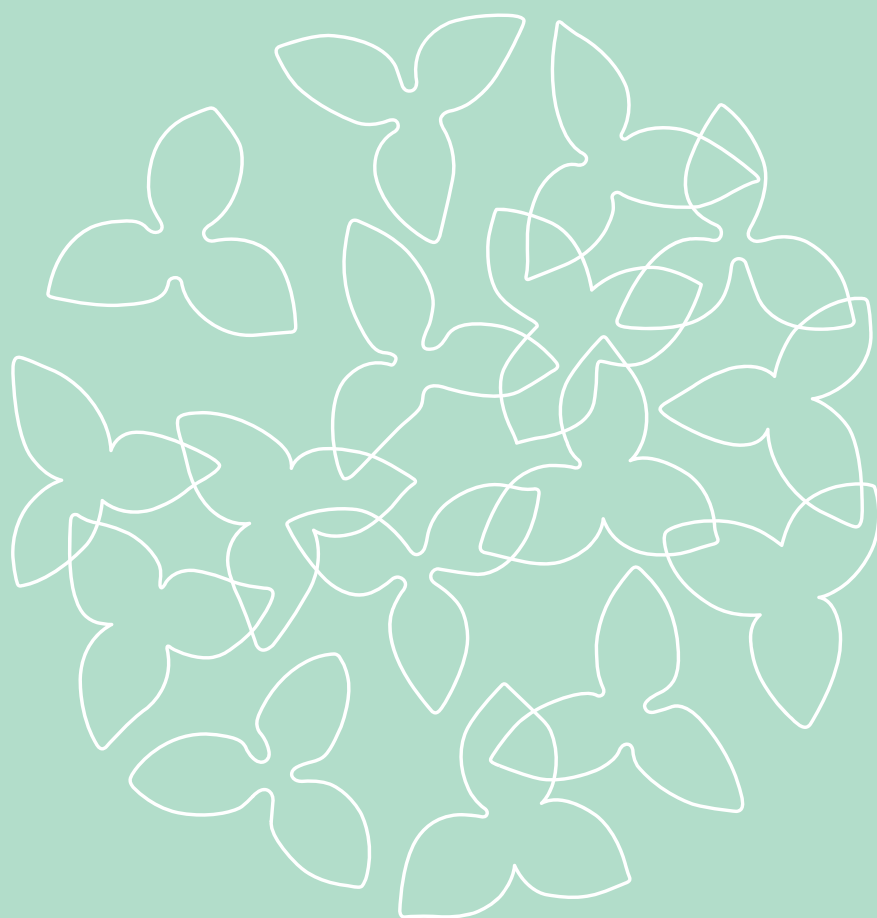




Hokkaido University Sustainability Report 2021



To become a University that Contributes to the Resolution of

The spread of COVID-19 has had a huge impact on university activities. What is the purpose of education, research, and universities? These questions are now being asked again. This time, Ms. Atsuko Miwa, Co-Chair of SDGs Japan, spoke with Kiyohiro Houkin, the 20th President of Hokkaido University, from the perspectives of environmental protection, social inclusion, and economic growth.

Issues highlighted by the COVID-19 pandemic

First, please tell us about the situation and role of the University during the COVID-19 pandemic.

Houkin: There's no doubt that online systems are new educational tools, but when I talked with students, I felt strongly that they were either lonely or mentally exhausted. Meanwhile, our University is very active in the field of virus research. Vaccine development in Japan lags that in Europe and the United States, and Japan must catch up. Hokkaido University also wants to play a part in that endeavor.

Miwa: I think this pandemic has revealed problems that have existed for a long time but haven't been dealt with properly, rather than new problems that have emerged due to the pandemic. I think "women" are the ones who have been the most seriously affected. More women than



Talk with the

Atsuko
MIWA

Co-Chair,
Japan Civil Society Network
on SDGs (SDGs Japan)

Ms. Miwa earned a master's degree from the Institute of Development Studies, University of Sussex. She has been involved in various programs in the fields of development, gender, human rights and humanitarian assistance in the Japanese Red Cross Society External Affairs Department; the Regional Office for Asia and the Pacific, Bangkok, of the United Nations Development Fund for Women (now, UN Women); and other bodies. She has been in her current position since July 2019. She also serves as the Director of the Asia-Pacific Human Rights Information Center (HURIGHTS OSAKA).

Moderator: Hidenori IMAZU, Toppan Printing
Japan Forum of Business and So

men are unemployed, and it has been reported that consultations regarding pregnancy from teenage women have been rapidly increasing. Underlying these situations is the issue of sexual and reproductive health and rights (SRHR). Low-dose contraceptive pills and emergency contraceptives are not readily available in Japan, and women — especially young ones — don't have sufficient awareness and knowledge to protect their bodies. Domestic violence has increasingly been reported, and the problem of violence against women — called the "shadow pandemic"— is also serious. I think that the increase in female suicides reflects

these various social problems surrounding women. I think the problem of student loneliness, which the President mentioned earlier, is also related to this issue.

What is expected of the post-COVID-19 generation?

Houkin: The idea that the pandemic has uncovered already-existing problems and social problems is highly evocative. As an institution of higher education, the University must seriously consider how to deal with



The Research Center for Zoonosis Control is heavily involved in the development of COVID-19 therapeutic agents.

Global Issues

President

Kiyohiro HOUKIN

President,
Hokkaido University

Born in Sapporo, 1954. Doctor of Medicine. Mr. Houkin graduated from the Hokkaido University School of Medicine in 1979, and has worked as a neurosurgeon at Hokkaido University Hospital and private hospitals. He was appointed Director of Hokkaido University Hospital in 2013, and has held his current position since October 2020.



Co., Ltd.; Chair of the Program Committee,
ciety

(Titles omitted)

the problems that have become apparent.

Miwa: Thank you. The SDG philosophy of creating a “sustainable world” by approaching environmental, social, and economic issues in an integrated manner, while “leaving no one behind”, is a guiding thread in the COVID-19 era. I think that every student who has experienced the COVID-19 pandemic has had a very hard time. I believe that the problems of financial difficulties, isolation, and loneliness are issues that the University should actively address. At the same time, I hope that students will gain a lot of “learning” and “awareness” toward the end of the

COVID-19 pandemic and will foster change. I think the SDGs will be a guide for that.

Integrated approach to SDGs

What is Hokkaido University’s approach to the SDGs?

Miwa: Reading the 2020 Sustainability Report, I’d like to praise the University for its wonderful contributions. I think it will be a more meaningful report if it can expand its scope to society and economy; address how inseparable society, the environment,

and the economy are; and how Hokkaido University is working on them in an integrated manner. Regarding society, I think it is important to show the enthusiasm, determination, and strategy for realizing inclusiveness based on the recognition of diversity — for example, in gender equality. Unfortunately, this report does not clearly convey a strategy for gender equality. Gender equality issues also include the challenges of sexual minorities. The challenges of people with disabilities and of diverse ethnicities and nationalities are also important. Regarding ethnic groups, I think the unique history of Hokkaido is also important. Recognizing that diverse people face different challenges, the University should address those challenges from an inclusive perspective.

Toward becoming a university where women can develop their potential “ambitiously”

Houkin: Diversity is a very beautiful word, but on the other hand, it’s a very tough concept, and I think we must be determined to realize it. Considering the coming era, I think we should work toward realizing diversity. At Hokkaido University, papers by female researchers receive higher evaluations. The percentage of female researchers who write papers



In the Times Higher Education Impact Rankings 2021, published by a British magazine related to higher education, Hokkaido University ranked at the top in Japan. The development of automated/robotic agricultural vehicles is one of our research seeds.

that rank in the top 10% in the world is higher than that of male researchers. Not only should our University allow women to play active roles, but so should other Japanese universities. Such universities will have an advantage in expanding into the world.

Miwa: There are still some women who are worried about continuing their research, though I hope the number is decreasing. They may think it's difficult for women to continue their research due to the unconscious bias in our society, as they'll marry and give birth. I hope the data will be widely disseminated.

In order for universities to exert their power

Please tell us your current thoughts from the perspective of university management.



Houkin: I don't know how it is being received, but in plain language my message is, "Only when basic needs for living are met can people learn to be polite". I don't support simple academic capitalism. The final goal should not be for universities to make a profit as management

bodies. ESG* is still a very important focus when we work with communities and companies. Under such circumstances, universities should improve their financial performance. To that end, I think I should meet people from various fields and listen to various ideas directly.

Miwa: Regarding the inclusion of diversity, which I mentioned earlier, I think the degree of achievement will probably be directly reflected in ESG investment.

*the environment, society, and governance

Aiming for research that will change the world

What do you think about Hokkaido University's uniqueness and strengths?

Houkin: Considering the role of our University in relation to the environment, we are unique in that we have the largest research forest in the world. The forest absorbs more carbon dioxide than that emitted by our campuses. Currently, a research project is looking into how effective natural forests can be (in terms of carbon offset), utilizing satellite technology and drones. Our University is also good at marine sciences, such as oceanography. In the fields such as fisheries science, agriculture, and environmental science, there are some aspects that can't be advanced

without the university being actively involved. We'd like to gather the wisdom of the university and launch new initiatives based on the value of the university's experience. Since Hokkaido University has long been taking initiatives in sustainability, which is now referred to as SDGs, it is our responsibility to develop research and policies that will change the world. Unless we do that, I don't think the University has any significance. We'd appreciate your further encouragement.



Miwa: Based on Hokkaido's historical background as a frontier and on its geography and environment, I think Hokkaido University can make an

infinite contribution to the SDGs. Now, what I strongly expect is that Hokkaido University will produce Japan's first female Nobel Prize winner. Thank you for your time today.

Houkin: My pleasure. Thank you very much.



The training ship *Oshoro Maru V*, weighing 1598 tons, is used for research and practical training in fisheries science-related fields.

University overview and measures for sustainability and development

Hokkaido University's Four Basic Philosophies

- Frontier Spirit
- Global Perspectives
- All-round Education
- Practical Learning

Hokkaido University Environmental Policy Formulated on September 5, 2005

[Basic philosophy]

Hokkaido University will play a central role in Japan's academic research and human resource development for researchers, and as a national university that supports the foundation of Japan's knowledge in the 21st century, it will protect the environment from the global level to the regional level through all activities, and strive to build a sustainable society.

[Basic policy]

To concretely realize the basic philosophy, Hokkaido University will establish an environmental management implementation system and will set and implement environmental goals on the following with the participation of all persons on campus, including faculty, staff, and students. The university will also make the goals known to everyone on campus, including faculty, staff, and students, and will disclose the goals to the general public to establish continuous environment-conscious activities.

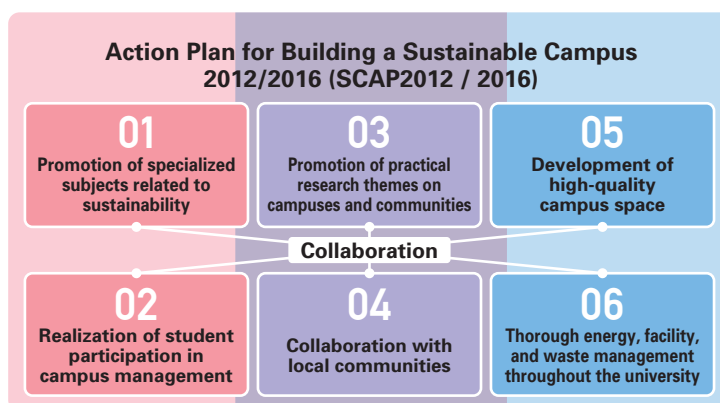
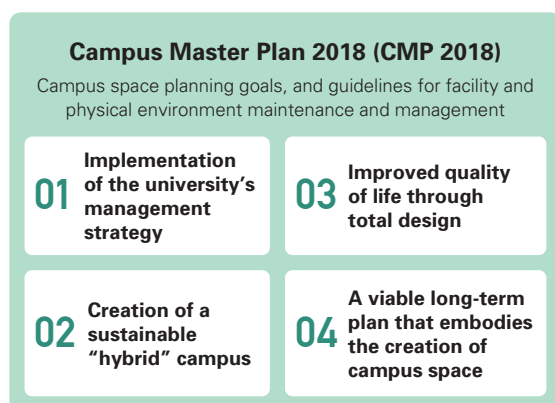
- 1.Consideration for the global and local environments through education and research
- 2.Contributions to society through the dissemination of environmental information
- 3.Reduction of environmental load associated with university management

Future Strategy For the 150th Anniversary of Hokkaido University formulated in March 2014

Hokkaido University will have 150th anniversary in 2026. The following goals have been set to promote university reform toward "Hokkaido University contributing to the resolution of global issues."

- 1.Hokkaido University will promote world-class research to resolve a variety of issues to sustain future generations.
- 2.Hokkaido University will produce graduates who will play a leading role in contributing to the development of a global society. As specialists in their fields, they will possess sound judgment and deep insight, along with the ability to understand and communicate with those of different cultures.
- 3.Hokkaido University will continue to transmit knowledge and promote social advancement through outside collaborations, providing assistance to regions and communities in Japan and overseas by addressing and resolving the issues that concern them.
- 4.Under the leadership of the president, Hokkaido University will carry out reforms of our organizational, personnel, and budget systems, establish an infrastructure that enables members to carry out their tasks with a sense of pride and fulfillment, and implement administrative policies with a focus on sustainable development.
- 5.Hokkaido University will establish a global presence by actively publicizing the fruits of its education and research through strategic marketing.

Main measures for building a sustainable campus



Education/Research × Campus Management

Towards a New Stage

Hokkaido University SDGs

SUSTAINABLE DEVELOPMENT GOALS

Since the time when the term "SDG" did not exist, Hokkaido University has been performing educational and research activities with the aim of realizing a sustainable society. The results have been steadily evaluated. We have developed relationships with various stakeholders and are moving forward to a new phase.

》》》 1st Place (Tied) in Japan: THE Impact Rankings 2021

In THE Impact Rankings 2021, published by the British magazine Times Higher Education (THE) on April 21, 2021, Hokkaido University ranked 100-200th worldwide and took 1st place in Japan, along with six other universities (sole possession of 1st place in Japan last year). The rankings evaluate the degree of social contribution of universities using the framework of SDGs and consist of two parts: an overall ranking, and a ranking by SDG.

In the ranking by SDG, the University is on the 15th place worldwide for the contributions towards "SDG

2. Zero Hunger." In addition, the University has earned high evaluations for its contributions in a wide range of fields, such as "SDG 9. Industry, Innovation, and Infrastructure" (47th worldwide), "SDG 14. Life Below Water" (82nd), and "SDG 15. Life on Land" (94th).



A Meal Card, used at the Co-op Cafeteria, is an Annual Cafeteria Pass integrated into a student ID card. It supports a healthy diet by securing food expenses that tend to be cut off first in student life.

The Research and Education Center for Robust Agriculture, Forestry and Fisheries Industry was established in 2018. As part of the robust research project, two two "Robust Greenhouses" have been installed on the university campus to provide a research environment for demonstration experiments of horticultural facilities for cold regions.



THE Impact Rankings 2021: overall ranking (Japanese universities: alphabetical order)

Ranking (place)	Ranking in the previous year	University
101-200	101-200	Hiroshima University
101-200	76	Hokkaido University
101-200	101-200	Kyoto University
101-200	201-300	Okayama University
101-200	97	Tohoku University
101-200	77 (Tied)	The University of Tokyo
101-200	101-200	University of Tsukuba

● Distinctive approaches

Accelerating innovation through venture certification



The Hokkaido University Venture Certification System is intended to help start-ups by supporting their application of university research results in society. Twenty four companies have been certified.

At the Harmonious Systems Engineering Laboratory, led by Professor Hidenori Kawamura of the Faculty of Information Science and Technology, faculty members, students, and graduates have established numerous venture companies and conducted joint research with companies. Among them, Chowa Giken Corporation, which develops AI algorithms, AWL, Inc., which provides AI camera solutions, and TIL Inc., which develops AI voice recorders, have been certified as ventures by Hokkaido University. The laboratory is

distinguished not only by the pursuit of academic value in research, but also by the development of activities with a view to the social implementation of the results as products and services that are useful to people.



Hidenori KAWAMURA
Professor, Faculty of
Information Science and Technology



Experiment on self-driving cars that yield the right-of-way to each other using the Deep Q-Network algorithm conducted by the Harmonious Systems Engineering Laboratory

Monitoring to protect marine resources



The marine environment and living creatures have been monitored for years from the training ship Oshoro Maru, with their data having been released. Since 2017, the University has cooperated with the



Training ship *Oshoro Maru V*

Ministry of the Environment's marine debris survey in a fact-finding survey of drifting and

marine debris in offshore waters. The Faculty of Fisheries Science is conducting joint research on porpoises with Otaru Aquarium Corporation. The Field Science Center for Northern Biosphere participates in the Ministry of the Environment's Monitoring Site 1000, which aims to quickly detect the deterioration of diverse ecosystems in Japan and to promote the conservation of biodiversity. The Faculty of Environmental Earth Science has participated in the creation of the Japan Seabird Colony Database under the Ministry of the Environment.

Protecting our green future from vast research forests



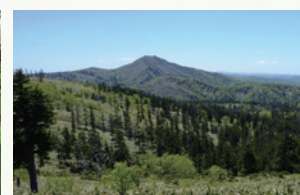
Hokkaido University has approximately 70,000 ha of research forest, which is the world's largest among any other university in the world, spread through Teshio, Nakagawa, Uryu, Sapporo, Tomakomai, Hiyama, and Wakayama. Utilizing these vast tracts, the University has been continuing research and education related to reforestation and conservation. In October 2020, the Northern Forest Project was established under the Hokkaido University Frontier Foundation as a mechanism to carry out reforestation, carbon sequestration, and biodiversity/ecosystem conservation. Appropriate management of research forests has

been realized with contribution to communities.

The Botanic Garden, which opened in 1886, is the second oldest in Japan after the Koishikawa Botanical Garden in Tokyo, and is the core facility for research on the conservation of plant diversity in northern and cool-temperate zones.



Spring garden (Botanic Garden)



Forest in the sky
(Nakagawa Research Forest)



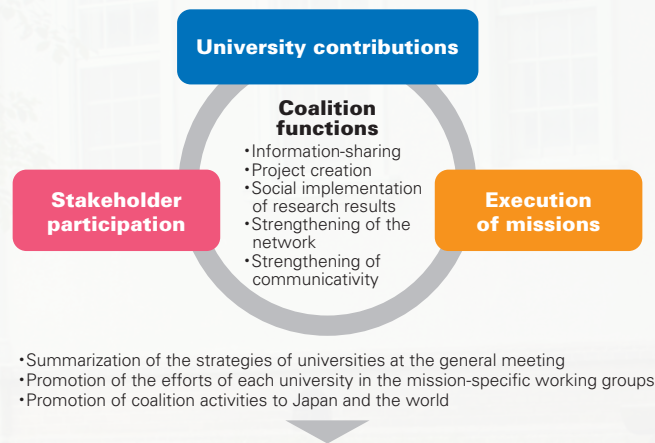
Challenges in the world, in Japan, and in our town

To address global issues such as decarbonization, Hokkaido University is taking on the challenge of new Initiatives in collaboration with a variety of stakeholders on various phases.

Accelerating decarbonization by uniting with 120 universities nationwide

Achieving Japan's 2050 goal of carbon neutrality will require a wide range of knowledge, from the humanities and social sciences to the natural sciences.

Toward the launch of the Coalition of Universities and Other Institutes as Contributors to Carbon Neutrality (Coalition of Universities and Other Institutes), the Ministry of Economy, Trade and Industry, the Ministry of Education, Culture, Sports, Science and Technology, and the Ministry of the Environment held an online summit with presidents of participating universities and other institutes on March 23, 2021. President Houkin participated with the heads of 120 universities and research institutes nationwide. As one of the 13 secretariat schools, Hokkaido University will further strengthen cooperation between universities and other institutes and will promote research, social implementation, and regional contributions for local decarbonization and adaptation to climate change.



Contribution to carbon neutrality in Japan and the world

Visual representation of the coalition of universities and other institutes (based on materials from the Ministry of Education, Culture, Sports, Science and Technology)



President Houkin speaks at an online summit about how universities and other institutes should contribute

The only member of IUCA from Japan: Recommendations for G20 leaders



Hokkaido University participated in the International Universities Climate Alliance (IUCA) on November 11, 2020 as the only member from Japan. The IUCA is an organization that was established in April 2020 to widely disseminate facts based on research on climate change science, impacts, adaptation, and mitigation as a reliable source of information. As of March 2021, 48

institutes from 20 countries around the world are members. The University aims to collect information on climate change and to build a network by participating in the annual assembly, regional committee meetings, workshops on research themes and roundtable meetings of researchers.

At the G20 Summit held in Saudi Arabia on November 21 and 22, 2020, 37 volunteer institutions of the members, including our University, made recommendations on climate change to the leaders of G20 countries.

Joined the Future Earth Japan Committee with the aim of transdisciplinary initiatives

Future Earth (FE), which was launched in 2015, is an international academic platform that lays the foundation for resolving global environmental problems in collaboration with various stakeholders. To promote FE in Japan, the Science Council of Japan, universities, and other institutes established the FE Japan Committee in September 2017. Currently, it plays a role not only in promoting FE but also in promoting SDGs.

Hokkaido University's Faculty of Health Sciences joined the FE Japan Committee in February 2019, and then the Center for Environmental and Health Sciences, the Arctic Research Center, and the Field Science Center for Northern Biosphere participated, leading to the establishment of the Hokkaido University FE Consortium in December 2020. Membership in the FE Japan Committee was approved in February 2021.

Japan's first initiative to think about decarbonization together with the general public



From November to December 2020, public meetings attended by randomly selected Sapporo citizens on climate change countermeasures were held as part of joint research by Hokkaido University, Osaka University, the National Institute for Environmental Studies, and other institutes (representative researcher: Associate Professor Naoyuki Mikami, Institute for the Advancement of Higher Education) in collaboration with the City of Sapporo, the Hokkaido Environmental Foundation, and RCE Hokkaido Central.

At the conference, entitled Climate Assembly Sapporo 2020, 20 participants from their teens to their 70s had four online discussions for 16 hours in total under the theme of "How Sapporo should realize a transformation to a carbon-free society." The results were published as a report and submitted to the City of Sapporo. They are also being used for measures by the city. This trial showed that if such a method is used properly, it can be a powerful approach to form and present the opinions of the general public toward the realization of a carbon-free society in Japan.



Climate Assembly Sapporo 2020 on December 20, 2020



Reporting the result of those meetings to Sapporo City officials on January 25, 2021



➤➤➤ The new building of the Institute for Chemical Reaction Design and Discovery (ICReDD): A flagship for promoting SDGs

The Institute for Chemical Reaction Design and Discovery (ICReDD) is an organization whose goal is for researchers in the three fields of calculation, information, and experimentation to conduct integrated research and to freely design chemical reactions.

The Sustainable Campus Management Office and the Facilities Department have prepared the design development documents of the new ICReDD building (see page 17). Under the theme of “a sustainable lab that co-creates innovation and contributes sustainably to the university and society,” sustainable architecture is designed to use natural energy while reducing energy loss with general-purpose technology. The new building is planned to be built next to the Creative Research Institute building on the North Campus and is scheduled to be completed by March 2023.



Rendering of the new building to be built on the North Campus



Rendering of the “super mix lab,” where researchers in the three fields can easily collaborate



Rendering of the “priority research zone” for activating team research

Design Concept (4 core themes and SDGs)

1 Improved comfort and productivity



2 Environmental consideration



3 High value asset



4 Contribution to the university and society



Note: The renderings are designs at the design phase and are subject to change.



The Institute for Chemical Reaction Design and Discovery is a research center that was established at the University in October 2018 as a part of the World Premier International Research Center Initiative (WPI), a program subsidized by the Ministry of Education, Culture, Sports, Science and Technology (MEXT).

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

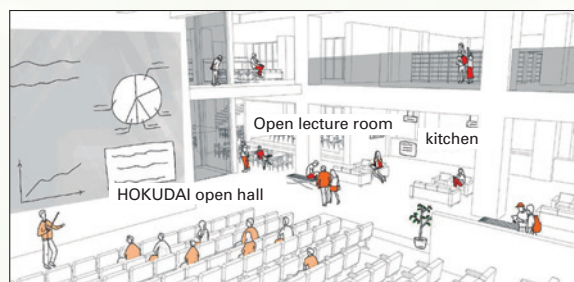
➤➤➤ A Future Campus Plan that students and the university work together



The Advanced Studio on Architectural and Urban Design I, which is conducted jointly by the Faculty of Engineering, the Sustainable Campus Management Office, and the Facilities Department, is intended for students to understand the issues and required roles of the campus based on the students’ own experiences, to develop highly feasible future plans and to make proposals for the University. In FY 2020, students worked on “the future plan for the area of the Institute for the Advancement of Higher Education.” Based on the analysis of the current situation, five issues were identified: (1) deterioration of buildings, (2) future shortages of land due to the high density of the building area, (3) exceeding the standard for exclusively possessed area ratio, (4) lack of sunshine in the frequently used external space, and (5) unutilized

existing trees.

Based on this analysis, students proposed three plans, from a solid plan with the construction period and scale reduced to an aggressive plan to renew the system of liberal arts education. In the future, a specific facility renewal plan will be made based on these proposals.



Rendering of the proposed “Liberal Learning Area,” which makes life itself a venue for learning by linking various activities

... INTERVIEW ...



》》》 The project of Ms. Wang, a graduate student in the Graduate School of Environmental Science, won the Finalist Award at "Daigaku SDGs ACTION! AWARDS 2021"

In March 2021, the project that was submitted by Ms. Wang Ting of the Graduate School of Environmental Science and was supported by the Support Program 2020 for "Jikatagaku" won the Finalist Award at "Daigaku SDGs ACTION! AWARDS 2021" (sponsored by The Asahi Shimbun), where university students present their ideas for achieving the SDGs. We asked Ms. Wang about the features of the project and her future goals.

What kind of project is the award-winning proposal "Building a Framework for Collaborative Maintenance of campsites* (Yaeishiteichi) in Daisetsuzan National Park"?

My research aims to clarify the impact of human activities on the natural environment and to find solutions by utilizing knowledge from the social science and natural science. This project is part of that, and I propose to identify the condition of crowding problem and soil erosion on campsites* in Daisetsuzan National Park and to introduce a reservation system.

A reservation system for campground** has been operating for more than 10 years in three mountain national parks in Taiwan, where I conducted interview surveys before. Using that system as a model, I considered how to build such a system in Daisetsuzan National Park with the Ministry of the Environment and local stakeholders.

*Camp facilities that are not officially managed

**Camp facilities that are officially managed

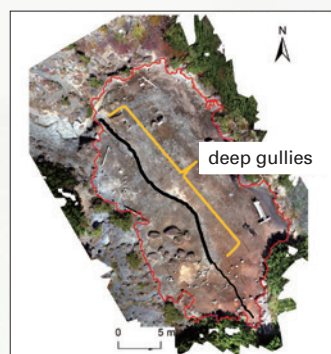


The Kuro-dake campsite : The particularly crowded campsite in Daisetsuzan National Park.

What made you apply for the Support Program?

My project focuses on solving actual social problems, where cooperation with the local community is important. Looking at the support program application guidelines, I thought this would be perfectly suitable for my

project and I applied. Usually, I have to pay half of the travel expenses for research fieldworks, so I'm grateful for the program, which provides 50,000 yen for travel expenses.



Soil erosion in the Kuro-dake campsite
(From the presentation materials of Daigaku SDGs ACTION! AWARDS 2021)

Please tell us how you feel about being selected for the Finalist Award from 96 applications nationwide.

I'm delighted that my research has been recognized. I wasn't particularly conscious of the SDGs, but when I saw the presentations of the other finalists (11 people), I realized that various types of research, including my own research, would promote the SDGs.

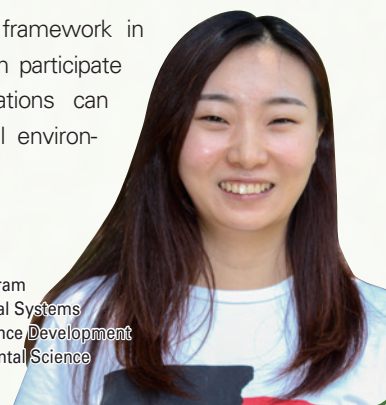
Please tell us your future goals.

Based on my research in Daisetsuzan National Park, I'd like to become a researcher who can contribute to the sustainable use of mountain national parks around the world.

I'd like to propose a framework in which many people can participate so that future generations can enjoy the same natural environment we now enjoy.

WANG Ting

Third year of the doctoral program
Course in Human and Ecological Systems
Division of Environmental Science Development
Graduate School of Environmental Science





Latest Research and Studies Related to COVID-19

COVID-19 has spread worldwide since the end of 2019. Hokkaido University is proceeding with various initiatives such as research and study on COVID-19.

First detection of SARS-CoV-2 RNA in wastewater

Masaaki KITAJIMA, Associate Professor, Division of Environmental Engineering, Faculty of Engineering

Associate Professor Masaaki Kitajima of the Division of Environmental Engineering, the Faculty of Engineering has developed a technology to detect viruses in wastewater and to understand the prevalence of COVID-19.

He regularly collects samples from wastewater treatment plants in Sapporo City and carries out quantitative measurements of SARS-CoV-2 RNA in wastewater. As a result, it was confirmed that the increase

in the number of newly infected persons corresponded to the fluctuations in SARS-CoV-2 RNA concentrations in wastewater after April 2021 and that signs of infection spread can be detected at an early stage.



Concentrating viruses in wastewater to detect their RNA

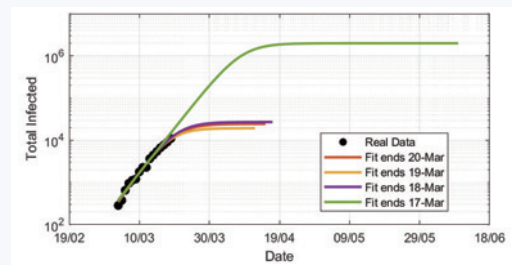


Clarification of uncertainty in predicting the number of COVID-19 cases

Yuzuru SATO, Associate Professor
Research Center of Mathematics for Social Creativity, Research Institute for Electronic Science

Predictive data on the numbers of people infected with and killed by COVID-19 contains various measurement errors due to the different reporting standards in many parts of the world. Associate Professor Yuzuru Sato of the Research Institute of Electronic Science, together with an international collaborative research team consisting of seven researchers from five countries, has examined the degree of uncertainty in the prediction, clarified that a slight error in the observed data can increase the predicted number of infected people by nearly 100 times, and suggested

that long-term predictions by infectious disease models should be made carefully.



Predicted number of infected people in France when the observation end date is changed

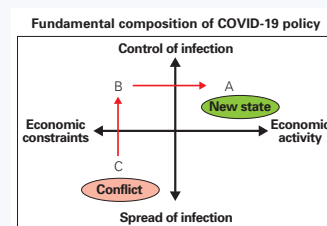


Public policy amid the COVID-19 pandemic

Atsushi MIYAWAKI, Professor, Public Policy School

Professor Atsushi Miyawaki of the Public Policy School is conducting research and study on options for regional policy and revitalization after the COVID-19 pandemic and is considering those issues from various angles. The effects of COVID-19 are thought to threaten social life, such as through economic contractions in countries and regions, the deterioration of administrative services, and the urgency of medical care and welfare, resulting in serious adverse effects and disparities. Professor Miyawaki emphasizes the ideal

state of administration and the importance of role sharing, and advocates for the examination and review of the direction of local government management.



The fundamental composition of COVID-19 policy from a paper published in Research Information Magazine ECPR of the Ehime Center for Policy Research



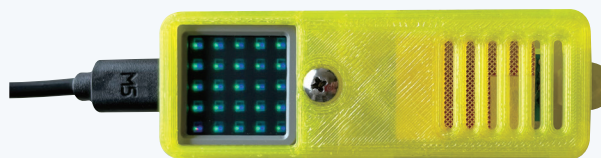


Development of inexpensive CO₂ measuring equipment for buildings in cold regions

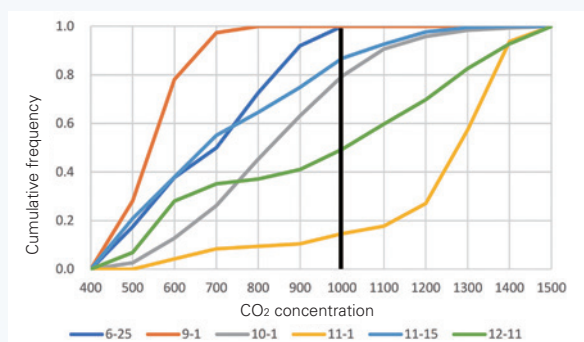
Taro MORI, Associate Professor, Division of Architecture, Faculty of Engineering

It has been reported that COVID-19 may spread by aerosols, which are fine particles that are suspended in a gas.

In November 2020, Associate Professor Taro Mori of the Division of Architecture, the Faculty of Engineering measured the CO₂ concentration, temperature, and humidity during class and made a prototype CO₂ densitometer with a warning display function, with the cooperation of Muroran Institute of Technology, the National Institute of Technology, Kushiro College, and Sapporo Shinkawa High School. The LED of the prototype densitometer turns red when the CO₂ concentration exceeds 1,000 ppm and blinks red when it exceeds 1,500 ppm. The densitometer installed in classrooms showed the timing of ventilation and was effective at controlling infection at school.



Prototype CO₂ densitometer with warning display function



Average CO₂ concentration for each class from October to December based on measurements of classroom ventilation

Participating
researchers

Kouhei KUWAHARA, Muroran Institute of Technology

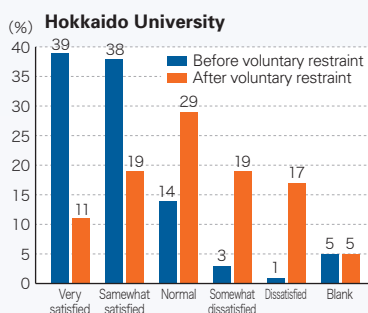
Yoshiko OHTSUKI and Noriyuki OHTSUKI, National Institute of Technology, Kushiro College

Taisei AKAMATSU, Doctoral Program, Laboratory of Building Environment, Hokkaido University

TOPICS

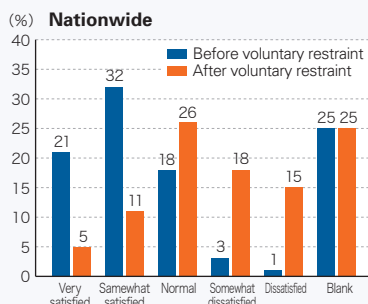
A survey of campus users amid the COVID-19 pandemic

Satisfaction with campus spaces



Before the request for voluntary restraint, Hokkaido University students tended to show higher satisfaction than students nationwide showed.

Many students reported reduced satisfaction after the request for voluntary restraint was made, but twice as many students here have maintained their satisfaction than students nationwide have done.



Throughout Japan, the percentage of "somewhat dissatisfied" and "dissatisfied" increased from 4% to 33% after the request for voluntary restraint was made.

*1 The Campus Living Laboratory Subcommittee (today's Campus Living Lab Design Subcommittee), City Planning Committee, Architectural Institute of Japan (Chairman: Takao Ozasa)

*2 Conducted from Sep. 1 to Oct. 4, 2020. The answers to the questionnaire on GoogleForms were aggregated. The number of valid responses was 1,770 for Hokkaido University and 6,789 nationwide.

Associate Professor Takao Ozasa of the Urban and Regional Design Laboratory, the Faculty of Engineering participated on behalf of Hokkaido University*² in a survey of university campus users amid the COVID-19 pandemic, which was planned by him in 2020 and conducted by the Architectural Institute of Japan*¹. A survey targeting Hokkaido University students was conducted, and a comparative analysis with students nationwide was also performed. Classes have changed to online or on-demand, and students can no longer use the places they once did, which has significantly changed their behavior and awareness. A comparison between Hokkaido University students and students nationwide showed differences in behavior change and awareness due to differences in the composition of campus spaces. It also showed that the request for voluntary restraint has made students realize that the campus space is "a place they belong to" and "a place for interaction."

<http://news-sv.ajl.or.jp/toshi/s1/Campus/katudounaiyou.html/>



Research and Education Topics

Awards, Certifications and Establishments

Four parties conclude a partnership agreement to develop Future IT Personnel



Nitori Holdings Co., Ltd., which promotes regional collaborations utilizing data science toward the realization of “a Super-Smart Society” (Society 5.0), the City of Sapporo, which aims to build a supportive environment for young people learning advanced technology, and Hokkaido University, which promotes research and education on advanced data science, signed a partnership agreement in July 2019 and have been promoting the development of Future IT Personnel who can solve regional issues by utilizing IT.

With the participation of the Hokkaido Government in March 2021, the partnership’s efforts have been strengthened and expanded for further development.



At the partnership agreement execution ceremony on March 25, 2021 (From left: President Kiyohiro Houkin, Governor Naomichi Suzuki, Mayor Katsuhiko Akimoto, Chairman Akio Nitori)

An endowed course established to promote the wine industry in Hokkaido



Since 2015, the Hokkaido Government has been working on human resource development in the wine industry, such as by holding the Hokkaido Wine Academy (Wine School in 2015). In the future, there are plans to establish the Hokkaido Wine Education and Research Center (tentative name) as a base of activities.

Prior to the establishment of the center, the Research Faculty of Agriculture established the endowed course “Laboratory for Nouvelle Vague of Hokkaido Wines” in April 2021. Professor Teruo Sone, who has also worked at the Laboratory of Applied Molecular Microbiology, and Specially Appointed Associate Professor Tomoyuki Sato belong to the laboratory, which is intended to enhance Hokkaido Wine Academy, provide lectures common to graduate schools, engage in research activities to solve issues faced by grape producers, wineries, distributors, and consumers, and carry out dissemination activities such as extension courses, thereby promoting the wine industry and providing technical support.



Laboratory for Nouvelle Vague of Hokkaido Wines established in Room N371 at the School of Agriculture

Conclusion of an academic cooperation agreement with the Ainu Museum and proposal of an affluent society model



The National Ainu Museum, which opened in Shiraoi Town in July 2020, is Japan’s first national museum specializing in the history and culture of the Ainu people, while the Center for Ainu and Indigenous Studies at Hokkaido University is Japan’s only research center specializing in research on Ainu and indigenous peoples. These two parties signed an academic cooperation agreement on November 13, 2020. They will foster specialists in research on Ainu and indigenous peoples, disseminate the history and culture of the Ainu people, and promote international joint projects.



At the academic cooperation agreement execution ceremony on November 13, 2020 (From left, Shiro SASAKI, Executive Director of the National Ainu Museum, Hirofumi KATO, Director of the Center for Ainu and Indigenous Studies)

13 winners of the Commendation for Science and Technology given by the Ministry of Education, Culture, Sports, Science and Technology (MEXT)

In April 2020, the winners of the 2020 Commendation for Science and Technology Given by MEXT were announced, and 13 researchers from Hokkaido University received the commendations.

Awards for Science and Technology (Research Category)

Masako KATO, Professor
Faculty of Science

Hideki SUDO, Specially Appointed Associate Professor
Faculty of Medicine

Satoshi KANAI, Professor
Faculty of Information Science and Technology

Shin-Ichiro NISHIMURA, Professor
Faculty of Advanced Life Science

Naoki WATANABE, Professor
Institute of Low Temperature Science

Awards for Science and Technology (Technology Category)

Toshikazu KAWAGUCHI, Associate Professor
Graduate School of Global Food Resources

Young Scientists' Award

Tomohiro SEKI, Assistant Professor
Faculty of Engineering

Yusuke TAKAHASHI, Assistant Professor
Faculty of Engineering

Yuya NAGATA, Specially Appointed Associate Professor
Institute for Chemical Reaction Design and Discovery, Creative Research Institute

Outstanding Support for Research Award

Technical Specialists, Instrument Analysis Division, Global Facility Center, Creative Research Institute

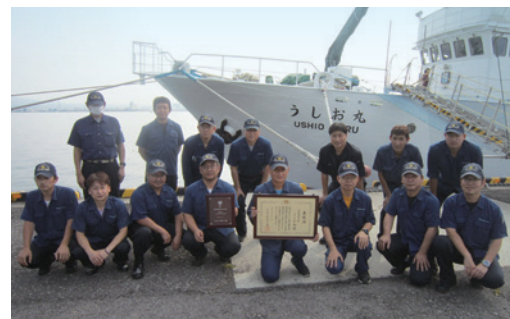
Seiko OKA (Division Manager), **Tomohiro HIROSE**, **Nozomi TAKEDA**, **Ai TOMOMITSU**

Training ship *Ushio Maru* receives a commendation from Ministry of Land, Infrastructure Transport and Tourism (MLIT)



On the 145th Meteorological Day on June 1, 2020, the training ship *Ushio Maru* of the School of Fisheries Sciences received the 2020 Commendation Given by the Ministry of Land, Infrastructure, Transport and Tourism for many years of active cooperation in observation reports on ocean surface temperatures and the like and for contributions to the development of meteorological services.

On June 25, 2021, the head of the Hakodate Meteorological Observatory of the Japan Meteorological Agency visited the Hakodate Campus and addressed gratitude to the captain and crew, and the School of Fisheries Sciences for their long-standing contributions.



The *Ushio Maru* crew receives the commendation

Innovative Food & Healthcare Master COI site receives the Science Council of Japan President's Award



In February 2021, the Industry-Academia-Regional Co-creation Project of Iwamizawa City and Hokkaido University That Has Reduced Premature Births, which has been promoted by the Innovative Food & Healthcare Master COI* site, received the Science Council of Japan President's Award of the third Japan Open Innovation Prize given by the Cabinet Office. This award is presented to unique, pioneering initiatives that promote open innovation in Japan.

The project analyzed big data of mothers and children to predict premature babies. The number of premature babies was reduced (by 10.4% in 2015 → by 6.3% in 2019) through the Mother and Child Health Survey, which provides continuous follow-up from pregnancy to childbirth and child-rearing.



Masanori YOSHINO
Director, Innovative Food & Healthcare Master COI site
Visiting Professor
Senior Project Manager, Hitachi, Ltd.

*Center of Innovation Program: A research and development program implemented by the Ministry of Education, Culture, Sports, Science and Technology and the Japan Science and Technology Agency (JST) that aims to realize innovation through industry-academia-government collaboration



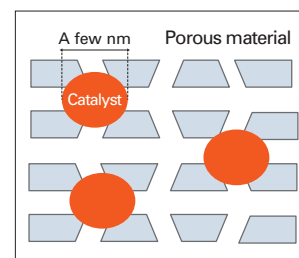
Highlights of Cutting-edge Research

Development of technology to create new energy from livestock manure



Takao MASUDA
Specially Appointed Professor
Faculty of Engineering

Specially Appointed Professor Takao Masuda, et al. and the research group of Furukawa Electric Co., Ltd. have developed a technology to convert biogas (mainly carbon dioxide and methane) into LP gas by applying a jointly developed metal catalyst fixation technology. By using the Ramune Catalyst™, which features a metal catalyst immobilized within a porous material, they have succeeded in generating LP gas, which is easy to store and transport, from carbon dioxide and methane obtained from livestock manure.



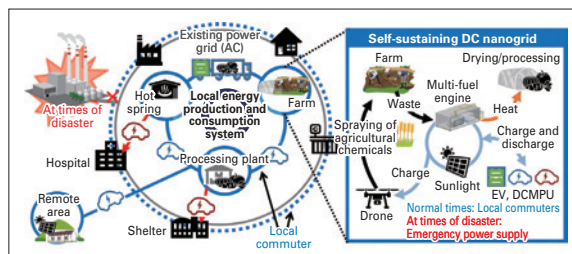
Structure of Ramune Catalyst™ (visual representation)

Promoting the development of a self-sustaining local energy production and consumption system



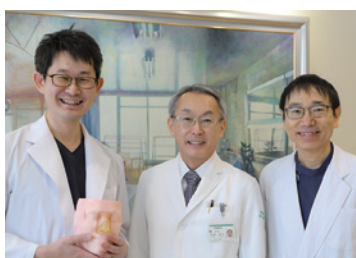
Takashi TAKEMOTO
Deputy Laboratory Manager,
Hitachi Hokkaido University Lab
Senior Researcher
Visiting Professor, Research
Institute for Electronic Science

The research group of Takashi Takemoto, a senior researcher at Hitachi Hokkaido University Lab, is promoting the development of a self-sustaining local energy production and consumption system. This system introduces local energy production and consumption services through the installation of multiple self-sustaining ultra-compact DC grids (DC nanogrids) that utilize a developed AI multi-combustion engine within the region and link with each other through EVs. Since the AI multi-combustion engine can generate electricity even from methane gas (at concentrations of 50% or more), it is possible to return unused resources in the region to local industries as energy.



Visual representation of a local energy production and consumption system utilizing an AI multi-combustion engine

Online training system for endoscopic surgery



Akihiro HONMA
Professor (middle)
Yuji NAKAMARU
Medical Professor (right)
Masanobu SUZUKI
Assistant Professor (left)
Head and Neck Surgery, Otorhinolaryngology Faculty of Medicine

Professor Akihiro Honma and his group have devised an online training system for nasal sinus endoscopic surgery that allows users to receive direct guidance from the world's top surgeons while in Japan, using a 3D model that precisely reproduces the human body and a telemedicine system. In February 2021, the world's first online international training session was held between Hokkaido University and the University of Adelaide in Australia. This system allows users to conduct training anywhere in the world as long as they have a 3D model, surgical instruments, a PC and an internet connection.



Delivery of simulated surgery and guidance using a 3D model

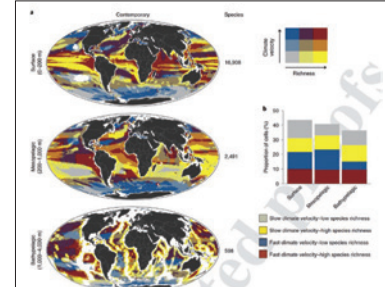
Predicting the impact of climate change on deep-sea biodiversity



Jorge Garcia Molinos
Associate Professor
Arctic Research Center

An international group led by researchers from the University of Queensland (Australia) and with the participation of Hokkaido University Associate Professor Jorge Garcia Molinos has obtained new analytical results that challenge the prevailing view that “marine biodiversity will be less impacted by climate change at greater depths than on the ocean surface.” They analyzed contemporary and future patterns in the rates and directions of temperature changes (climate velocity) at different depths across the world’s oceans. Irrespective of the emission scenario, the climate velocity was found to be much higher in deeper layers than in surface ones.

These results highlight new future challenges for the conservation of marine biodiversity in the global oceans.



(a) Classification of the relationships between the magnitude of climate change rate and the number of species and (b) the frequency of classification in three deep-water ocean zones

Estimation of national health risks caused by road noise



Junta TAGUSARI
Assistant Professor
Faculty of Engineering

Assistant Professor Junta Tagusari and his research group have estimated the prevalence of road noise-related health risks, including death, throughout Japan, such as sleep disorders and myocardial infarction, based on road noise forecast data and the latest environmental noise guidelines. The prevalence was estimated to be approximately one million for mild sleep disorders and approximately 9,000 for myocardial infarction, and it was estimated that roughly 2,000 people die each year due to noise. These estimated numbers of deaths are comparable to those of tuberculosis and asthma. The risk of death was shown to be particularly high along highways.



A map of health risks from noise: The risks along highways are very high.

Evaluation of the merger and cooperation of municipalities from regional revitalization questionnaires



Yuichi MURAKAMI
Associate Professor
Faculty of Public Policy

Associate Professor Yuichi Murakami has analyzed the results of questionnaires conducted by his research group from 2016 to 2017 regarding the national regional revitalization policy and has evaluated the Great Heisei Merger and the merger and cooperation of municipalities as a policy means and process for regional revitalization. It has become clear that non-merged local governments were less likely to be encouraged to promote wide-range cooperation under the national regional revitalization policy and were more likely to prefer cooperation with industries within and beyond their region than with neighboring local governments.



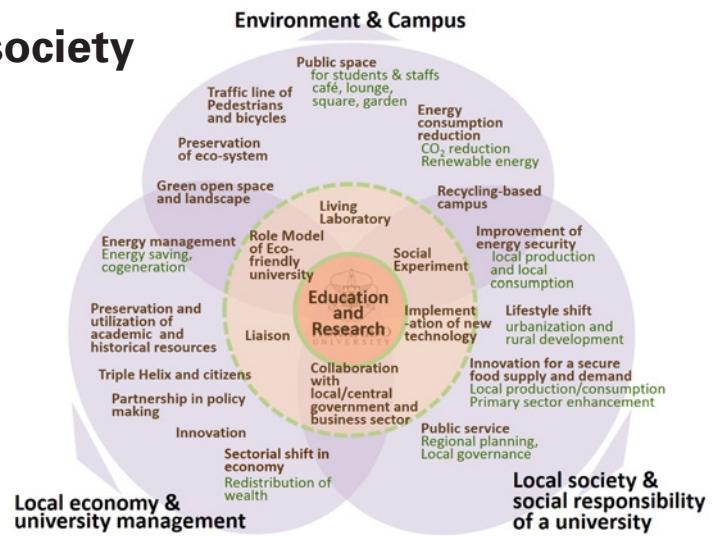
Policy discussion with six local government officials in Hokkaido

Movements toward the Creation of a Sustainable Campus

Campus Management that contributes to a sustainable society

Sustainable campus concept

Hokkaido University established the Office for a Sustainable Campus in 2010 as a place to practice sustainability knowledge together with society. The office was reorganized into the Sustainable Campus Management Office (SCMO) on April 1, 2018. The SCMO is promoting efforts to build a sustainable campus in conjunction with the Hokkaido University Campus Master Plan 2018 (CMP 2018).



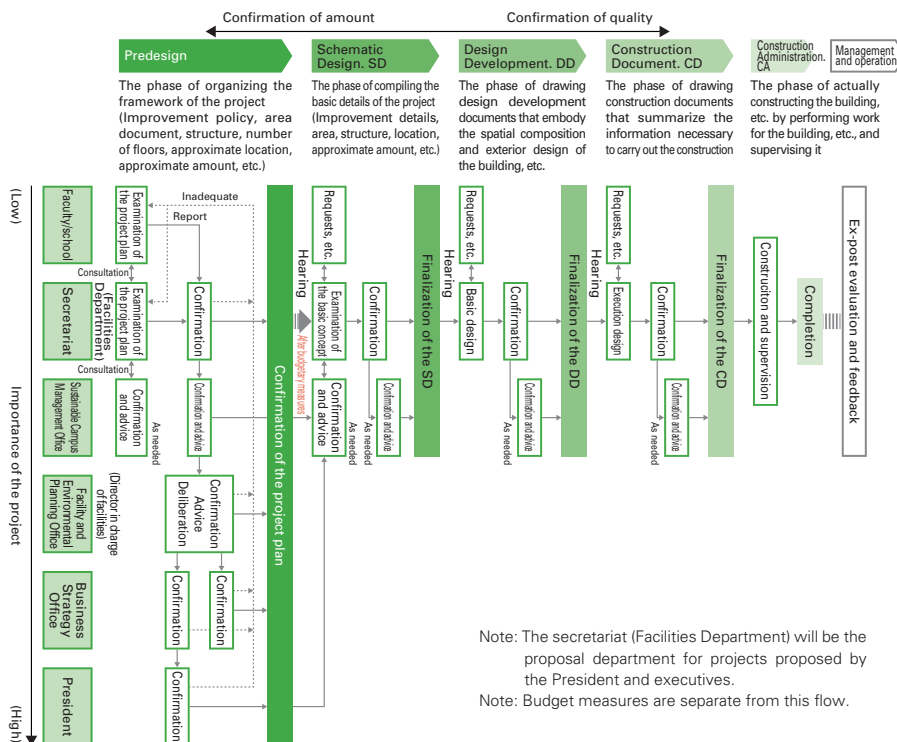
Visual representation of sustainable campus (Ikegami, SCMO, revised in 2014)

Consulting for improved facility quality

The Hokkaido University Campus Master Plan 2018 (CMP 2018) includes consistent consulting for facility quality improvement from the predesign phase to the design and operation phases for future project planning in order to improve the quality of life (QOL) on campus.

In FY 2020, consultation was provided based on confirma-

tion and advice by the SCMO regarding the design of a new building for the Institute for Chemical Reaction Design and Discovery (ICReDD) and the design of a new research and educational building for the Research Center for Zoonosis Control.



Flow of confirmation, advice, and deliberation from predesign to construction administration phase (CMP 2018, p. 66, Fig. 5-10)



Rendering of a new building for the Institute for Chemical Reaction Design and Discovery (ICReDD)

Rendering of a new research and educational building for the Research Center for Zoonosis Control

Note: The secretariat (Facilities Department) will be the proposal department for projects proposed by the President and executives.
Note: Budget measures are separate from this flow.

Facility satisfaction survey



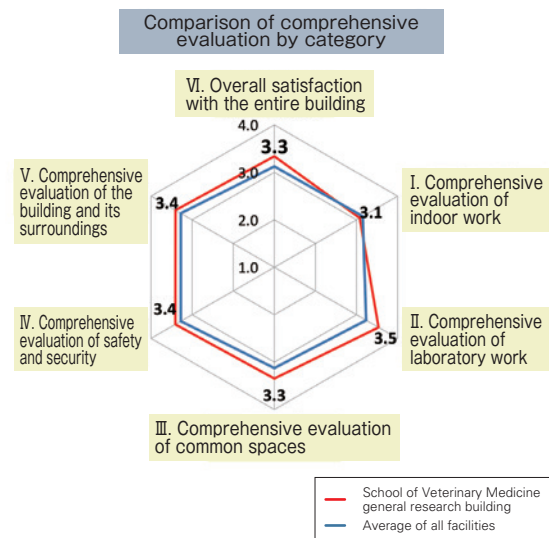
Hokkaido University formulated the Hokkaido University Facility Satisfaction Survey Implementation Manual in 2016 and has been conducting a survey on buildings with a total floor area of 1,000 m² or more for which at least two years have passed since construction completion.

In FY 2020, a survey of the general research building of the School of Veterinary Medicine was conducted. There were many opinions regarding the indoor and outdoor environment and the ease of use. This survey is an activity that is positioned as the “C” (check) in the PDCA cycle for facility management, and it will be reflected in the Hokkaido University Facility Design Standards.

< Outline >

- The Hokkaido University Facility Satisfaction Survey Implementation Manual was established (March 2016)
 - A survey on buildings with a total floor area of 1,000 m² or more for which at least two years have passed since construction completion
 - Targeted at faculty members and graduate students who use the building on a daily basis
- The results will be reflected in the Hokkaido University Facility Design Standards to realize high-quality facility design.

Major survey results for the School of Veterinary general research building (simple tabulation)



■ Previous surveys

- FY 2016: Institute for International Collaboration building
- FY 2017: School of Pharmaceutical Sciences, management and experiment building
- FY 2018: School of Fisheries Sciences, management and research building
- FY 2019: School of Engineering, civil engineering research building

Preservation of historic properties and preparation of long-term repair plans



Hokkaido University, which boasts 150 years of tradition, has formulated a long-term repair plan for important cultural properties and registered tangible cultural properties based on the national Basic Plan for Life Extension of Infrastructure.

In the long-term repair plan for FY 2020, priorities are set in terms of aging and damage, importance as a cultural property, and repair costs.



The Old School of Entomology



Furukawa Hall



Former School of Agriculture Library



Sapporo Agricultural College's Farm No. 2

Update of “Policy on Ecosystem Preservation and Management”:

Designation of preserved trees

The Policy on Ecosystem Preservation and Management has been formulated. In FY 2020, trees that represent the landscape of Hokkaido University, rare trees, and venerable trees were designated as preserved trees.

Name	Location	No. of trees	Name	Location	No. of trees
Japanese elm donated by Mrs. Nitobe	In front of the Secretariat In front of the Information Center	2 3	<i>Acer miyabei</i>	In front of the School of Economics and Business	1
Red maple, sugar maple, Japanese elm	South side of the Centennial Hall	3	Painted maple	East side of the Faculty of Environmental Earth Science	1
Japanese alder	West side of Centennial Hall	1	Poplar Avenue	East side of the Field Science Center for Northern Biosphere building	72
Amur cork tree	Central Lawn	3	Ginkgo Avenue	Kita 13-jo-dori Avenue	70
Japanese lime, <i>Tilia maximowicziana</i>	West side of Furukawa Hall	2	Heisei Poplar Avenue	West Gate	70
Japanese elm in Elm Forest	Around Elm Forest (Including the area in front of Furukawa Hall)	3	Japanese elm	Sapporo Agricultural College's Farm No. 2 (Model Barn)	2





Movements toward the Creation of a Sustainable Campus



Assessment of Hokkaido University in FY 2020 using ASSC **ASSC** Assessment System for Sustainable Campus

The Assessment System for Sustainable Campus (ASSC), developed by Hokkaido University in 2013, is a questionnaire format for evaluating standards that are needed to realize sustainability of a campus. FY 2020 saw a year-on-year increase in scores for three out of the four categories, and the total score reached 83.25%, which was equivalent to “gold” certification. The

university has been awarded “gold” every year since FY 2016.

The university has been conducting evaluations using this assessment system every year since FY 2013. As seen from the gradual upward trend in the radar chart below, campus management has been reviewed and improved based on the assessments.

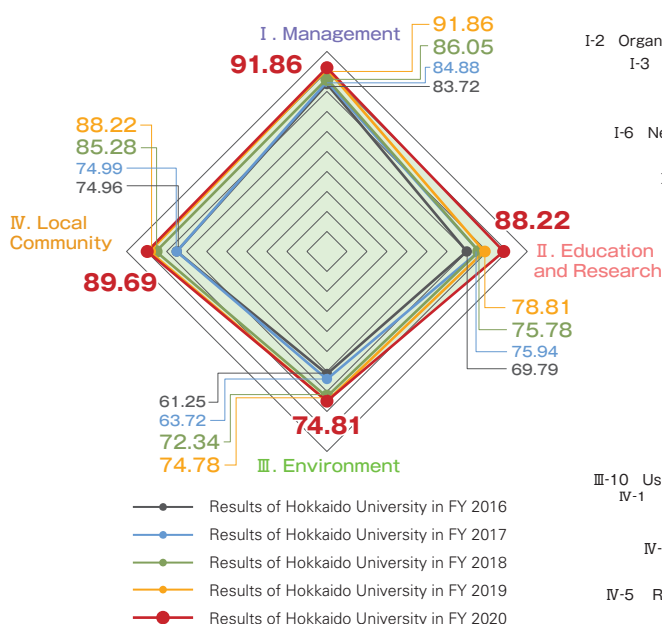


Figure 1. Score rates of Hokkaido University in the four categories

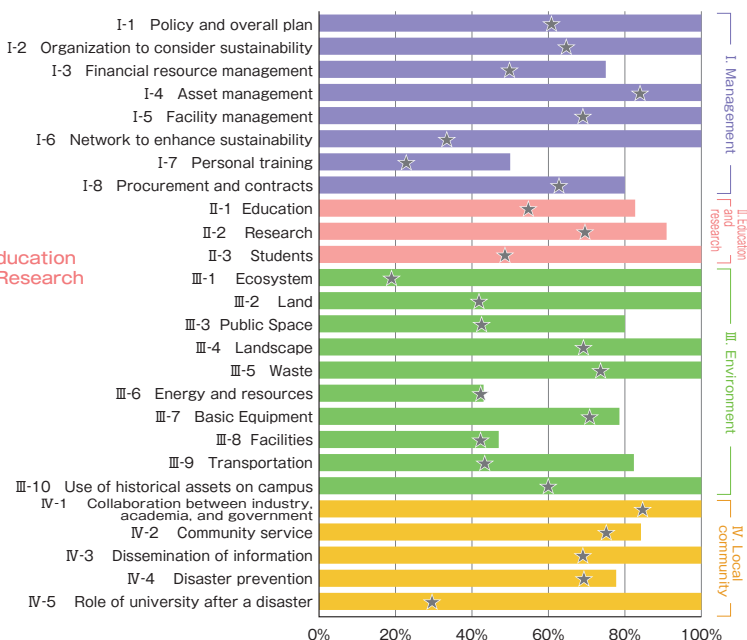


Figure 2. Score rates of Hokkaido University by assessment area

Bar graph indicating the results of HU in FY 2020
★ Average of 19 national universities in FY 2014

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

Efforts for Energy Saving

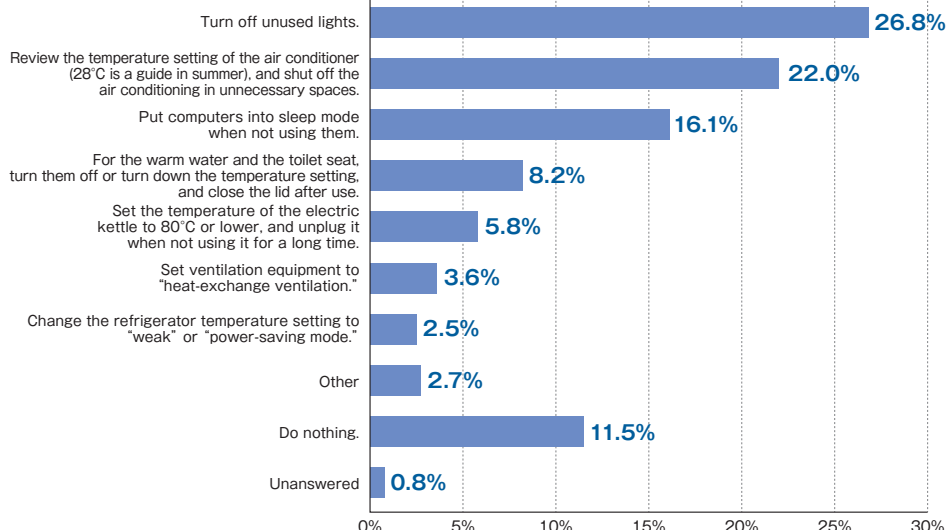


Saving Electricity questionnaire

The Sustainable Campus Management Office conducted a questionnaire on power saving in summer and has summarized the results.

Part of the questionnaire results

What actions, if any, were taken after the power saving alert in summer? (2,215 responses)



Energy-saving proposals for research and education

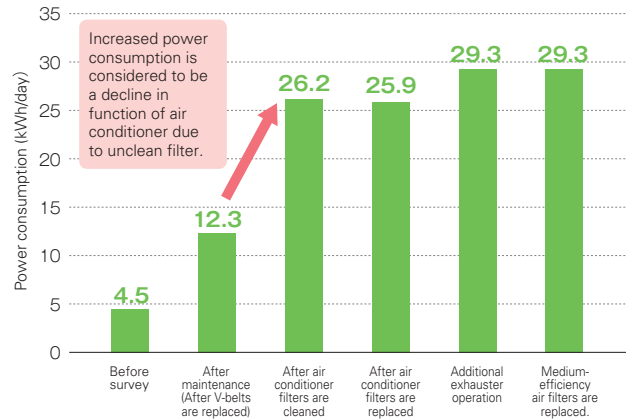


Adopted project: Survey on power consumption reduction achieved by cleaning and taking other measures for air-conditioning systems that compensate for outdoor air exhausted by the fume hood

At the Institute for Catalysis, there is one vacant room with an air-conditioning system that includes two outside air-treating air conditioners, four Lossnay ventilation units, and four exhausters, and these had not been cleaned. The reduction in power consumption achieved by cleaning these units was measured.

The results have revealed that a decrease in the power consumption of the ventilation units shows a decrease in the volume of air supply and exhaust (dirt on the filters).

Changes in power consumption of air conditioners



Energy-saving measures that utilize the centralized controller of air conditioners



As part of the creation of a sustainable campus, a university-wide promotion was made to utilize a centralized air conditioner controller (avoiding unnecessary energy loss by timer-controlled air conditioners), which can be expected to achieve a steady reduction without incurring special costs. The timer of the existing centralized air conditioner controller was set at the Faculty of Health Sciences (Buildings A to E) in December 2020. The centralized controller was used to set the heating/cooling schedule (preheating operation, stop signal), change the temperature setting, and set the upper and lower limits of the set temperature. A comparison between the predicted power consumption when the centralized controller is not used and the power consumption when the controller is used showed the power consumption to be reduced by 48,385 kWh, or approximately 20%, in the three winter months (Dec. to Feb.). Assuming the same reduction for the period when the air conditioner is used in summer, it was estimated that the cost of heating and cooling could be reduced by approximately 1.5 million yen annually in the Faculty of Health Sciences (Buildings A to E).

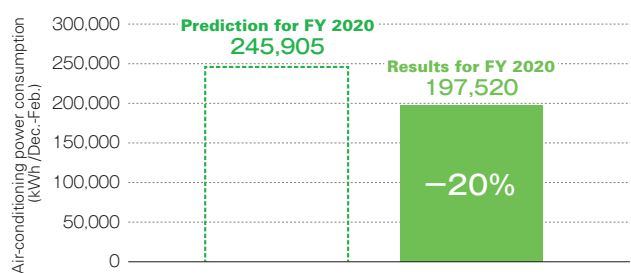
Based on these results, the Sustainable Campus Manage-

ment Office has positioned “the utilization of centralized air conditioner controllers” as a university-wide measure from FY 2021 and plans to implement it widely for campus facility operations.

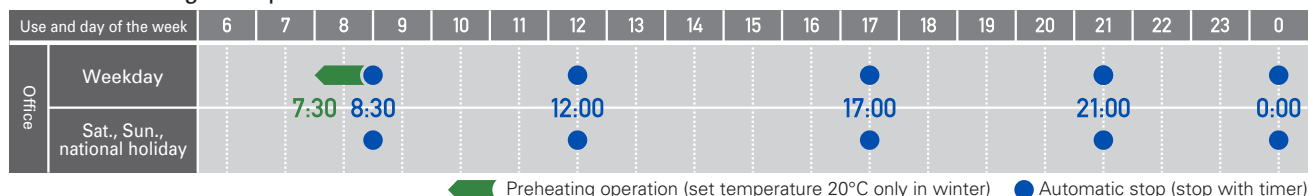
Comparison of power consumption prediction and actual results

	Monthly power consumption (kWh/month)	
	Prediction for FY 2020	Results for FY 2020
Dec.	75,957	59,033
Jan.	90,941	75,428
Feb.	79,007	63,059
Total from Dec. to Feb.	245,905	197,520
Reduction		-20%

Electricity Power reduction



Schedule setting example



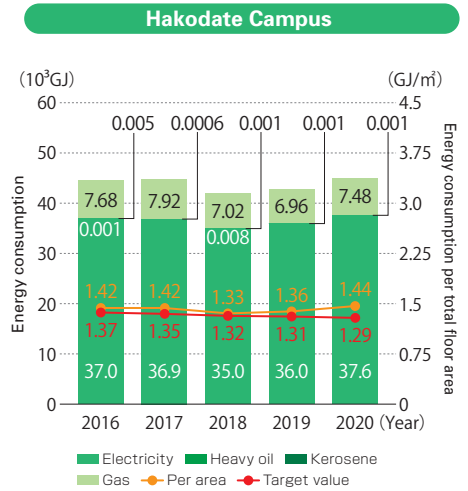
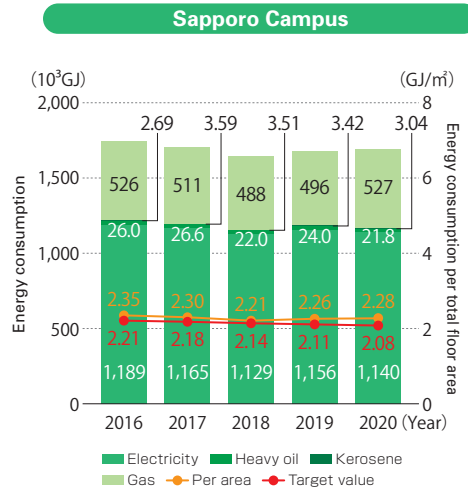
Preheating operation (set temperature 20°C only in winter) Automatic stop (stop with timer)

Changes in Environmental Data

Primary energy consumption



Electricity **1,178,150GJ**
 Heavy oil **21,832GJ**
 Kerosene **3,048GJ**
 Gas **535,132GJ**



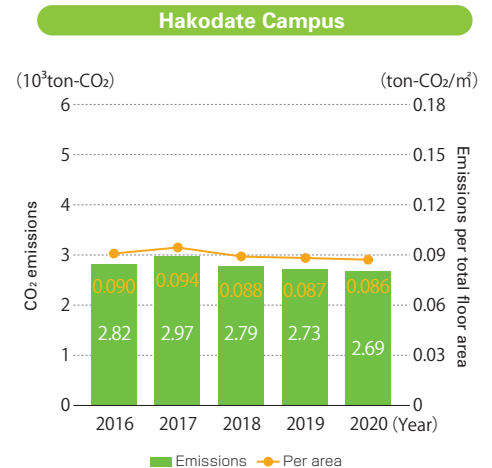
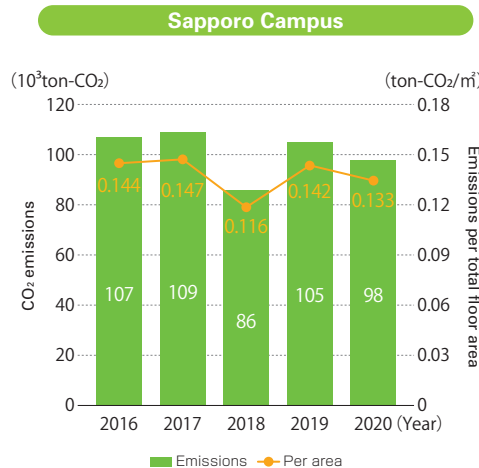
Conversion factor by type of energy Electricity: 9.76 MJ/kWh Heavy oil: 38.9 MJ/ℓ Kerosene: 36.49MJ/ℓ Gas: 45.0MJ/m³

Note) 2018: Usage decreased due to the impact of the Hokkaido Eastern Iburi Earthquake
 The energy target is to reduce the basic unit for primary energy consumption on the Sapporo and Hakodate Campuses by 1.5% annually. (Source: Action Plan 2016 for Building a Sustainable Campus)

Greenhouse gas emissions



Carbon dioxide
101,542t-CO₂

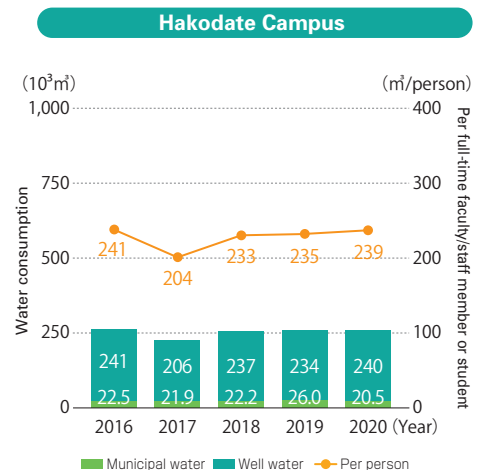
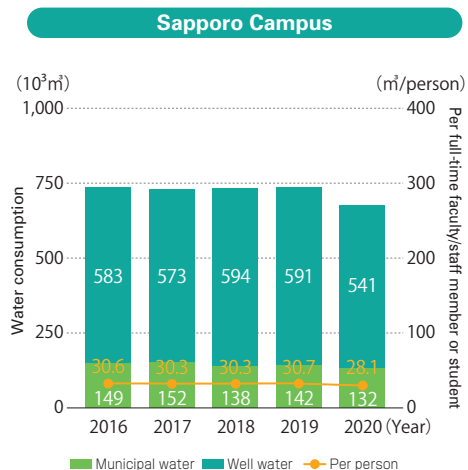


Note 1) The adjusted electricity-derived CO₂ emission factor [kg-CO₂/kWh] used for calculation was 0.640 in FY 2016 and 0.678 in FY 2017. In FY 2018, it was 0.511 (new electric power company) for the Sapporo Campus and 0.678 for the Hakodate Campus. In FY 2019, it was 0.673 (Apr. – Jun.: new electric power company) and 0.656 (Jul. – Mar.: HEPCO) for the Sapporo Campus and 0.656 for the Hakodate Campus. In FY 2020, it was 0.601.
 Note 2) 2018: Emissions decreased due to the impact of the Hokkaido Eastern Iburi Earthquake

Water consumption



Municipal water **153,470m³**
 Well water **782,175m³**



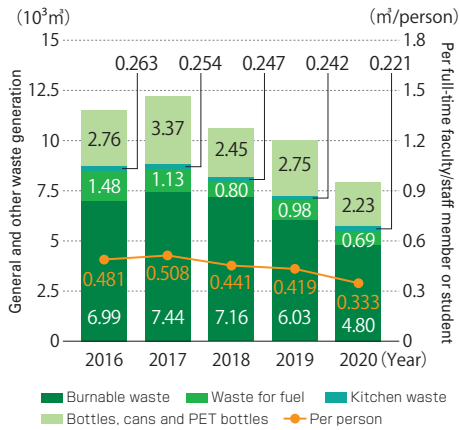
Note) Per capita consumption figures include temporary faculty/staff.

General and other waste generation

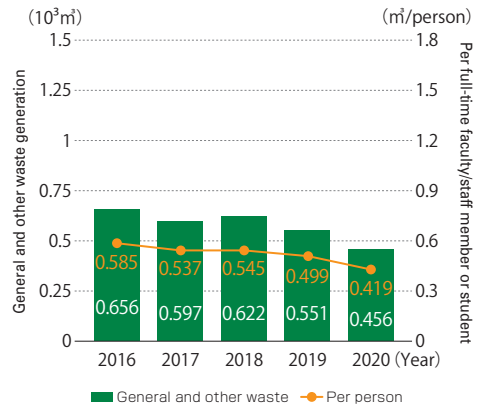


General and other waste
8,418m³

Sapporo Campus



Hakodate Campus



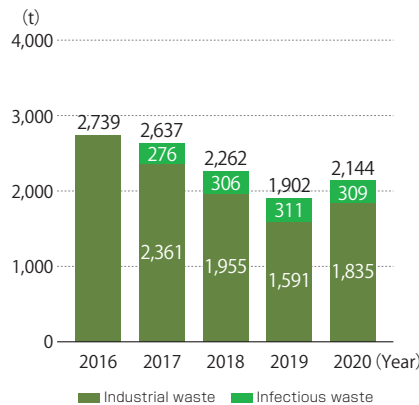
Note 1) "Kitchen waste" refers only to that generated by the University Hospital's food preparation facilities.
 Note 2) Per capita generation figures include temporary faculty/staff.
 Note 3) General and other waste for the Hakodate Campus includes bottles and PET bottles.
 Note 4) The waste compaction project started with a phased approach in FY2016.

Industrial waste generation

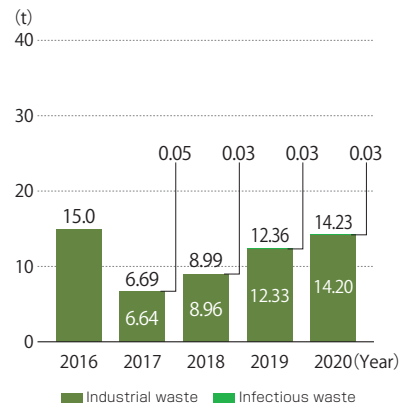


Industrial waste **1,849t**
 Infectious waste **309.2t**

Sapporo Campus



Hakodate Campus



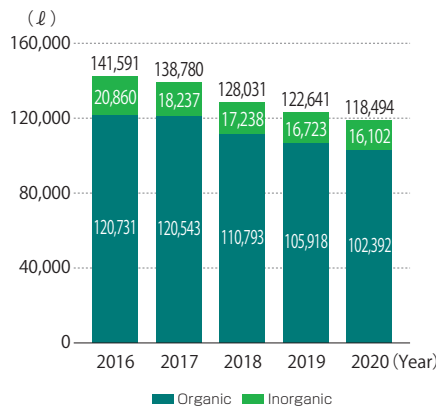
Note 1) The figures for the Sapporo Campus exclude items under the Act on the Recycling of Specified Kinds of Home Appliances. The figures for the Hakodate Campus include discarded electrical appliances.
 Note 2) Infectious waste is shown separately in the data of FY 2017 and onward.

Experimental waste fluid generation

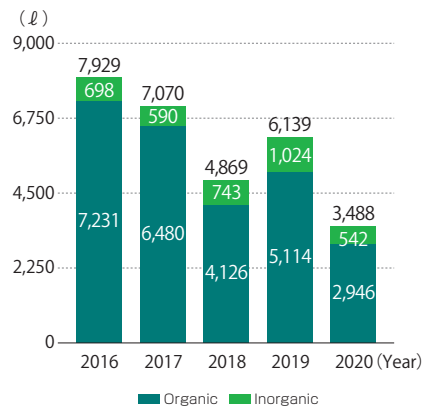


Organic **105,338ℓ**
 Inorganic **16,644ℓ**

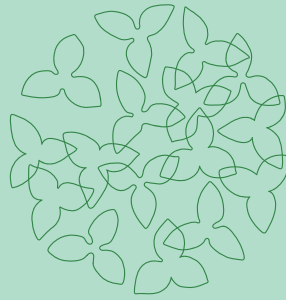
Sapporo Campus



Hakodate Campus



Note) Including local facilities



HOKKAIDO UNIVERSITY

The Trillium flower is symbolic of Hokkaido University and used as its official logo. In this design, the flower symbolizes “human” by combining intelligence, individuality, and diversity. The overlapping elegant lines of the flowers represent human relationships and knowledge. The flowers’ silhouettes reflect academic and contemporary values, suitable for Hokkaido University.

Hokkaido University Sustainability Report 2021

Published by: Sustainable Campus Management Office

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Published: September 2021 (next issue scheduled for September 2022)



Sustainable
Campus

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 2018.

Organizations involved

Hokkaido University

Sapporo Campus (incl. contracted commercial operators on campus)

Hakodate Campus

Period

April 2020 – March 2021

Field

Environment

This Sustainability Report is available on the Sustainable Campus Management Office website.
See the two-dimensional code below.



Note: This report is prepared as a report equivalent to an Environmental Report under the Environmental Consideration Act.

Until 2019, this report was published as the “Environmental Report,” but it has been renamed as the “Sustainability Report” in order to comprehensively disclose the university’s sustainability efforts.



Printed with environmentally
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