Kanazawa University Carbon Neutrality Progress Report

e:C0Real

2026
Vol.3

e:C0Real(EcoReal is a report summarizing Kanazawa University's carbon neutral initiatives. The name combines Eco, which represents the environment, with the goal of achieving zero carbon (0), and represents the university's position as a core center for green innovation.core)

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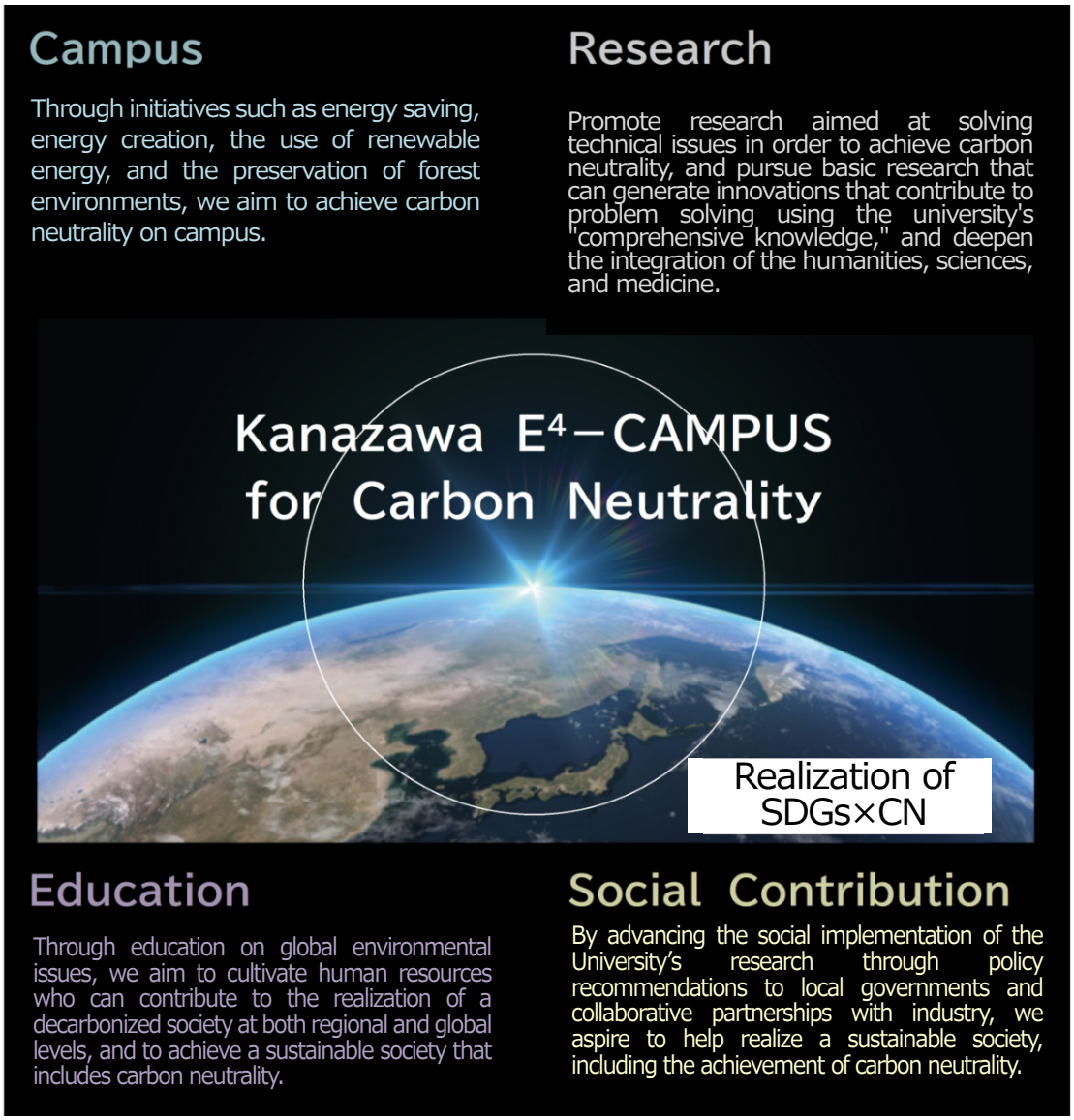
1. Basic Policy toward Carbon Neutrality

1-1 University-wide Policy

In March 2022, Kanazawa University formulated the "Kanazawa E4-CAMPUS for Carbon Neutrality" initiative, which is based on the pillars of “Research”, “Social Contribution”, “Education”, and achieving carbon neutrality for “Campus” facilities, and published a revised version in June 2026.

Kanazawa University's Future Vision "Aspiration" Version UP 2024 sets out the goal of "All Kanazawa University contributing to society through 'future intelligence'" and, in line with the initiative plan toward carbon neutrality, aims to achieve carbon neutrality through "future intelligence." As "All Kanazawa University," the university will not only achieve carbon neutrality on its campus, but will also contribute to society by serving as a leader in promoting human resource development and research and development that can contribute to the realization of carbon neutrality.



1 - 2 Basic Policies for Research, Social Contribution, Education, and Campus

<Basic Research Policy>

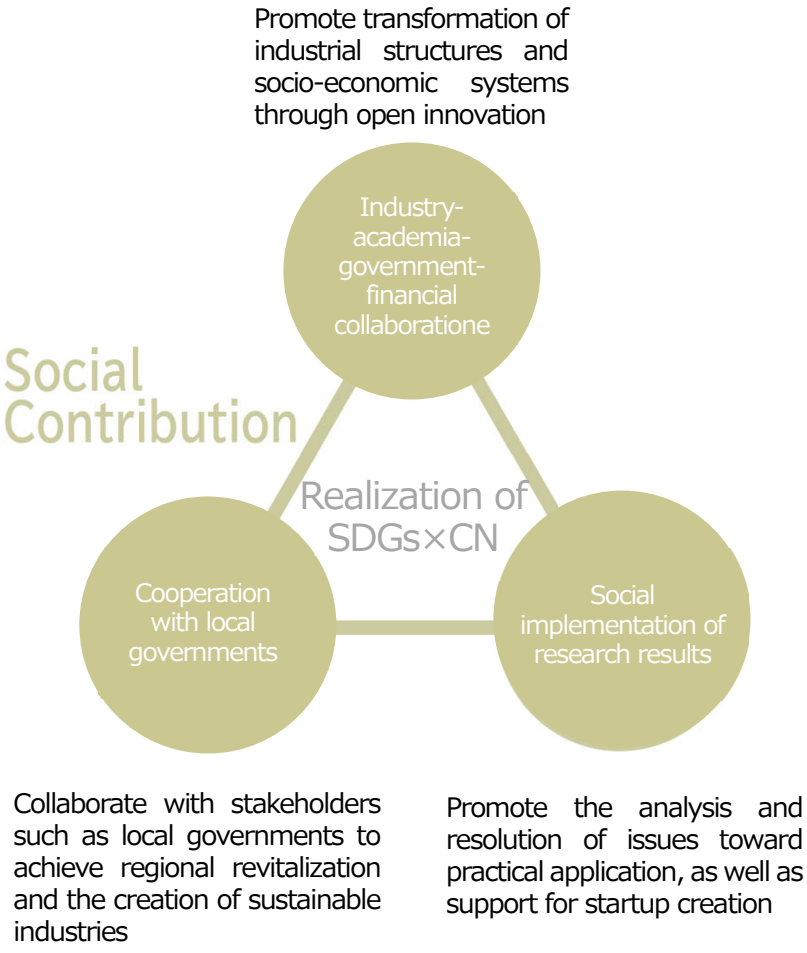
In its "Innovative Environmental Innovation Strategy," the government has organized the important areas that should be addressed in order to contribute to reducing greenhouse gas emissions worldwide through the creation of innovative innovations into five categories: 1) non-fossil energy, 2) energy networks, 3) hydrogen, 4) carbon recycling, and 5) zero emissions in the agriculture, forestry, and fisheries industries. It has also selected technological challenges and set themes in which Japan can make a significant contribution using its technological capabilities.

Our university aims to be a "world-class" university that offers outstanding education and research on a global level, and will promote research and development aimed at resolving technical issues in order to achieve carbon neutrality on a global scale. Furthermore, through collaboration with industry, academia, government, and international partners, we will constantly analyze the latest social and technological trends, and without being limited to existing themes, we will utilize the strengths of our university to pursue basic research that can create innovations that contribute to problem-solving through "comprehensive knowledge," and to deepen the integration of the humanities, sciences, and medicine.

<Basic Policy for Social Contribution>

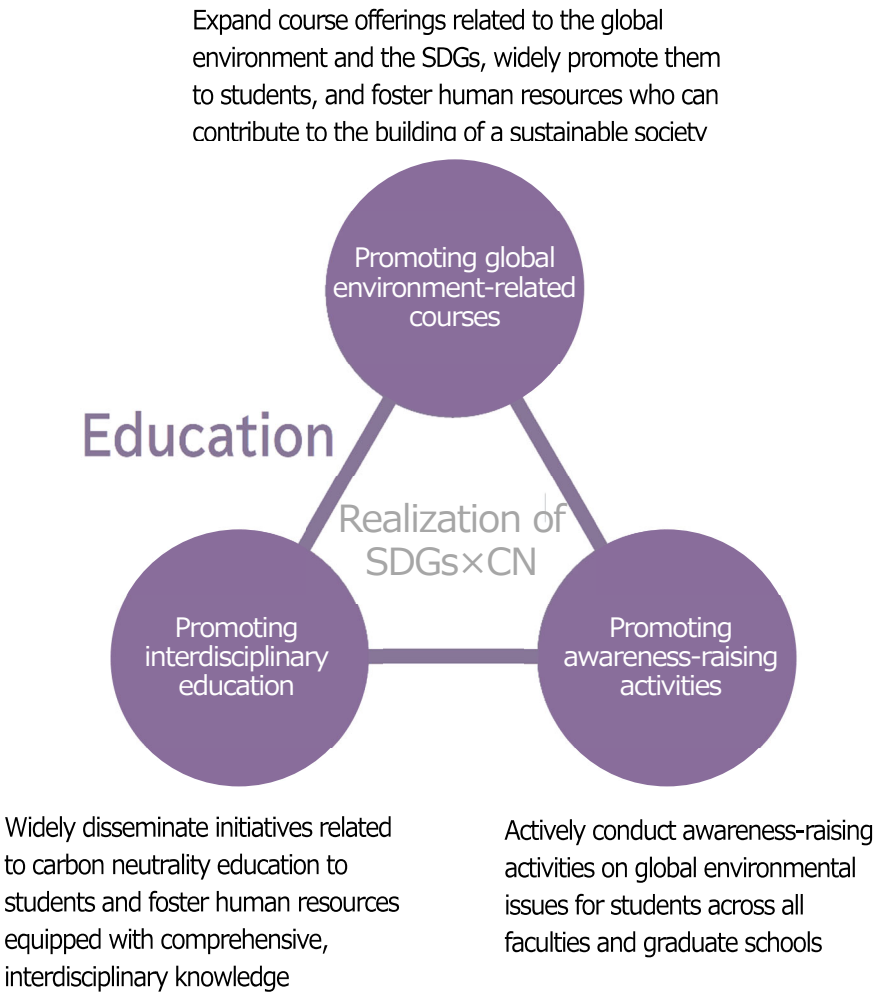
In its "Green Growth Strategy for Carbon Neutrality by 2050," the government states that in addition to establishing innovative technologies to address the issues outlined in the "Innovative Environmental Innovation Strategy," a further challenge is social implementation and cost reduction through investment. For each priority area, the government has formulated an "action plan" that includes: 1) goals with clear time frames, 2) research and development/demonstration, 3) system development such as regulatory reform and standardization, and 4) international collaboration.

This strategy (a virtuous cycle between the economy and the environment) posits that responding to global warming will bring about changes in industrial structure and socio-economy, leading to growth. It calls for the implementation of this strategy not only by the industrial sector, which is the main driver of social implementation, but also by government, academia, finance, and all other sectors in a unified manner. In order to promote the return of our university's research results to society, we will work with industry, academia, government, and financial institutions, as well as local governments, to propose policies based on comprehensive knowledge, promote open innovation, and support startup businesses, thereby working to co-create a carbon-neutral society.



<Basic Educational Policy>

In order to realize a sustainable society, including carbon neutrality, our university has adopted the basic policy of education that contributes to carbon neutrality as "cultivating human resources who can contribute to the realization of a carbon-neutral society in the local and global regions through education on global environmental issues." We will promote the expansion of courses related to global environmental issues and the SDGs, and actively carry out awareness-raising activities regarding global environmental issues. We will also widely disseminate information about carbon neutrality among students and strive to develop talent with comprehensive knowledge across multiple fields.

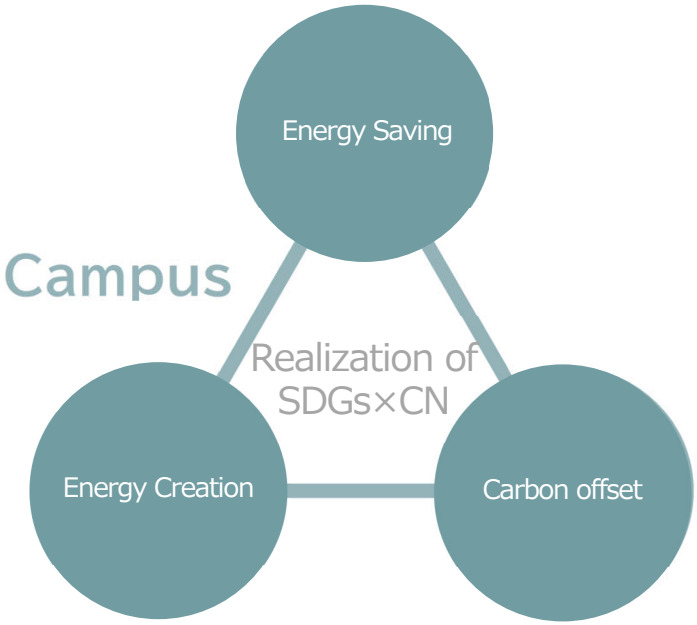


<Basic Policy for Campus Facilities>

Kanazawa University emits approximately 37,600 t-CO2 of greenhouse gases per year. This is equivalent to the carbon neutrality of approximately 14,900 average households (approximately 6.9% of Kanazawa city). Although it will not be easy to achieve carbon neutrality for the campus facilities, we will promote initiatives that will serve as a leading model for realizing a sustainable society.

Kanazawa University aims to achieve carbon neutrality for campus facilities by simultaneously implementing energy conservation measures, energy creation measures, utilization of renewable energy, preservation of the forest environment, and demonstrating the use of research results.

Implement energy reduction initiatives such as updating existing facilities to high-efficiency equipment, converting buildings to ZEBs, implementing ESCO projects, and implementing daily energy conservation measures



Implementing energy creation initiatives such as developing renewable energy power generation facilities, utilizing 100% renewable energy electricity, and demonstrating the use of research results

Promote greenhouse gas absorption by maintaining and improving the forest environment unique to our university

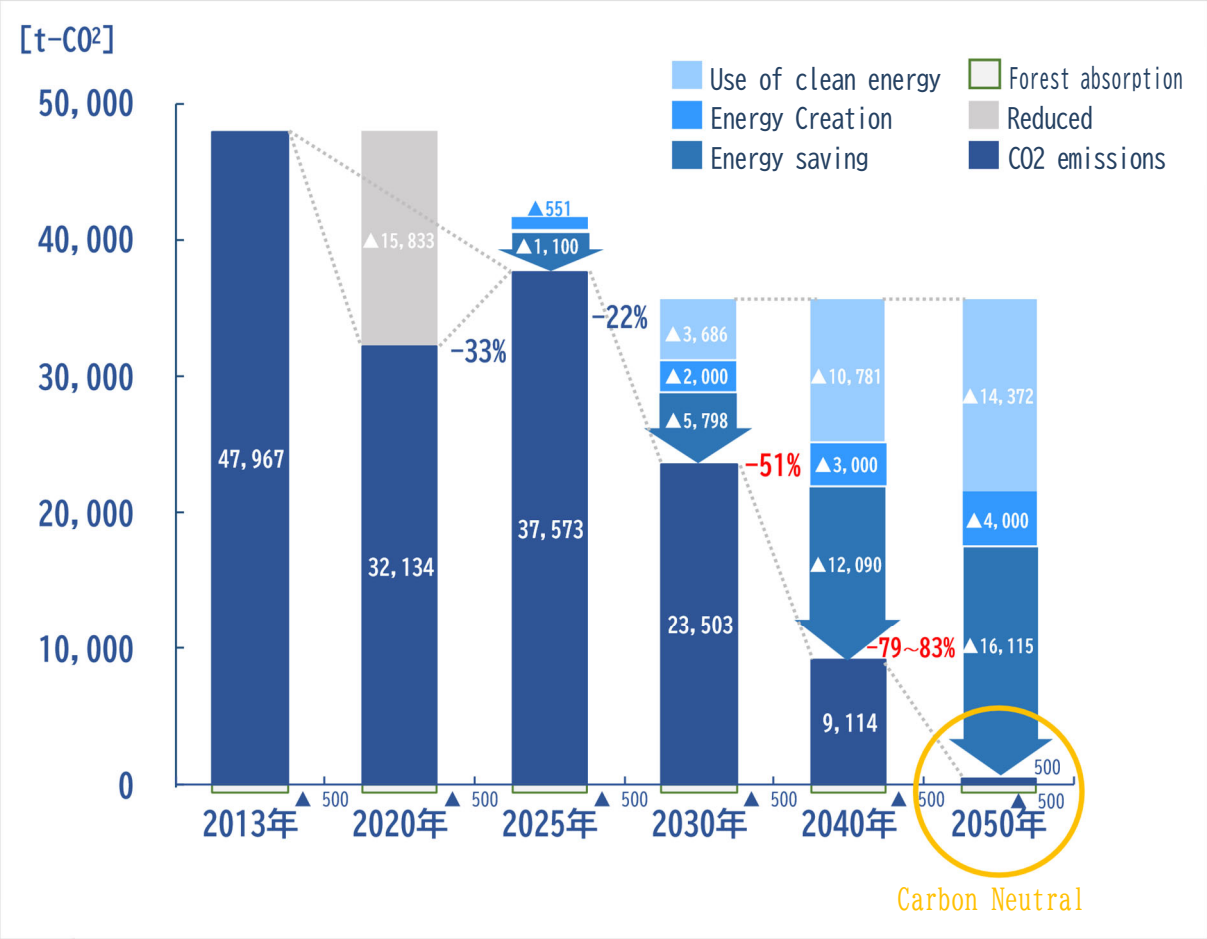
1-3 Greenhouse Gas（GHG） Reduction Targets

Through daily energy-saving efforts, our university's greenhouse gas emissions will be 37,573t-CO2 in 2025, a reduction of approximately 22% compared to 2013.

However, an increase in greenhouse gas emissions is expected due to the construction of new buildings (such as the Natural Science Lecture Hall 2 and the Usui Hall) and increased air conditioning load due to the effects of global warming. In addition, taking into account their age, the renovation of the university's main buildings to become ZEB-compatible is expected to take place after 2030.

Taking these factors into consideration, we will set reduction targets and timelines for achieving them based on the "Plan for Global Warming Countermeasures" and promote efforts to achieve carbon neutrality by 2050.

Mid-term target : By 2030, compared to 2013 Aiming for a reduction of 51% or more
Long-term target : Aiming to achieve Carbon neutral by 2050



2. Achievements for FY2024

2-1 Outcomes of Initiatives in Research, Social Contributing to Carbon Neutrality

■Initiatives in the green energy field

<Energy utilization of formic acid derived from CO_2>

In fiscal year 2025, efforts were made to develop elemental technologies for using formic acid and formate synthesized by CO_2 electrolysis as fuels for fuel cells. In particular, conditions for electrode configurations that contribute to higher power output and stable operation of fuel cells using formate—assumed to be the discharge form of formic acid synthesized in the electrolyte—were clarified[*1]。

Building housing the CO_2 electrolysis system installed at the demonstration site in Suzu City

In addition, it was demonstrated that electricity generation is possible using formic acid actually synthesized from carbonate ions[*2]. Toward the practical application and social implementation of this technology, system development is also underway. As part of the NEDO "Public–Private Partnership Program for Supporting Young Researchers," a small-scale power generation system using formic acid as fuel, jointly developed with JTEKT Corporation, was confirmed to achieve an output of 150 W.

Furthermore, as part of the formic acid production process, a bench-scale CO_2 electrolysis system for formic acid synthesis was installed at the demonstration site in Noto. Demonstration testing starting in the next fiscal year and integration with formic acid fuel cells are anticipated.

＊1 : Y. Wang, F.A.L Halim, M. Miskan, K. Fujiwara, Y. Osaka, A. Kodama, T. Tsujiguchi, "High-Power Alkali-Free Direct Formate Fuel Cell Enabled by Optimized Ionomer Loading With a Cation-Exchange Membrane", Electrochemical Science Advances 6(1), (2026), e70027

＊2 : F.i Amano, S. Higashino, Y. Wang, K. Nomoto, T. Shishido, T. Tsujiguchi, "Electrosynthesis of Concentrated Formate as a Direct Liquid Fuel from a Bicarbonate Feedstock" ACS Electrochemistry 2026 *2* (3), 661-667

■Initiatives in the Field of Material Creation

＜Resource Circulation through Renewable Plant-Based Plastics Utilizing Unused Agricultural By-products＞

Since being selected in FY2022 for the 'COI-NEXT - Co-creation Field' (Main-Type) by the Japan Science and Technology Agency (JST), we have been developing plant-based plastics and biodegradable superabsorbent polymers using cellulose components found in unused agricultural by products. These materials are designed to be biodegradable in both soil and marine environments.

Our research focuses on utilizing agricultural residues such as sugar beet pulp—a by-product of sugar production cultivated globally—and banana stems, which amount to approximately one billion tons worldwide. In FY2024, we published the following research papers:

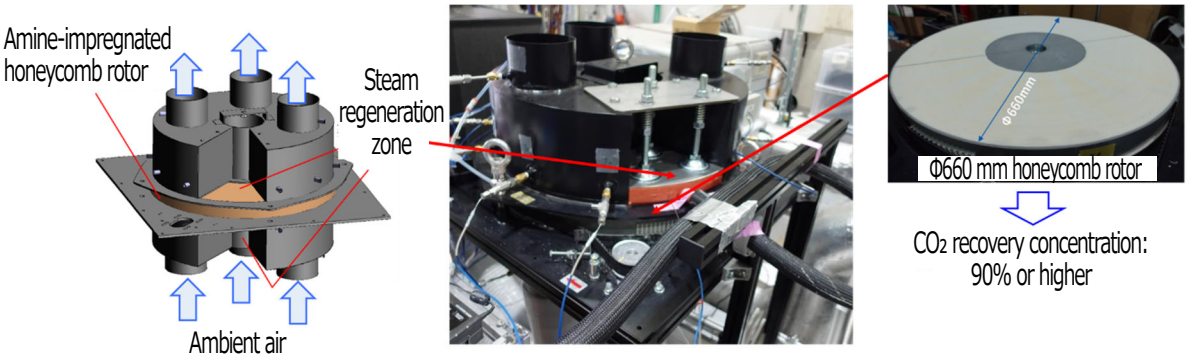
- ✓ Mengyang Qu, Gyanendra Sharma, Naoki Wada, Hisaki Ikebata, Shigeyuki Matsunami, Kenji Takahashi,"Machine Learning-Driven Generation and Screening of Potential Ionic Liquids for Cellulose Dissolution". Journal of Cheminformatics, 17(1), 78, MAY 21, 2025
- ✓ Shiori Suzuki, Shogo Ishikura, Shoichi Ikebata, Naoki Wada, Kenji Takahashi, "Degradation behavior in soil and mechanical properties of bagasse monoesters with different acyl chain lengths and residual hydroxy contents".Polymer Journal, MAR 26, 2025

Others (8 reports in total)

■Initiatives in the resource circulation field

＜NEDO Moonshot Project: Concentration and recovery of carbon dioxide from ambient air to a concentration of 90% or higher＞

Under the NEDO Moonshot Project, efforts are underway to develop a process for the concentration and recovery of CO_2 from ambient air, known as Direct Air Capture (DAC). A pilot-scale test with a processing capacity of 1,000 m^3/h has been initiated using a honeycomb rotor with a diameter of 660 mm impregnated with amines as CO_2 absorbents. The absorbed CO_2 is desorbed by heating the honeycomb rotor with steam at approximately 100 °C. Through the examination of process design and operating parameters, it has been successfully demonstrated that CO_2 at an atmospheric concentration of 0.04% can be concentrated and recovered to a concentration exceeding 90%. Further performance improvements and the development of amine-impregnated honeycomb rotors with enhanced steam resistance are ongoing.



Experimental setup of the steam-regenerated honeycomb rotary DAC system (1,000 m^3/h scale)

As part of initiatives related to CO_2 recovery, a joint research project entitled "Study on CO_2 Concentration from Incinerator Flue Gas Using Waste Heat from Incineration" has been conducted based on a comprehensive collaboration agreement with Actree Corporation (Hakusan City, Ishikawa Prefecture). In this project, a test apparatus using zeolite as a CO_2 adsorbent was installed at Actree's R&D Center (Mibu Town, Tochigi Prefecture), and demonstration tests using actual flue gas have been carried out. The results have been presented at venues such as the 29th Power and Energy Technology Symposium of the Japan Society of Mechanical Engineers.

<Related links>

NEDO Moonshot Project : https://www.nedo.go.jp/content/100923459.pdf

<Dia-DREEM TM – CO_2 Reduction Technology Using Electron Emission from Diamond Surfaces Triggered by Visible Light>

Regarding the "Solar Super-Reduction®" technology*1, which was developed in fiscal year 2023 and is expected to be an innovative carbon recycling technology due to its long catalyst lifetime and low power consumption, research and development were conducted in fiscal year 2025, following the previous year, with the aim of elucidating the CO_2 reduction mechanism and further improving performance.

This technology features a layered structure of heavily nitrogen-doped diamond (NDD) and heavily boron-doped diamond (BDD). Upon exposure to visible light, electrons are emitted from the NDD layer and simultaneously supplied from the BDD layer, driving the reduction reaction.

In fiscal year 2025, the selectivity of reduction reactions was investigated for electrons near the valence band of diamond and for visible-light-excited electrons in the conduction band of the NDD layer. The results revealed that electrons near the valence band primarily induce hydrogen evolution, whereas electrons excited to the conduction band by visible light preferentially promote CO_2 reduction. By suppressing carrier trapping, improvements in photovoltaic conversion efficiency and reduction performance were achieved*2.

Daicel Corporation is planning demonstration experiments to apply this technology to its chemical plants, aiming to convert CO_2 emissions from factories into carbon monoxide, a raw material for chemical products, as a sustainable technology.

*1 : Dia-DREEM TM (Diamond-Driven Electron Emission for Molecular Reduction) is a proprietary diamond crystallization technology combining Daicel Corporation's detonation synthesis and Kanazawa University's CVD techniques. It produces diamond catalysts with a unique crystal structure that absorbs visible light—most abundant in sunlight—and emits electrons to reduce CO_2 to CO.

*2 : Taro Yoshikawa, Akira Kaga, Kimiyoshi Ichikawa, Kan Hayashi, Tsubasa Matsumoto, Mitsuru Ohno, Satoshi Yamasaki, Hitoshi Asakawa, Norio Tokuda, Switching reduction selectivity of diamond electrodes with heavily N-doped surface nanolayers by visible light irradiation, Carbon 244 (2025) 120649

■ Initiatives in the Field of Social Systems

<Social Implementation of Autonomous Driving Technology>

In fiscal year 2025, building on the previous year's efforts, initiatives toward the social implementation of automated driving technologies were promoted in collaboration with the government, private companies, and other stakeholders. Specifically, the Ministry of Economy, Trade and Industry (METI)–directly commissioned project awarded in fiscal year 2023, entitled "Demonstration and Support Program for CASE Including Unmanned Automated Driving (Research on Perception Technologies Required for Automated Driving Technologies at Levels 3 and 4)", was continuously implemented. In parallel, discussions were held with related METI projects and organizations such as the Japan Automobile Manufacturers Association on appropriate approaches to safety evaluation for the social deployment of automated driving technologies. As fiscal year 2025 marked the final year of the project, a final results briefing session was held in collaboration with related projects, attracting significant attention from a wide range of stakeholders.

In addition, the Strategic Innovation Promotion Program (SIP), Phase 3, "Smart Mobility Platform Development: Research and Development of Infrastructure and Onboard Sensor Systems to Understand the Actual Conditions of Living Zones and Lively Road Spaces Using Compact PCSEL-LiDAR Technology," commissioned by the Cabinet Office in fiscal year 2023, was continuously carried out. Next-generation LiDAR and LiDAR-based perception technologies were developed, and demonstration experiments of automated driving on public roads were conducted using the achivements of this research.

Furthermore, in collaboration with MOVIES Inc., a company established based on the initiatives of the Kanazawa University Institute of Advanced Mobility Research, a remote operation center for automated driving systems was established within the Future Knowledge Demonstration Center to realize remotely monitored Level 4 automated driving. This enabled remote monitoring of both the operational status of automated driving systems and the surrounding environment of autonomous vehicles.

In addition, demonstration experiments under the "Demonstration and Support Program for CASE Including Unmanned Automated Driving (Research on Perception Technologies Required for Automated Driving Technologies at Levels 3 and 4)" were promoted in both summer and winter snow-covered environments. As a result, a robot taxi demonstration experiment was conducted at a speed of 60 km/h, the fastest in Japan to date. Notably, this initiative represented the first autonomous demonstration experiment in Japan conducted under winter snow conditions, drawing considerable attention from various sectors.

Based on the outcomes of these initiatives, efforts toward the social implementation of automated driving technologies will continue to be promoted.

<Related links>

MOVIES Inc : https://moveez-inc.com/

■Social Contribution initiatives

<Activities of the MIRAICHI Research Center>

To promote the university-wide social implementation of research seeds, Kanazawa University established the MIRAICHI Research Center in 2023.

The Center disseminates research seeds based on envisioned future societies as key technologies and conducts an internal open call program called "Showcase" as an initiative aimed at social implementation. In fiscal year 2025, in addition to the 18 projects selected to date, three new projects were adopted, resulting in support for a total of 21 projects. Proof-of-Concept (PoC) development support has been provided for these projects, and some have also been selected for the GAP Fund of Tech Startup HOKURIKU (TeSH). As a result, the commercialization of research outcomes is steadily progressing.

Introduction of key technologies from "Showcase" projects aimed at social implementation (completion event)

Group photograph of participants at the MIRAICHI Research Center completion event

The Center also promotes socially responsible implementation that considers ethical and social issues through the promotion of demonstration research and the convening of an ELSI Committee. To strengthen industry–academia collaboration, needs assessment and matching activities targeting approximately 700 companies have been carried out, and a Co-Creation Planning Committee has been newly established as a framework for collaboration. A total of 24 organizations, including companies and local governments, have participated, advancing network building and the sharing of challenges.

In June 2025, the MIRAICHI Research Center was completed, and following a completion event, full-scale operations began in July of the same year. Centered on shared laboratories and an incubation/startup floor, research and development and business preparation activities involving a diverse range of researchers and companies are underway. The facility is equipped with functions to support interdisciplinary research, co-creation with industry, the development of demonstration research, and the creation of startups, and promotes these activities in an integrated manner.

<Related links>

MIRAICHI Research Center : https://miraichi.w3.kanazawa-u.ac.jp/

Tech Startup HOKURIKU : https://tech-startup-hokuriku.jp/

■ On-Campus Research Activities and Research Seeds

In addition to these initiatives, the following research activities are also progressing within the University. Going forward, organizations with implementation functions—such as the Future Knowledge Demonstration Center described above—will support the social implementation of these activities and guide them toward solving societal challenges. Through the return of research and development to society, Kanazawa University will accelerate the realization of carbon neutrality.

- ✓ Development of V-shaped vertical axis wind turbines
- ✓ Development of thin-film solar cells
- ✓ Research on the advancement and potential evaluation of renewable thermal energy and geothermal heat utilization
- ✓ Elucidation of the mechanism of nitrogen-doped carbon catalysts for fuel cells and exploration of new platinum-free alternatives
- ✓ Research on magnetic refrigeration for hydrogen liquefaction
- ✓ Development of "photosynthetic paper"
- ✓ Creation of new materials from plant biomass
- ✓ Development of a novel catalytic reaction system enabling room-temperature CO_2 chemical conversion
- ✓ Advancement of mobility technologies, including zero-emission vehicles
- ✓ Development of a high-current interruption method using SF_6 alternative gases and the creation of eco-friendly power circuit breakers
- ✓ Research on climate cooling based on geological records
- ✓ Development and implementation of off-grid community technologies

2-2 Outcomes of Educational Initiatives Contributing to Carbon Neutrality

Kanazawa University is promoting the expansion of courses related to global environmental issues and the SDGs, and is actively conducting awareness-raising activities regarding global environmental issues. We also strive to widely disseminate carbon neutral education to students and to nurture talented individuals with comprehensive knowledge across multiple fields.

■Human resource training initiatives

<General Education Subject GS (Global Standard) Courses "Environmental Study and ESD">

"Environmental Study and ESD" is positioned as Standard 5, "Tackle future problems," of the Kanazawa University “Global” Standard (KUGS). With more than 1,000 students enrolled each year, the course aims to improve the practical problem-solving skills necessary to solve global environmental issues and realize a "sustainable society."

Scenes from the class

In classes, we make extensive use of active learning methods to encourage students to learn collaboratively and proactively. Specifically, classes combine lectures by faculty with individual assignments that students complete before class, group discussions and group work during class based on their individual assignments, and presentations and feedback between students, with the aim of improving students' knowledge of environmental issues, their ability to think for themselves, their creativity, their logical thinking, their communication skills, and their presentation skills.

Furthermore, by taking advantage of the benefit of this general education course being a place where students from different organizations, such as College of Transdisciplinary Sciences for Innovation, College of Human and Social Sciences, College of Science and Engineering, and College of Medical, Pharmaceutical and Health Sciences, and who have a variety of interests and values, can come together, students can study collaboratively with students who have different ways of thinking and values than their own, and this will hopefully develop the ability to see things more objectively, from multiple perspectives, and in a comprehensive manner.

＜Specialized Educational Subjects in College of Transdisciplinary Sciences for Innovation: "Introduction to SDGs" and "Practical Approach for SDGs"＞

Scenes from the class

The SDGs (Sustainable Development Goals), agreed upon by the member states of the United Nations in 2015, include 17 goals across a wide range of areas, including poverty, the environment, education, and human rights, and outline the path for the world to transition to a "sustainable society." Achieving the SDGs requires active efforts from companies, governments, and citizens, and in order to achieve this, a fundamental understanding of the SDGs is an urgent task.

The "Introduction to SDGs" and "Practical Approach for SDGs" courses offered by the School of Entrepreneurial and Innovation Studies , School of Tourism Sciences and Design and School of Smart Technology and Innovation of College of Transdisciplinary Sciences for Innovation start with students' awareness of the problems facing modern society and aim to grasp the essence of the "sustainable society" that the SDGs aim for, consider effective actions for building such a society, deepen their understanding of modern social issues, and improve the positive future-oriented and problem-solving abilities necessary for solving these issues.

<Graduate School of Natural Science and Technology - All Divisions " Graduate Program on Science and Engineering for Sustainable Development" Environmental/Energy Science and Engineering Field>

The world is currently at a major turning point toward the realization of a sustainable society. In April 2022, the Graduate School of Natural Science and Technology established a minor program for both the master’s and doctoral programs, titled the “Sustainable Science and Engineering Program,” with the aim of cultivating innovator-type doctoral human resources who can contribute to the development of a sustainable, safe, and secure society and play active roles on the global stage. This program enables students to learn new interdisciplinary fields by building on diverse academic disciplines and crossing traditional disciplinary boundaries.

Through this program, students strengthen and further develop expertise in their specialized fields while strategically undertaking a comprehensive set of programs that transcend disciplinary borders. In doing so, the program fosters innovator-type doctoral human resources with the ability to boldly challenge unexplored areas of innovation and to demonstrate their capabilities and contribute broadly within the global community.

Among the program’s five fields, the Environmental and Energy Science and Engineering

Field is based on established disciplines such as environmental science, environmental engineering, urban engineering, bioengineering, materials chemistry, chemical engineering, electrical and electronic engineering, and mechanical engineering. Its objective is to cultivate doctoral human resources who can contribute to society through research and development of technologies for solving and preventing interdisciplinary issues related to the environment, resources, and energy. This field was established in 2024, and in 2026, 15 students completed the master's program in this field.

<Graduate School of Natural Science and Technology: Five master's programs and all doctoral programs *Special Program with Priority Placement of Japanese Government (MEXT) Scholarship Students:
"International Interactive Engineering Human Resource Development Program for Energy and Environmental Technologies">

Japan is in a position to lead the promotion and dissemination of green innovation, as well as the sharing and creation of new value, through collaboration among industry, government, academia, and finance, in order to realize a sustainable society worldwide. By integrating Japan's outstanding energy- and environment-related technologies with the achievements of initiatives toward the realization of Society 5.0, and by evolving these technologies to suit the specific conditions of each country while taking regional characteristics and cultures into account, Japan is expected to internationally deploy new growth strategies that achieve both economic growth and environmental protection.

This program is designed as a special course in which degrees (master's and doctoral) are earned entirely in English. It accepts highly motivated international students mainly from Asia and Africa and provides a learning and living environment in which they can engage in international, competitive, and collaborative study alongside Japanese students. The program aims to cultivate highly skilled engineering professionals in the fields of energy and environmental technologies who can collaborate across national borders and contribute globally. As bridge-building human resources who help foster friendly and sustainable relationships between their home countries and Japan, a total of 32 master's students (including self-financed international students in this program) and 14 doctoral students were produced and sent into the international community between 2023 and 2025.

* Graduate School of Natural Science and Technology

- *Master's Programs (5)*: Materials Chemistry; Mechanical Science; Frontier Engineering; Electrical, Information and Communication Engineering; Geoscience and Civil Engineering
- *Doctoral Programs (All)*: Mathematical and Physical Sciences; Materials Chemistry; Mechanical Science; Frontier Engineering; Electrical, Information and Communication Engineering; Geoscience and Civil Engineering; Life Science and Engineering

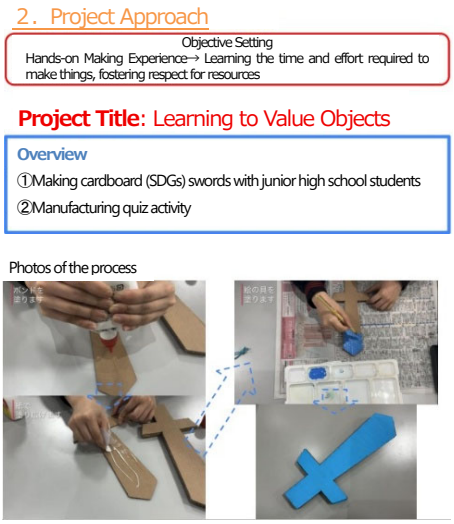
<Graduate School of Natural Science and Study abroad Special Program "RESD Program (REGIONAL ENVIRONMENT AND SUSTAINABLE DEVELOPMENT)">

The Graduate School of Natural Science and Technology is running the RESD Program as an international Program for doctoral students to train leaders in the environmental field in the Asian region. Through this program, seven of the top universities in Japan, China and Korea ranked in the QS University Rankings have signed departmental agreements to develop international research talent who will lead the world in sustainable development in the future by honing not only their skills in environmental science, environmental engineering and environmental management through activities on the front lines of environmental issues and at international organizations, but also their practical abilities.

<Initiatives at affiliated junior high schools>

At the junior high school affiliated with the School of Teacher Education, College of Human and Social Sciences, students also lead their daily school lives with carbon neutrality in mind, and each class has an "eco-team" that works on saving electricity, etc. The student council is also working towards going paperless, distributing student council agendas and the student council newsletter in electronic form.

In the "Creative Design" course, activities incorporating perspectives related to the SDGs are observed every year. In fiscal year 2025, a plan was developed in collaboration with the affiliated kindergarten to propose the creation of safe, playable toys made from reused cardboard.



<Initiatives at affiliated school for special needs education>

At the Lower Secondary Division of the Special Needs Education School attached to the College of Human and Social Sciences, School Education, continuous SDGs education has been conducted with the aim of fostering human resources who can contribute to the creation of a sustainable society. This environmental education emphasizes the perspective of Education for Sustainable Development (ESD), which is related not only to environmental issues but

Online session with the Japan Aerospace Exploration Agency (JAXA)

also to a wide range of fields such as social justice and the economy. The school actively collaborates with educational institutions and experts from multiple disciplines in implementing these initiatives.

In the current fiscal year, cleanup activities and analyses of plastic waste were carried out along the Tedori River—the longest river in Ishikawa Prefecture—as well as at Komaiko Beach and Senkoji-hama Beach, in order to identify where plastic waste originates and where it tends to accumulate. As part of this analytical learning, students also had opportunities to engage with cutting-edge technologies through exchange-based learning in collaboration with the Japan Aerospace Exploration Agency (JAXA) under the theme "Can plastic waste be detected from satellites?", as well as waste-tracking activities utilizing drones.

Collection boxes for used and unneeded stationery

Scenes from key holder production during upcycling activities

In parallel, as part of efforts to reduce plastic waste, initiatives such as the "Used and Unneeded Stationery Recycling Project" and upcycling activities were undertaken. In the stationery recycling project, used or fully consumed plastic stationery items were collected from Kanazawa University, affiliated schools and kindergartens, and local companies, and were recycled into new stationery products in collaboration with PILOT Corporation (the project is ongoing).

In addition, in collaboration with a local accessory designer in the prefecture, key holders made from marine plastic waste were produced and distributed as tokens of appreciation to partner organizations.

To build a sustainable society, it is important to actively incorporate education across multiple disciplines and to aim for the realization of a carbon-neutral society. As a special needs education school, efforts in environmental education will continue to be promoted.

In vocational learning classes at the upper secondary division, students collect used newspapers from the Kanazawa University Library and engage in creating eco-bags through upcycling. These eco-bags made from recycled paper can be widely used in homes, schools, and workplaces—for example, as liners for trash bins or to absorb moisture from food waste, thereby reducing moisture and odors and easing the burden of waste disposal.

A scene of making
eco-friendly bags out of newspaper

The eco-bags produced by the students are mainly used for cleaning operations in collaboration with the Personnel Division of the General Affairs Department at Kanazawa University. Previously, plastic bags were used as trash bin liners at the University, requiring approximately 4,000 bag replacements per month. Currently, with the introduction of eco-bags, monthly plastic bag usage has been reduced to approximately 220. In this way, the use of eco-bags through collaboration between the special needs education school and the University has made a significant contribution to reducing plastic waste and mitigating environmental impacts, such as greenhouse gas emissions associated with manufacturing and incineration processes. In addition, waste reduction and resource circulation efforts are also being implemented by collecting miscellaneous recyclable paper and cardboard at the school and regularly transporting them to local collection sites.

A scene of transporting cardboard boxes
to the installed eco collection box (Eco-Post)

Through these activities, students gain a sense of achievement by recognizing that they are valuing resources and contributing to environmentally conscious practices. By transforming “discarding” into “utilizing,” and taking small steps toward building a sustainable society, the school aims to continue identifying new value in resources that would otherwise be discarded and to sustain these environmentally responsible activities.

■Extracurricular activities

Kanazawa University has many extracurricular activities in which students demonstrate their creativity and vitality in tackling issues facing the local community and society. In all cases, the students themselves plan and act on their own, valuing the ideas and questions that arise in their classes studying the SDGs and while living as part of the local community, contributing to carbon neutrality from a grassroots level and helping to raise awareness among the younger generation.

<Volunteer Support Station>

This is a university-accredited extra-curricular organisation that was created in the wake of the Great East Japan Earthquake. Many of its members have qualified as disaster prevention specialists and have participated in many volunteer activities, mainly in the dispatch of disaster-affected areas such as earthquake and torrential rains. By visiting the affected areas and carrying out volunteer activities, they support the reconstruction of the affected areas and each student deepens their knowledge of disasters and disaster prevention through their own experiences.

Attentive listening activity

Removal of rubble

In response to the 2024 Noto Peninsula Earthquake and the Okunoto heavy rainfall disaster, efforts have been made to support both physical and psychological recovery in the affected areas through disaster recovery assistance, support for evacuation shelters,交流 with affected residents, and street fundraising activities. In addition, by actively participating in listening activities and community events, as well as engaging with elementary, junior high, and high school students to consider appropriate responses during disasters, a wide range of disaster prevention initiatives have been undertaken to help build resilient communities capable of withstanding future disasters.

<KuLOs>

This is an extracurricular activity group recognized by the School of International Studies, which works to spread the fair trade movement, which involves the continuous purchase of food, miscellaneous goods, etc. at fair prices in order to correct wages and achieve self-reliance for producers in developing countries.

Specifically, the school is actively engaged in consignment sales of fair trade products and participation in campus events.

Consignment sale

<Other Activities>

There are also cases where student volunteers have organized trash collection events under the themes of "having fun picking up trash" and "picking up trash is a sport," as well as conducting street surveys on changes in the amount of plastic waste during the COVID-19 pandemic.

Students who support the educational assistance activities for children in impoverished countries carried out by “STUDY FOR TWO Kanazawa University branch” unwanted textbooks and books from students, faculty, and staff, and resell them at low prices. The proceeds are used to support education for children in developing countries (currently supporting a girls’ education program in Tanzania). To date, this initiative has provided educational support to more than 2,800 children in countries such as Laos and Nepal.

A scene showing the activities of the “STUDY FOR TWO Kanazawa University branch”

2-3 Results of efforts to make campus facilities carbon neutral

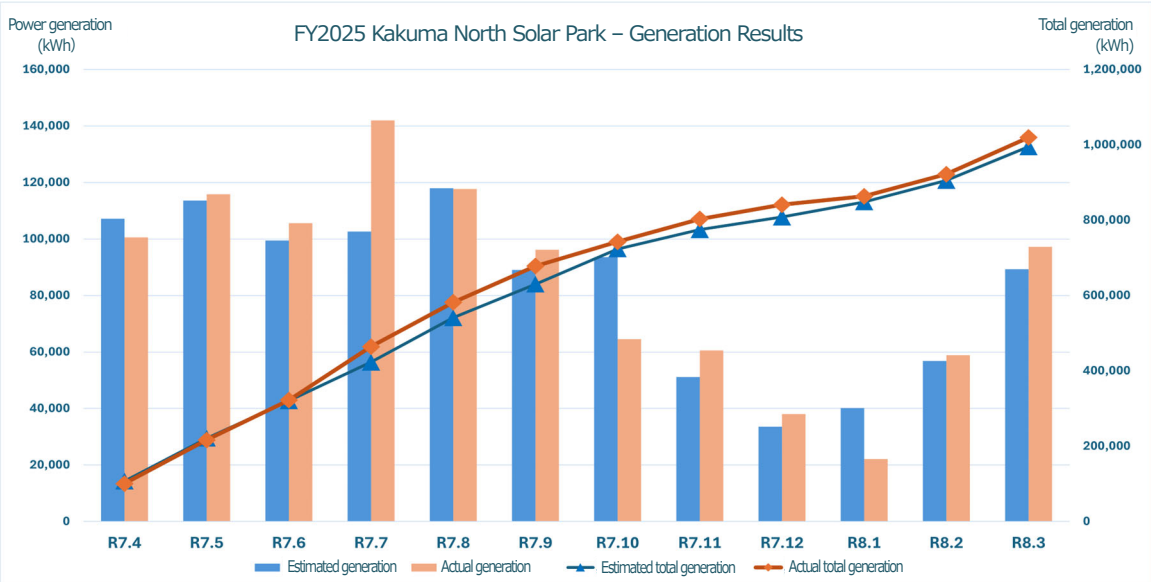
■Energy Creation Initiatives

<Operational Performance of the Kakuma Campus North Area Solar Park>

As the university's first large-scale energy generation initiative, we are implementing a project to install a third-party-owned (PPA model) solar power generation facility (755kW) in the Kakuma Campus D Parking Lot and purchase the electricity generated. From April 2024, we will begin supplying carbon-free electricity as the "Kakuma Campus North District Solar Park." The Kakuma Campus is located in the mountains, in a region with heavy snowfall of up to 2m, and so the buildings were designed with special considerations unique to snowy regions, such as setting the bottom of the racking frame 2m above the ground and using double-sided panels that can generate electricity by using light reflected from the ground.

In fiscal year 2025, due to an approximately 1.1-fold increase in sunshine duration compared to the previous year, the system generated 1.019 million kWh per year (an increase of 104.1% year-on-year). This resulted in an annual reduction of 552 t-CO_2 in greenhouse gas emissions, equivalent to approximately 1.5% of the University's total emissions in fiscal year 2025, indicating steady performance.
The projected annual electricity generation for this PPA project is 954,000 kWh (20-year average). The system is scheduled to be operated for 20 years until March 2044, after which the facilities will be removed by the project operator.

Panoramic view of the solar park in the north area of the Kakuma Campus
(2024(Photo taken at the end of February, green frame)



■Energy conservation efforts

<Takaramachi District Affiliated Hospital ESCO Project>

Kanazawa University is using an ESCO* business scheme to carry out the largest-scale energy conservation initiative to date, including updating the core large-scale air conditioning equipment that covers the entire affiliated hospital.

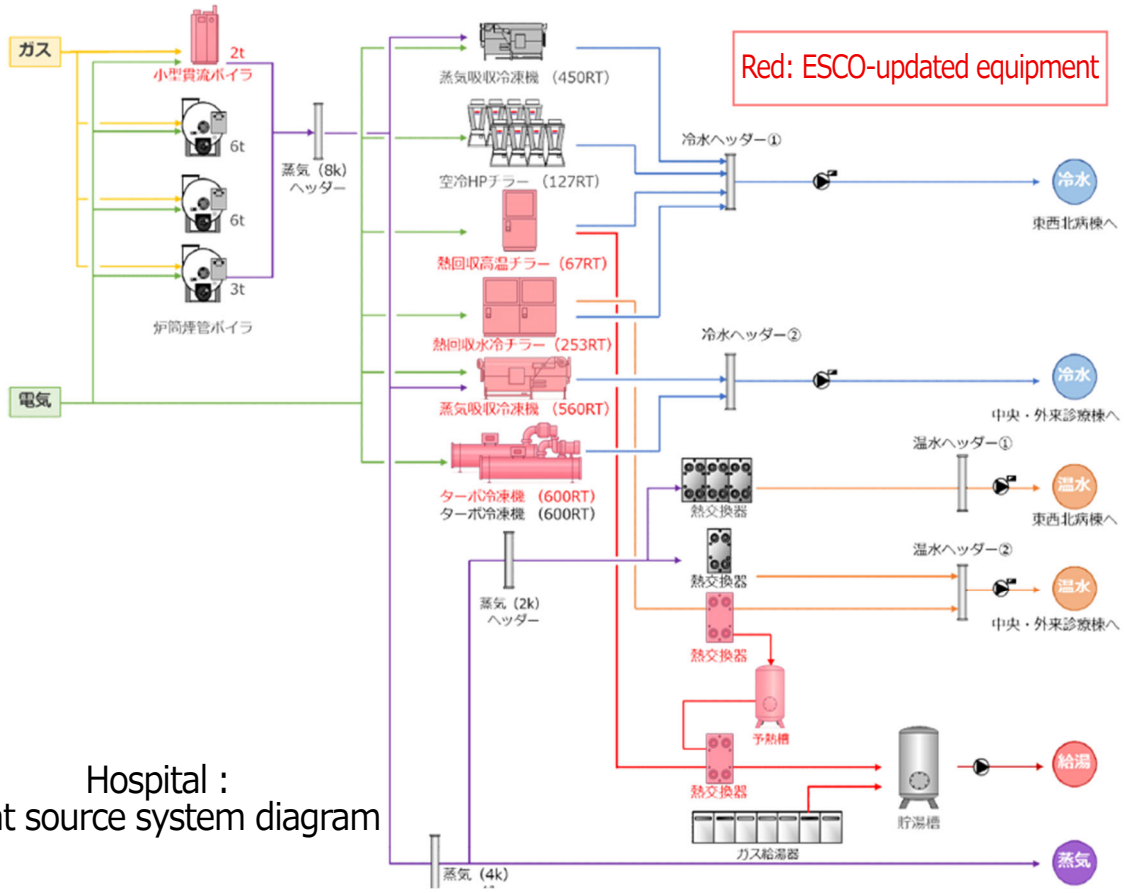
The purpose of the project is to reduce energy consumption and greenhouse gas emissions by introducing highly efficient equipment, and this will be the first time that our university has attempted this development using an ESCO project scheme. The project contract will be signed in September 2024, construction will begin, and the facility will begin operation in March 2025.

Through this initiative, the heat source system used for air conditioning was converted from gas to electricity, while simultaneously improving efficiency. As a result, an annual reduction of 2,700 t-CO_2, equivalent to approximately 7.8% of the University's total emissions (based on FY2024 results), had initially been projected. However, the actual greenhouse gas reduction achieved in fiscal year 2025 amounted to 1,133 t-CO_2 per year, corresponding to approximately 3.0% of the University's total emissions, resulting in a discrepancy from the original estimate. This shortfall is attributed to factors such as increased cooling demand during the summer due to the impacts of climate change (with the average maximum temperature from June to August being 2.7°C higher than normal) and the implementation of operational optimization (equipment tuning) for the upgraded systems through the summer period, which prevented the expected reduction effects from being fully realized.

On the other hand, in terms of energy consumption, a reduction of 24,636 GJ per year, equivalent to approximately 3.5% of the University's total energy consumption, was achieved. These results indicate that the benefits of the initiative are steadily materializing.

In light of these issues, the University will continue to steadily promote efforts toward achieving campus-wide carbon neutrality by implementing operational improvements—such as shortening ventilation times where feasible and optimizing chilled and hot water temperatures for air conditioning—as well as by proceeding with the replacement of aging equipment. The project period runs for eight years, from March 2025 to February 2033, and upon completion of the project, the relevant equipment will be transferred to the University free of charge.

*"ESCo" is an abbreviation for Energy Service Company and refers to a business model in which all costs associated with energy-saving retrofits are covered by the resulting reductions in utility expenses.



Hospital :
Heat source system diagram

<Large-Scale Renovation of the Human and Social Sciences Hall 1, Kakuma Campus>

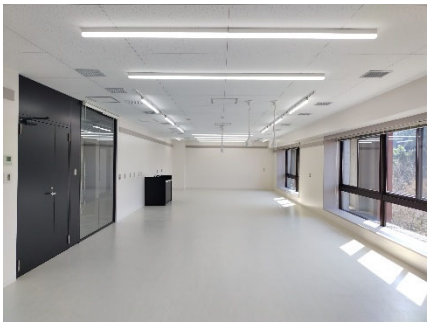
The Human and Social Sciences Hall 1, which has long served as a hub for humanities-related activities, is undergoing a large-scale renovation based on the concepts of "openness," "student-first," and "integration of the humanities, sciences, and medicine for innovation creation." Phase I of the renovation (the 5th and 6th floors and the basement level) will be completed in March 2026, and Phase II is scheduled for completion by Spring 2027.

The renovation initiatives include the enhancement of the building's thermal insulation performance and the installation of energy-saving technologies such as high-efficiency air conditioning and ventilation systems and high-efficiency LED lighting. As a result, a 56% reduction in primary energy consumption compared to the conventional building standard (BEI: 0.44) was achieved, and ZEB Ready certification was obtained.

Furthermore, by allocating 1,344 GJ/year of electricity generated by the Kakuma Campus North Area Solar Park (equivalent to approximately 19% of the standard primary energy consumption) as on-site renewable energy, the building achieved a Nearly ZEB equivalent level (BEI: 0.25).

Through this initiative, an annual reduction of 280 t-CO_2 (approximately 0.7% of the University's total emissions) is expected. Renovations of other buildings in the Kakuma Campus North Area will be carried out sequentially.

Exterior view



Interior view

BELS Evaluation Certificate

<Campus-wide LED Lighting Conversion Project>

To address urgent issues such as the “2027 problem” associated with fluorescent lighting and rising energy costs, the University launched a campus-wide project to convert lighting fixtures to LED. A lease-based financing scheme was adopted, using the savings from reduced electricity costs as the funding source. Construction began in March 2026, with a planned 10-year lease period from September 2027 to August 2037. Upon completion of the lease period, the lighting equipment will be transferred to the University free of charge.

Initially, the project targeted 54,000 lighting units, aiming for a 100% LED conversion rate. However, due to a nationwide surge in demand, rising costs, extended delivery times, and procurement difficulties caused by a seller’s market, the project scope was revised. From a cost-effectiveness perspective, areas with extremely short annual lighting hours—such as electrical rooms and mechanical rooms within the same buildings—were excluded, as limited electricity cost savings were expected. As a result, the number of units covered was revised to 43,000 lighting units, corresponding to 84% of the University’s total, and the project was implemented accordingly. The remaining 11,000 lighting units will be addressed through future facility improvement projects and repairs.

Through this initiative, annual reductions of 7.827 million kWh in electricity consumption (approximately 13.6% of the University’s total) and 3,530 t-CO_2 per year (approximately 9.4% of total emissions) are expected, representing significant progress toward achieving campus-wide carbon neutrality.

一般照明用の蛍光ランプの製造・輸出入は 2027 年までに廃止されます

2023 年 11 月の「水銀に関する水俣条約 第 5 回締約国会議」において、
一般照明用[1]の蛍光ランプの製造・輸出入を、2027 年までに段階的に廃止することが決定されました。
既に使用している製品の継続使用、廃止日までに製造された製品（在庫）の売り買い及びその使用が禁止されるものではありません。

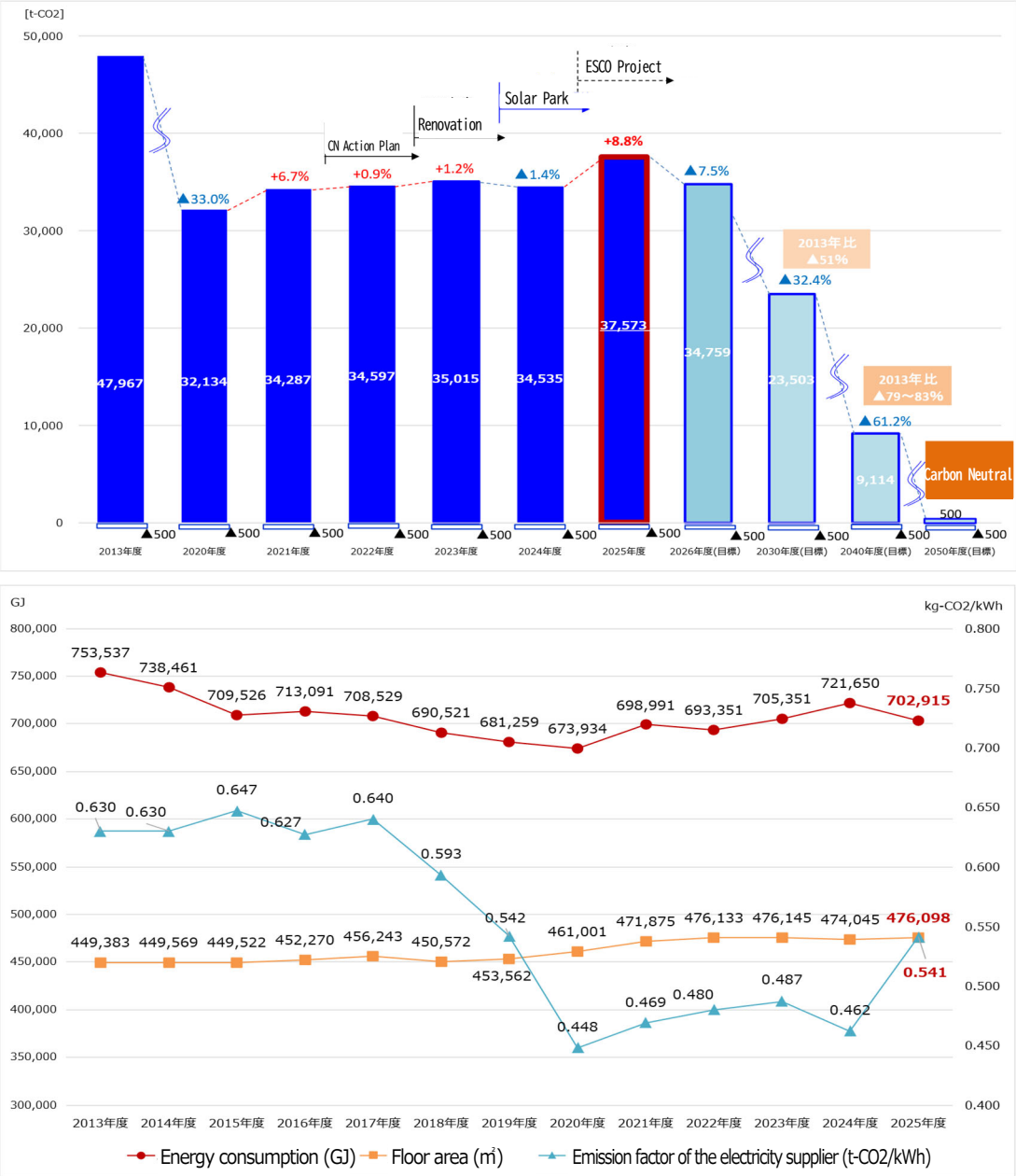
廃止の時期（蛍光ランプの種類ごとに廃止時期が異なります。）

種類	直管蛍光ランプ	環形蛍光ランプ	コンパクト形蛍光ランプ
廃止年月日	2027 年 12 月 31 日(※)	2027 年 12 月 31 日(※)	2026 年 12 月 31 日
写真（例）			

■Trends in Greenhouse Gas（GHG） Emissions

Since fiscal year 2021, Kanazawa University's GHG emissions have shown an increasing trend. In fiscal year 2025, emissions rose by 8.8% year-on-year to 37,573 t-CO_2, mainly due to a 17.1% increase in the electricity emission factor. Even after accounting for reductions from the Kakuma Campus North Area Solar Park (−552 t-CO_2/year) and the University Hospital ESCO project (−1,133 t-CO_2/year), total emissions increased compared to the previous year. Energy consumption, addressed through both energy-saving and renewable energy initiatives, has generally increased due to climate change and campus expansion. However, the effects of recent solar park and ESCO projects led to a 2.6% year-on-year reduction, bringing total energy use to 702,915 GJ.

Looking ahead, further reductions are expected from the renovation of the Human and Social Sciences Hall 1 and the campus-wide LED lighting project scheduled to begin in September 2027. Through comprehensive energy-saving measures, planned renewable energy deployment, and the decarbonization of electricity supply, the University aims to achieve its targets.



(Top) Trends in GHG emissions / (Bottom) Trends in key indicators affecting GHG emissions

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< Planning and editing >

Kanazawa University Carbon Neutrality Promotion Headquarters Meeting
Kanazawa University Facilities and Environmental Planning Meeting
Kanazawa University Research Planning Meeting
Kanazawa University Education Planning Meeting
Kanazawa University Facilities Department