Kanazawa University Carbon Neutrality Progress Report

e:C0Real

2025 Vol.2

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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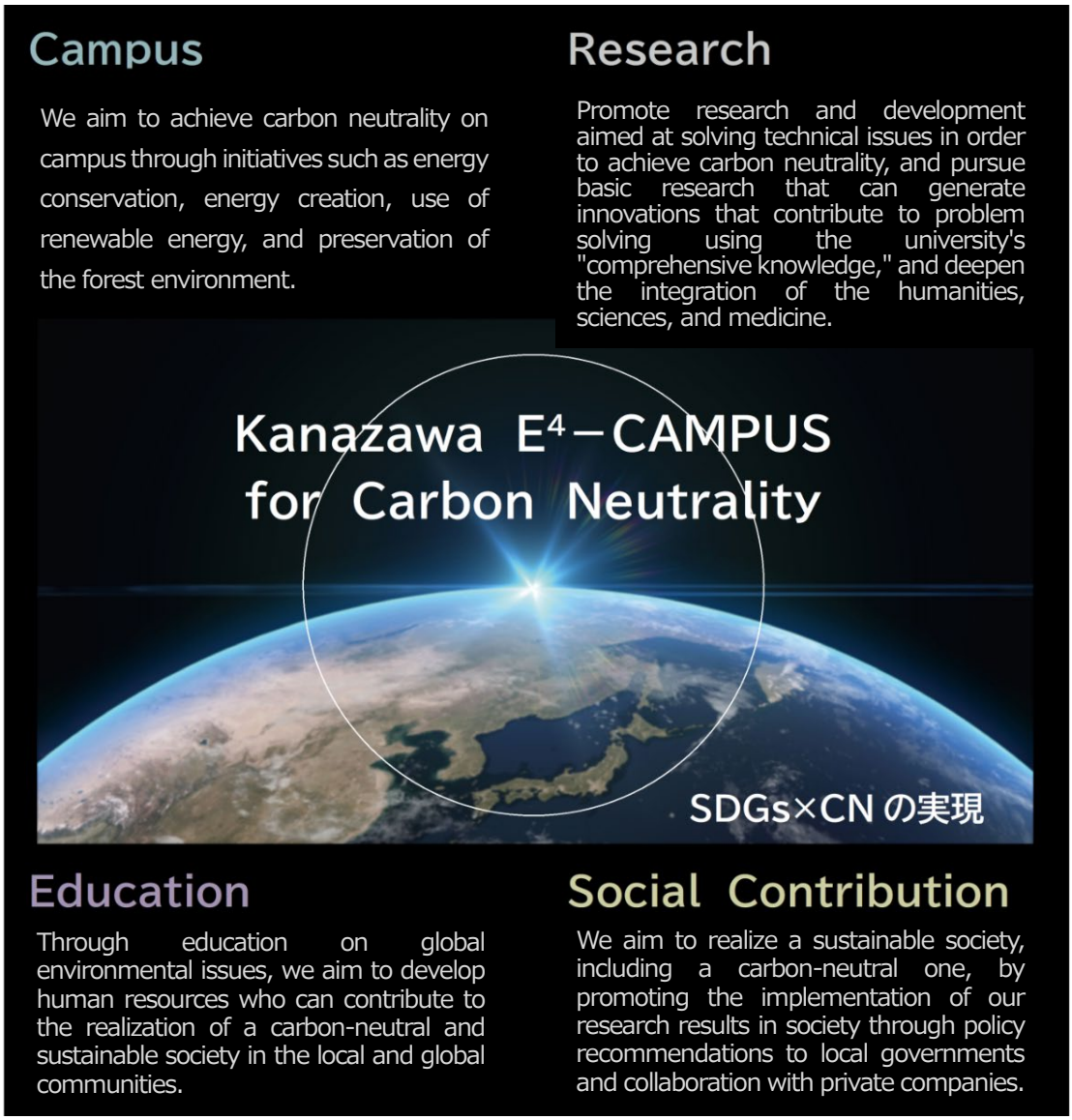
1. Basic policy towards carbon neutrality

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 and development (Research), social co-creation (Social Contribution), education (Education), and achieving carbon neutrality for campus facilities (Campus), and published a revised version in June 2024.

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 Policy for Research and Development, Social Co-Creation, Education, and Campus

<Basic Research and Development 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.

Work to solve important technological challenges that can contribute to reducing greenhouse gas emissions worldwide

Analyze the issues that society needs to solve and use comprehensive knowledge to present the optimal path to solving them

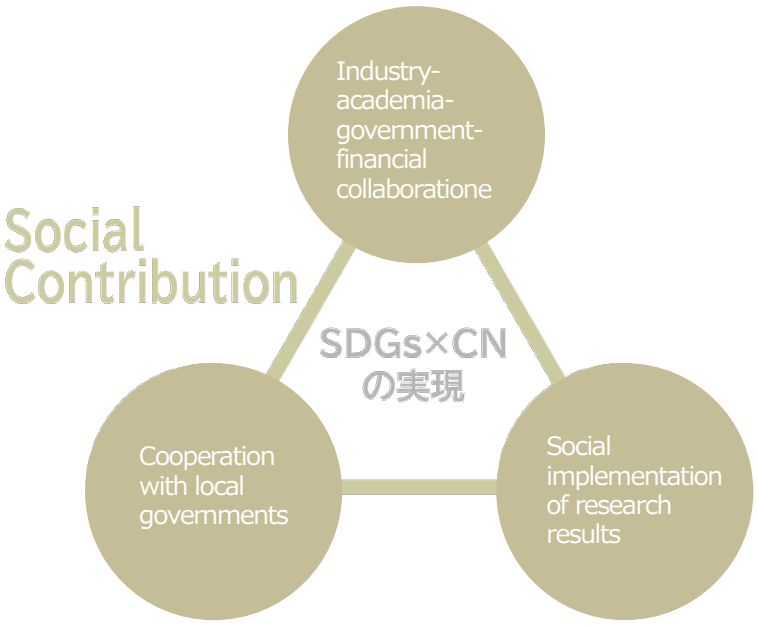
Strengthening collaboration with outside the university to promote research and development and accumulate the latest knowledge

<Basic policy for social co-creation>

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.

Promoting transformation of industrial structure
and socio-economy through open innovation



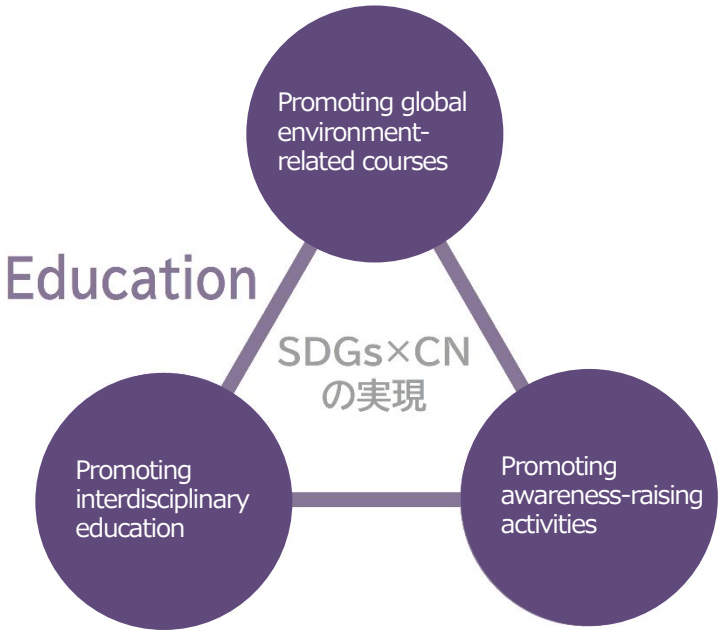
Collaborate with local governments and other stakeholders to revitalize the region and create sustainable industries

Promoting analysis of issues for practical application and their resolution, as well as support for start-up business ventures

<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 carbon neutrality education among students and strive to develop talent with comprehensive knowledge across multiple fields.

We will expand and broaden our courses on the global environment and SDGs, and strive to develop human resources who can contribute to building a sustainable society



We will widely publicize our carbon neutral education efforts to students and strive to develop human resources with comprehensive knowledge across fields

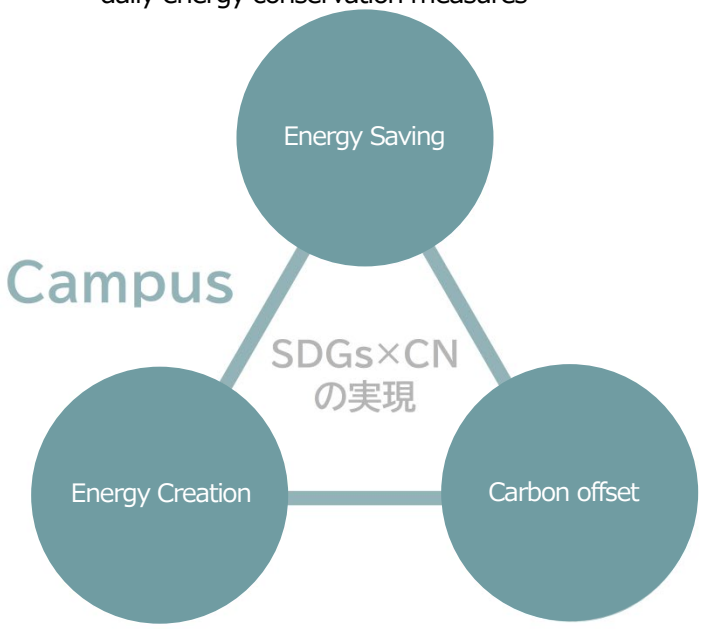
Actively implement awareness-raising activities regarding global environmental issues for students in each colleges and graduate school

<Basic Policy for Campus Facilities>

Our university emits approximately 34,500 t-CO2 of greenhouse gases per year. This is equivalent to the carbon neutrality of approximately 13,700 average households (approximately 6.4% 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.

Our 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

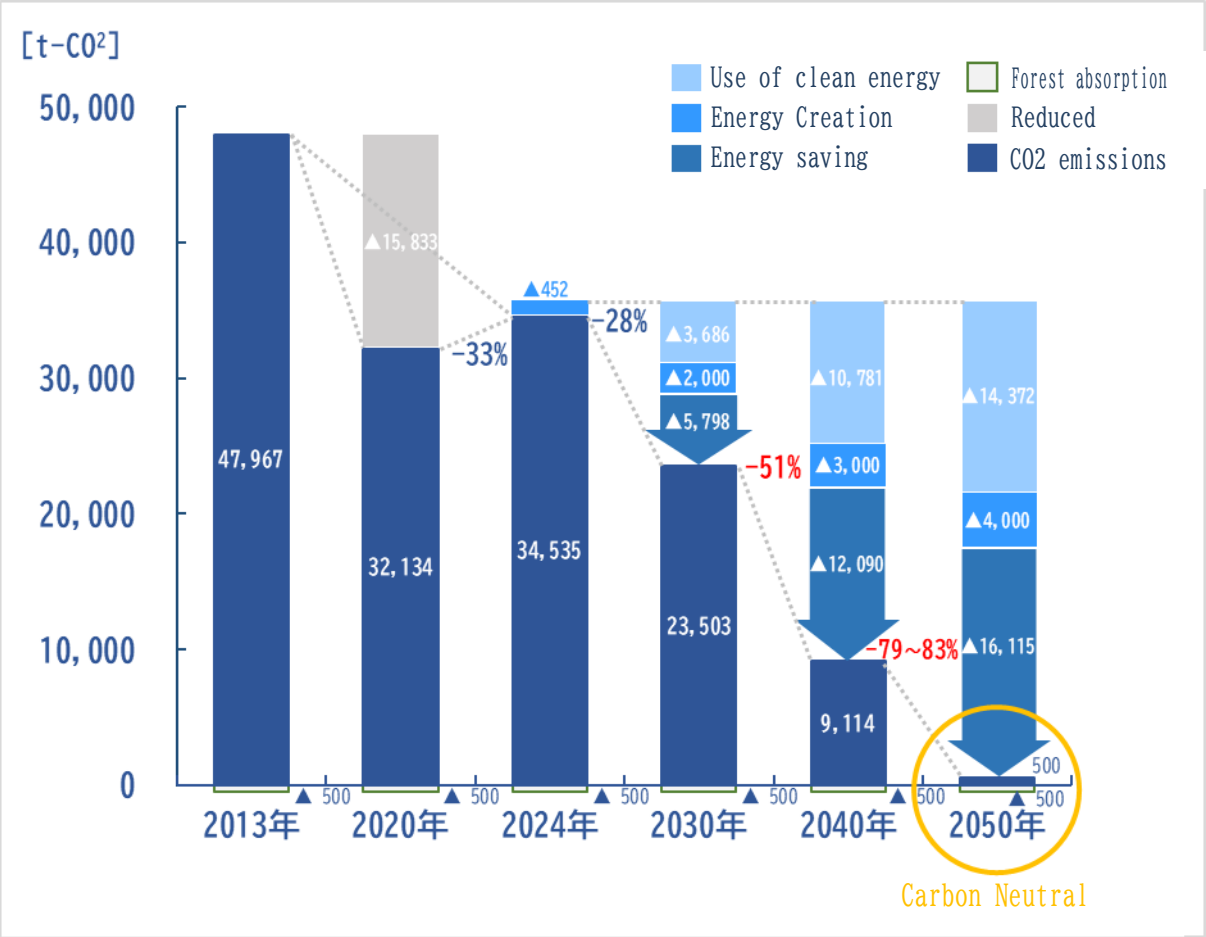
1-3 Greenhouse gas reduction targets

Through daily energy-saving efforts, our university's greenhouse gas emissions will be 34,535t-CO2 in 2024, a reduction of approximately 28% compared to 2013.

However, an increase in greenhouse gas emissions is expected due to the construction of new buildings (such as the Second Central Medical Building and the Future Intelligence Demonstration Center) 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: 2030toAim to reduce emissions by more than 51% compared to 2013



2. Results of initiatives in FY2024

2-1 Outcomes of Research, Development, and Social Co-Creation Contributing to Carbon Neutrality

■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:

- ✓ Ryo Serizawa, Romain Milotskyi, Shogo Iwata, Tetsuo Fujie, Naoki Wada, Kenji Takahashi, "Synthesis and characterization of thermoplastic resin from sugar beet polysaccharides via one-step transesterification". Carbohydrate Polymers, 352, 123224, MAR 15, 2025
- ✓ Daisuke Hirose, Daiki Ina, Akina Yoshizawa, Samuel Budi Wardhana Kusuma, Masaki, Wada Nishio, Naoki, Kenji Takahashi, "Fully bio-based cellulose ester synthesis from natural aldehydes via aerobic oxidation". Chem Commun (Camb), 61(17), 3484-3487, FEB 20, 2025

A total of 12 papers were published during the fiscal year.

■ Resource Circulation Initiatives

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

In FY2023, we developed the innovative carbon recycling technology 'Dia-DREEM TM'*, which is expected to be a breakthrough due to its long catalyst lifespan and low power requirements. In FY2024, we conducted research and development aimed at 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.

Research in FY2024 revealed that defects in the NDD layer trap carriers, reducing photoelectric effect and reduction performance. To address this, we utilized Kanazawa University's chemical vapor deposition (CVD) technology to grow high-quality NDD layers, suppressing carrier traps and improving photoelectric conversion efficiency and reduction

performance. **

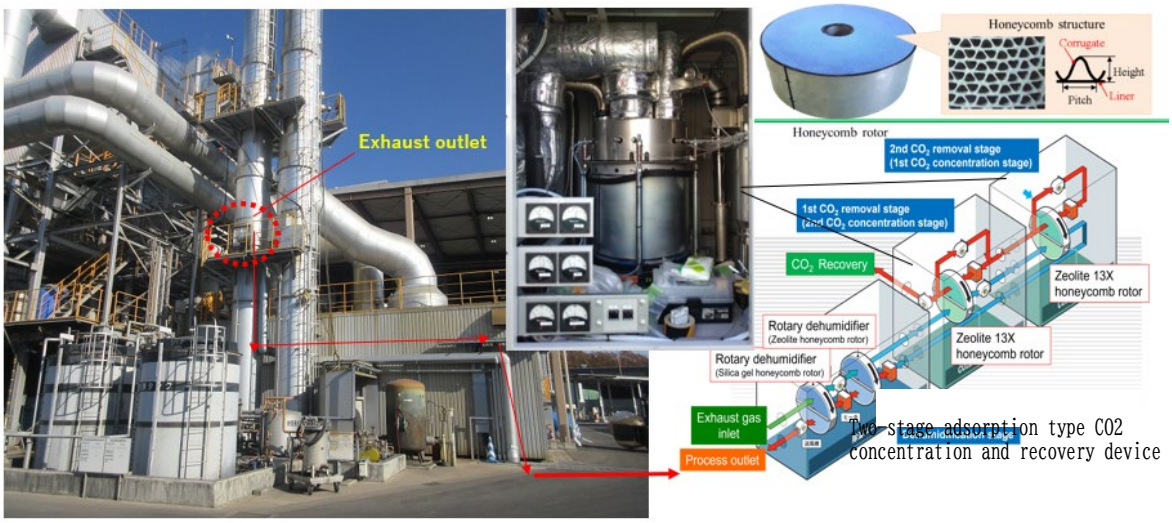
Daicel Corporation is planning demonstration experiments to apply this technology to its chemical plants, aiming to convert CO_2 emissions from factories into carbon monoxide, a raw material for chemical products, as a sustainable technology.

* 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.

** Taro Yoshikawa, Akira Kaga, Kimiyoshi Ichikawa, Kan Hayashi, Tsubasa Matsumoto, Ryosuke Izumi, Mitsuru Ohno, Satoshi Yamasaki, Norio Tokuda, Hitoshi Asakawa, Enhanced performance of diamond electrodes with heavily N-doped surface nanolayers grown by CVD for high reduction current density, Electrochimica Acta 525 (2025) 146058

< Demonstration Test for CO_2 Recovery from Waste Incinerator Exhaust Gas >

Under a comprehensive partnership agreement between Kanazawa University and ACTREE Corporation (Hakusan City, Ishikawa Prefecture), a joint research project titled "Research on CO_2 Concentration from Incinerator Exhaust Gas Using Waste Heat" was launched. At ACTREE's R&D Center (Mibu Town, Tochigi Prefecture), a test unit using zeolite as a CO_2 adsorbent was installed, and demonstration tests using actual exhaust gas are currently underway. Based on previous research achievements, a newly developed two-stage CO_2 adsorption unit has been introduced into the test system.



Demonstration Test Unit for CO_2 Concentration and Recovery from Incinerator Exhaust Gas

As a related initiative, under NEDO's International Collaborative Research Program for Innovative Clean Energy Technologies, joint research was conducted with Mitsubishi Chemical Corporation and Nagoya University on the development of new zeolites and CO_2 concentration processes. This research aims to utilize low-temperature waste heat at approximately 80°C. Furthermore, research and development on Direct Air Capture (DAC) technology for recovering CO_2 from the atmosphere is also progressing.

<Related Links>

- NEDO International Collaborative Research Program:
  https://www.nedo.go.jp/content/100937925.pdf (in Japanese only)
- NEDO Moonshot Research and Development Program:
  https://www.nedo.go.jp/content/100923459.pdf (in Japanese only)

■ Initiatives in the Field of Social Systems

< Social Implementation of Autonomous Driving Technology >

In FY2024, we continued to promote initiatives for the social implementation of autonomous driving technology in collaboration with the government, private companies, and other stakeholders, following efforts from the previous fiscal year. Specifically, we continued the METI-commissioned project launched in FY2023 titled "Demonstration and Support Project for CASE Technologies Including Unmanned Autonomous Driving (Research on Recognition Technologies Required for Autonomous Driving Levels 3 and 4)". Together with related METI projects and the Japan Automobile Manufacturers Association, we examined approaches to safety evaluation for the social implementation of autonomous driving technologies.

We also continued the Cabinet Office's SIP 3rd Phase project titled "Development of infrastructure and onboard sensor systems that utilize compact LiDAR technology to understand the actual situations of streets in living areas and busy districts", which was commissioned in FY2023. This project involves the development of next-generation LiDAR and recognition technologies using LiDAR.

Furthermore, for the METI-commissioned project titled "Support Project for Development and Demonstration of Unmanned Autonomous Driving for Mobility DX Promotion (Data Acquisition Project)", we collected a large volume of driving data on the Shin-Tomei Expressway, where autonomous driving priority lanes have been installed. As FY2024 marks the final year of this project, we compiled the final report in collaboration with stakeholders from related national programs.

As part of these efforts, we established the startup Moveez Inc., based on the research achievements in autonomous driving technologies. By leveraging private funding and other resources, we have built a system to accelerate the social implementation of autonomous driving technologies. In addition, we have accepted numerous joint research projects from private companies and will continue to promote initiatives for the social implementation of autonomous driving technologies.

- Moveez Inc.: https://moveez-inc.com/en/

■ Social co-creation initiatives

< Activities of the MIRAICHI Research Center >

The center will be equipped with shared laboratories to promote interdisciplinary research among university researchers, as well as rooms and other facilities to support startup creation. By leveraging these functions and showcasing research seeds externally, the center will serve as a hub for social co-creation—bringing together new knowledge, diverse human resources, and organizations. It will also collaborate closely with research seeds from across the Hokuriku region to provide one-stop support for social implementation.

Regarding the “Showcase,” in addition to the 15 projects selected through a public call for proposals in FY2023, a new call was issued in FY2024. From among research projects pursuing cutting-edge initiatives, three were selected as technological developments contributing to the realization of a sustainable society, bringing the total number of supported projects to 18.

Future Intelligence Demonstration Center (exterior)

Future Intelligence Demonstration Center
(3F Open Floor: A space for co-creation)

In FY2024, one of the supported projects was launched, and four were selected for the GAP Fund program of Tech Startup HOKURIKU (TeSH)—a startup creation platform involving universities and colleges of technology in the Hokuriku region—demonstrating steady progress in the commercialization of research outcomes for social implementation.

MIRAICHI Research Center: https://miraichi.w3.kanazawa-u.ac.jp/
Tech Startup HOKURIKU: https://tech-startup-hokuriku.jp/english/index.html

■ **On-Campus Research Activities and Research Seeds**

In addition to the initiatives mentioned above, the following research activities are currently underway on campus. In the future, organizations with implementation capabilities—such as the MIRAICHI Research Center —will support the societal deployment of these technologies, contributing to problem-solving. By returning the fruits of our research and development to society, we aim to accelerate the realization of carbon neutrality.

In addition to these efforts, the following research activities are progressing on campus: In the future, organizations with implementation capabilities, such as the Future Knowledge Demonstration Center mentioned above, will support the implementation of these technologies in society and lead to the resolution of problems. We will accelerate the realization of carbon neutrality by returning the fruits of our research and development to society.

- ✓ 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

2-2 Results of educational initiatives that contribute to carbon neutrality

Our 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.

<Five divisions in the Graduate School of Natural Science and Technology* "Environmental and Energy Technologies International Course">

The Asian and African regions are experiencing rapid growth and are predicted to continue to enjoy high growth in the future as the key to the stability of the global economy. However, we are now facing a serious threat from the growing environmental burden caused by the expansion of resource and energy consumption accompanying rapid industrial development and population growth. In order to dispel this threat and realize a sustainable international society, it is essential that each country develops an industrial development scenario suited to its individual circumstances and develops and introduces environmental and energy technologies.

As a global leader located in East Asia, Japan is in a responsible position to lead green innovation in developing regions. The purpose of this course is to develop human resources who can evolve Japan's outstanding energy and environmental component technologies into technologies suited to the actual conditions of each country, taking into account the regional characteristics and culture of each country, and who can then deploy these technologies internationally and supply them to the international community.

*Graduate School of Natural Science and Technology (Master's Program): Department of Material Chemistry, Department of Mechanical Science and Engineering, Department of Frontier Engineering, Department of Electrical, Information and Communication Engineering, Department of Geosciences and Civil Engineering

<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 at a major turning point toward realizing a sustainable society, and the Graduate School of Natural Science and Technology has established a five-year sub-major program called Graduate Program on Science and Engineering for Sustainable Development in April 2022 to train innovative doctoral students who can contribute to the development of a sustainable, safe, and secure society and play a wide range of roles in the international community by studying new areas that are based on diverse academic disciplines and cross-disciplinary fields. This program will enrich and develop abilities in specialized fields, and by strategically arranging a number of comprehensive programs that transcend the boundaries of fields, it aims to cultivate innovative doctoral students who have the innovative abilities to boldly venture into uncharted territory, and who can demonstrate their abilities in a global society and play a wide range of roles in the international community.

Of the five fields in this program, the " Environmental/Energy Science and Engineering " field is based on existing academic fields such as environmental science, environmental engineering, urban engineering, bioengineering, material chemistry, chemical engineering, electrical and electronic engineering, and mechanical engineering, and aims to train doctoral candidates who can contribute to society by researching and developing technologies to solve interdisciplinary problems related to the environment, resources, and energy, and to prevent their occurrence.

<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.

Additionally, in Creative Design classes, students are working to solve local problems, and some activities incorporate the perspective of the SDGs. They also held activities to discuss disaster prevention together with local residents, and the students themselves planned and held disaster prevention classes and practical classes on first aid for injuries.

Disaster prevention and first aid classes (for second-year junior high school students) organized by students themselves at the request of the Kanazawa City Crisis Management Division.

<Initiatives at affiliated school for special needs education>

Every year, students at the junior high school division of school for special needs education affiliated with the School of Teacher Education, College of Human and Social Sciences, study the SDGs (Sustainable Development Goals) during their "integrated learning period."

Of the 17 SDGs, the main learning themes were Goal 06 "Clean water and sanitation for all," Goal 11 "Sustainable cities and communities," and Goal 14 "Life below water," and students learned through hands-on experience. As part of their learning for Goal 06, "Clean Water and Sanitation for All," students conducted water quality surveys in the upper, middle, and lower reaches of the Tedori River, the longest river in Ishikawa Prefecture, and presented their findings to the Japan Society for Marine Education.

Meanwhile, as part of learning about Goal 11, "Sustainable Cities and Communities," cleaning activities

Water quality survey

Beach cleanup

Beach clean-up with the affiliated senior high school

around the school were carried out throughout the year. As part of learning about Goal 14, " Life below water,," students visited coasts in Ishikawa Prefecture and participated in cleaning activities and upcycling marine plastic waste in collaboration with the affiliated senior high school. In order to achieve the goals of the SDGs, it is necessary to realize a carbon-neutral society, and we will continue to conduct thematic learning related to the SDGs in the future.

■ **Extracurricular activities**

Our 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.

Attentive listening activity

<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.

Removal of rubble

Following the Noto Peninsula earthquake and Oku-Noto heavy rains that occurred in 2024, as of February 28, 2025, 1,411 people had participated in relief activities, including disaster recovery support, evacuation shelter support, interactions with affected people, and street fundraising. When carrying out their activities, they actively collaborate with universities both within and outside the prefecture, private companies, and local support organizations. They also contribute to activities such as connecting disaster-stricken

areas to promote the attractions of the Noto Peninsula, raising disaster prevention awareness in the local area, and spreading knowledge about emergency medical care.

<KuLOs (Cross)>

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.

Consignment sale

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

<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.

"STUDY FOR TWO"
Status of the initiative

In addition, student volunteers who support STUDY FOR TWO's educational support activities for children in poor countries collect textbooks and other books that are no longer used by students and faculty, resell them, and use the profits to support the education of children in developing countries (last year they supported a girls' education program in Tanzania).

To date, they have provided educational support to over 2,700 children in countries such as Laos and Nepal.

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

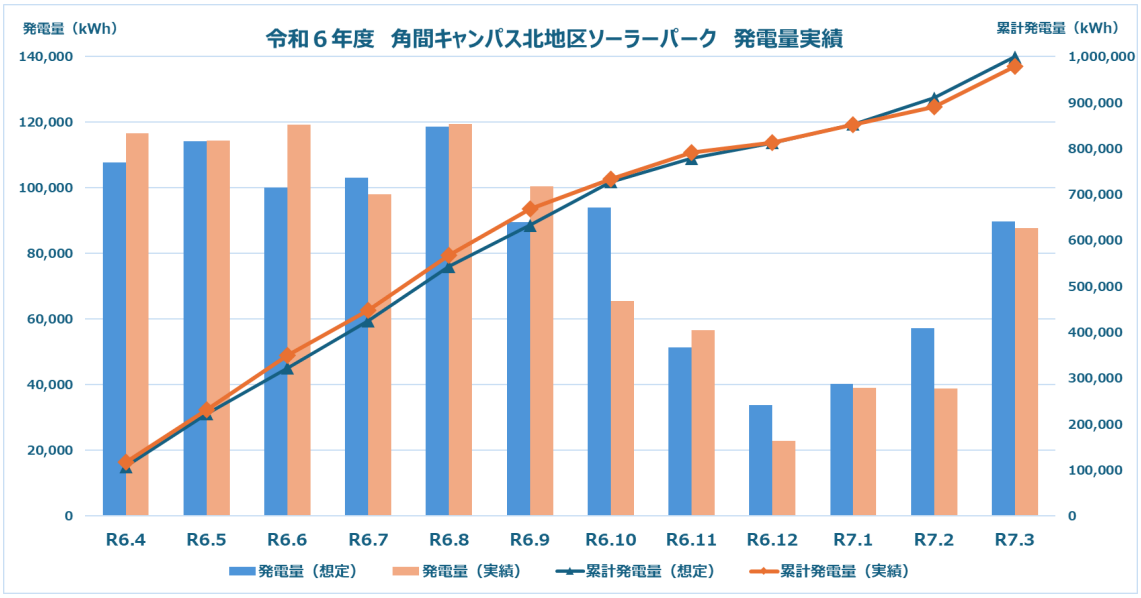
■ Energy Creation Initiatives

<Start of operation 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.

The actual results for 2024 are expected to be 979,000 kWh of electricity generated per year, resulting in a reduction of greenhouse gas emissions of 452 t-CO2 per year (equivalent to approximately 1.3% of the university's total emissions in 2024). The planned power generation volume of this PPA project is 954,000 kWh/year (20-year average), and power generation is progressing smoothly.

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



FY2024 Kakuma Campus North Area Solar Park Power Generation Results

■ **Energy conservation efforts**

<Takaramachi District Affiliated Hospital ESCO Project>

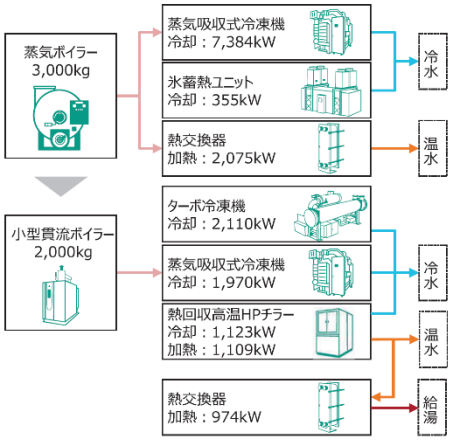
The university is using an ESCO* business scheme to carry out the largest-scale energy conservation initiative to date, including updating the core large-scale air conditioning equipment that covers the entire affiliated hospital.

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 will be publicly solicited in March 2023, 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 will be converted from gas to electricity, and at the same time, efficiency will be improved. This is expected to result in an annual reduction of 2,700 t-CO2, equivalent to approximately 7.8% of the university's total emissions (compared to actual results in fiscal 2024). Significant progress is expected toward achieving carbon neutrality on campus.

*Energy Service Company, a business that covers all costs related to energy conservation renovations through reductions in utility bills

Affiliated Hospital (Left: Central Medical Building, Right: Outpatient Medical Building)

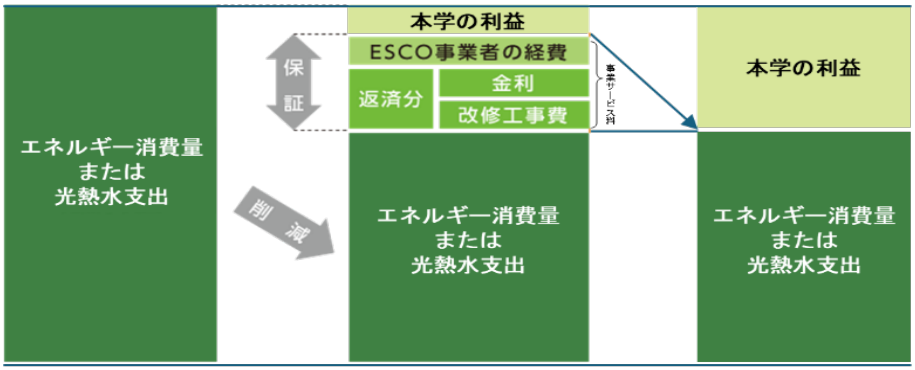


System overview

Turbo refrigerator x 1

Absorption chiller×1 unit

Heat pump chiller x 1

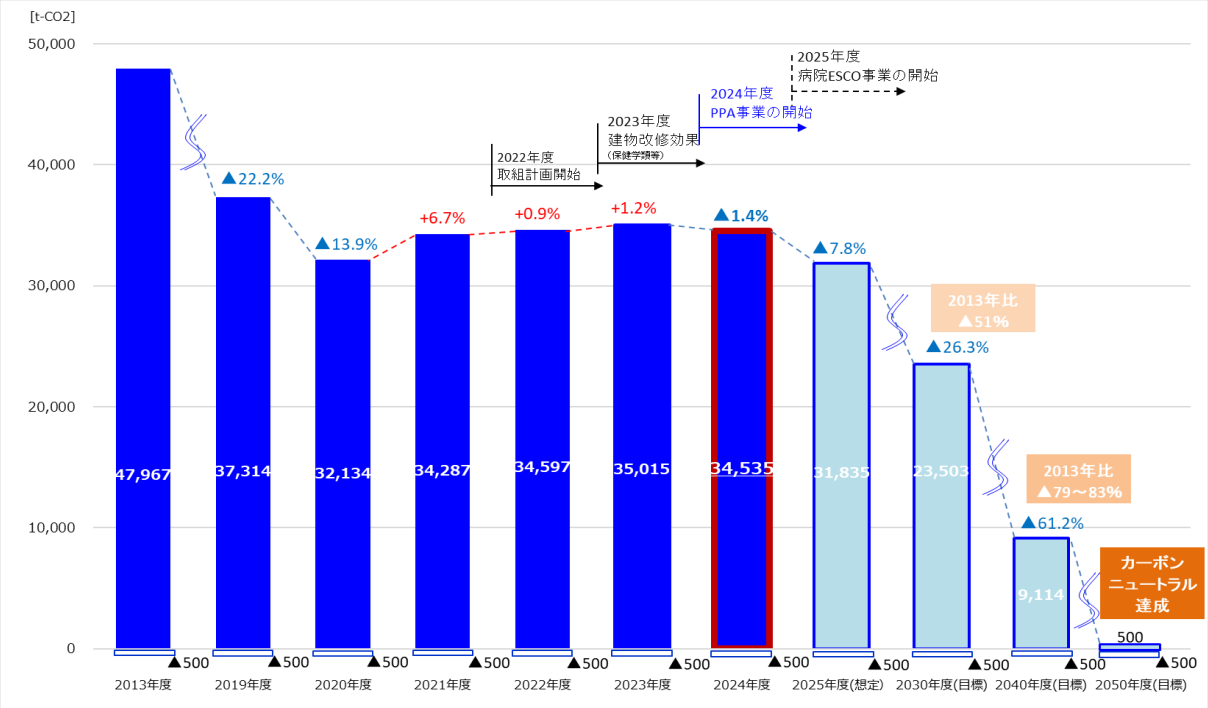


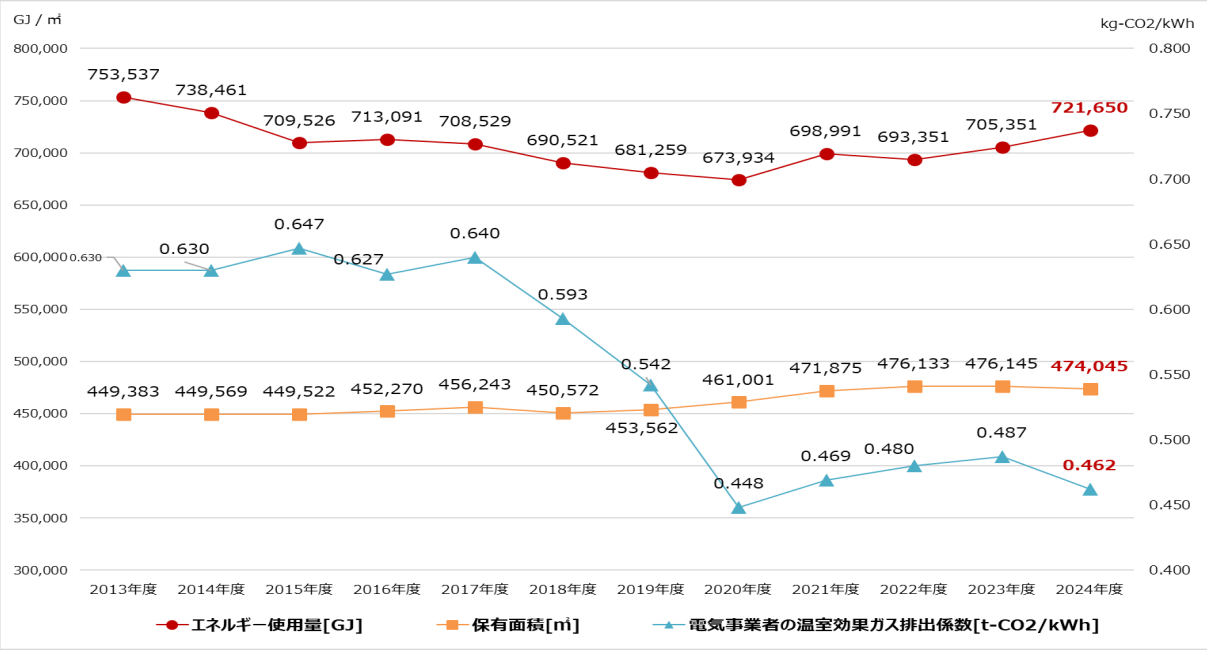
Overview of the ESCO business scheme (Source: ESCO/Energy Management Promotion Council)

■Trends in greenhouse gas emissions

The university's greenhouse gas emissions have been on an increasing trend since fiscal 2021, but in fiscal 2024, they decreased by 1.4% compared to the previous year due to a decrease in the electric power company's emission coefficient (-5.1%) and the effects of the Kakuma Campus North Area Solar Park (PPA project, overall greenhouse gas emissions -1.3%). On the other hand, energy consumption increased by 2.3% compared to the previous year, despite measures being taken to conserve and create energy, due to the severe cold (down 1.6°C from the average for December to February) and increased activity due to the expansion of the university (increase in land area and population).

Looking ahead, the company expects to see benefits from the Takaramachi District Affiliated Hospital ESCO project, which began operations in March 2025, and the LED lighting project scheduled for implementation this year. We aim to achieve this target through thorough energy-saving measures, including converting buildings to ZEBs, and energy-creation measures through the planned development of renewable energy sources, as well as through decarbonization of power sources by electric power companies.





(Top) Trends in greenhouse gas emissions / (Bottom) Trends in major indicators that affect

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Kanazawa University Research Planning Committee

Kanazawa University Education Planning Committee

Kanazawa University Facilities Department