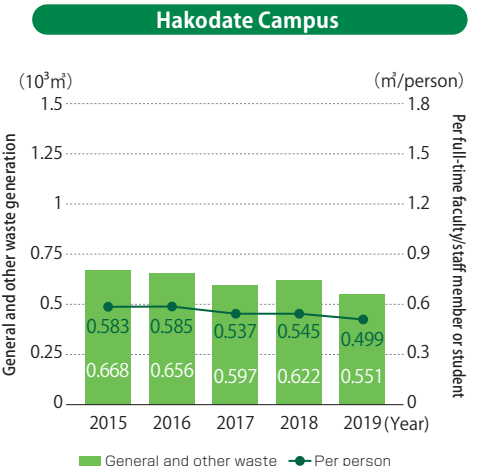
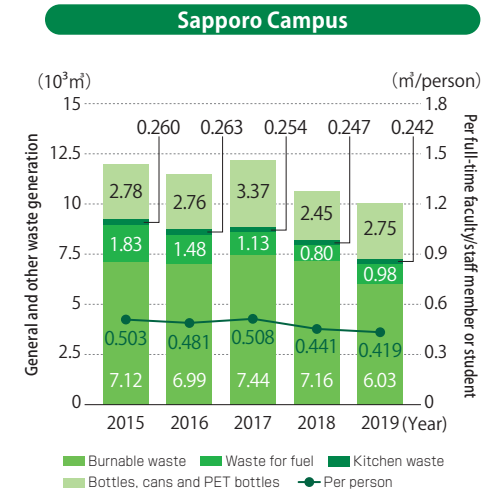
Note 1) The adjusted electricity-derived CO₂ emission factor [kg-CO₂/kWh] used for calculation was 0.676 in FY 2015, 0.640 in FY 2016 and 0.678 in FY 2017. In FY 2018, it was 0.511 (new electric power company) for the Sapporo Campus and 0.678 for the Hakodate Campus. In FY 2019, it was 0.673 (Apr. - Jun.: new electric power company) and 0.656 (Jul. - Mar.: HEPCO) for the Sapporo Campus and 0.656 for the Hakodate Campus.

Note 2) 2018: Emissions decreased due to the impact of the Hokkaido Eastern Iburu Earthquake

General and other waste generation



General and other waste
10,550m³



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 faculty/staff.

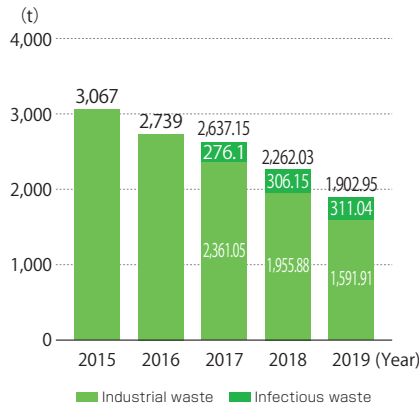
Note 3) General and other waste for the Hakodate Campus includes bottles and PET bottles.

Industrial waste generation

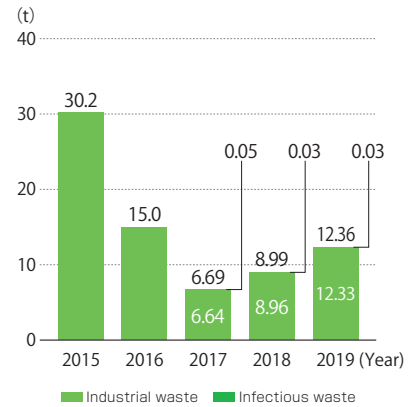


Industrial waste 1,604t
 Infectious waste 311.1t

Sapporo Campus



Hakodate Campus



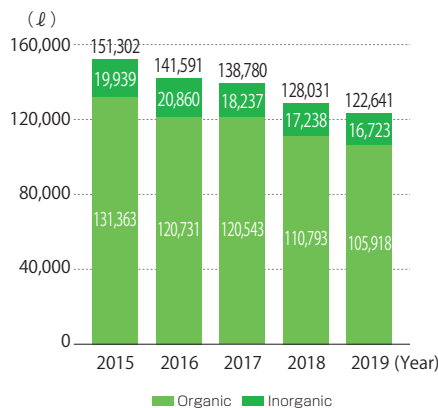
Note 1) The figures for the Sapporo Campus exclude items under the Act on the Recycling of Specified Kinds of Home Appliances. The figures for the Hakodate Campus include discarded electrical appliances.
 Note 2) Infectious waste is shown separately in the data of FY 2017 and onward.

Experimental waste fluid generation

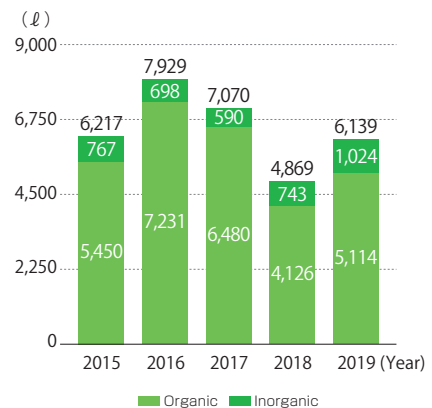


Organic 111,032ℓ
 Inorganic 17,747ℓ

Sapporo Campus



Hakodate Campus



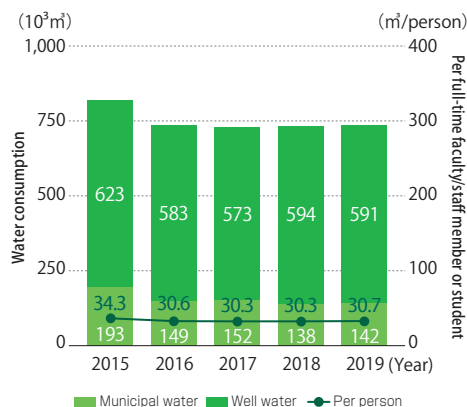
Note) Including local facilities

Water consumption

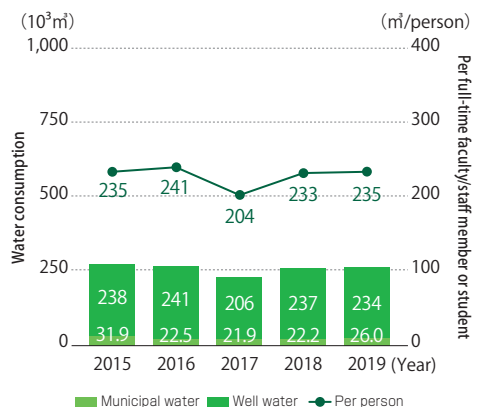


Municipal water 167,441m³
 Well water 824,896m³

Sapporo Campus



Hakodate Campus



Note) Per capita consumption figures include temporary faculty/staff.



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 Corporations, 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 2018.

Organizations involved

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

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Field

Environment

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Inquiries



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

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



Printed with environmentally friendly vegetable oil ink.