

# Kyushu University Carbon-Neutral Campus Facility Development Plan [Overview]

- Toward Decarbonization by 2040 -

## Continuing the Legacy from Hakozaki Campus

Kyushu University Museum continues its initiative to repair and reuse valuable wooden furniture from the former Hakozaki Campus. This effort to reuse wood instead of discarding it helps protect historic academic and cultural resources. It also contributes to preventing global warming by fixing CO<sub>2</sub>. The photo shows a built-in cabinet originally installed in the former Applied Chemistry Building of the Faculty of Engineering at Hakozaki Campus. It was repurposed and reused as a desk in the lobby of Shiiki Hall on the Ito Campus.

In this way, wooden fixtures that carry over 100 years of university history are being reborn as antique furniture. They are now used as interior decor in spaces such as the main reception area and the art museum, embodying the university's historical value and connecting it to the future.



Regeneration

Built-in cabinet  
(Former Applied Chemistry Building of the  
Faculty of Engineering, at Hakozaki Campus)

A reclaimed wood desk  
(Shiiki Hall on Ito Campus)

Carbon-Neutral Campus 2040

Founded during Japan's coal mining boom, Kyushu University has supported the nation's modernization and economic growth through academic research. The university remains committed to integrating a carbon-neutral perspective into its research and education, helping build a sustainable society.

Kyushu University Carbon-Neutral Campus Facility Development Plan [Overview]

~ Toward Decarbonization by 2040 ~

Finalized in March 2025

Planning  
and Editing

Campus Planning and Facilities Management Committee  
Project Team for Achieving a Carbon-Neutral Campus  
Energy Conservation Review Subcommittee Offset Review Subcommittee  
Research Promotion Subcommittee Kyushu University Facilities Department

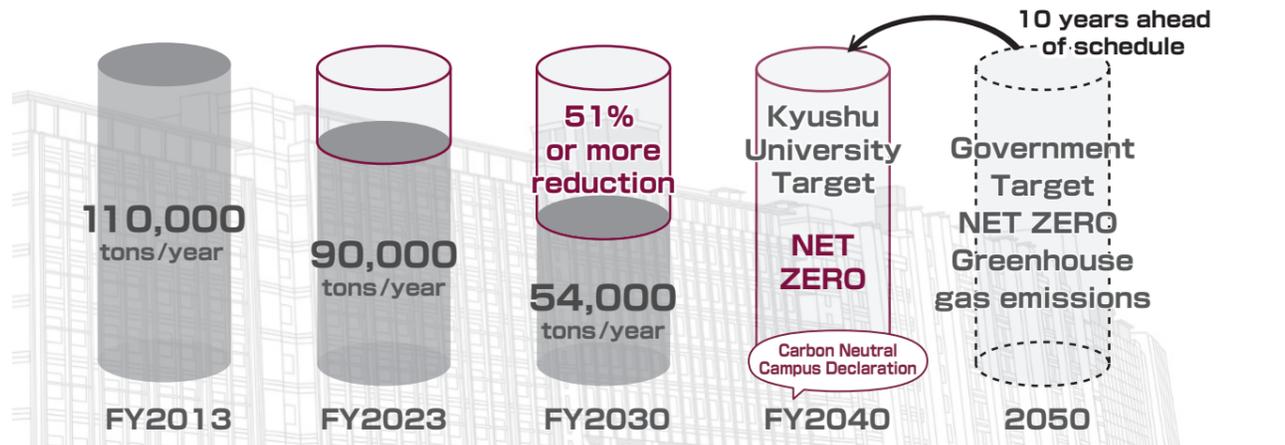
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九州大学  
KYUSHU UNIVERSITY

# Carbon Neutral Campus Declaration

Achieve a 51% or more reduction in CO<sub>2</sub> emissions from fiscal 2013 levels by fiscal 2030  
 Achieve a Carbon Neutral Campus by fiscal 2040 through a 100% reduction in CO<sub>2</sub> emissions from fiscal 2013 levels

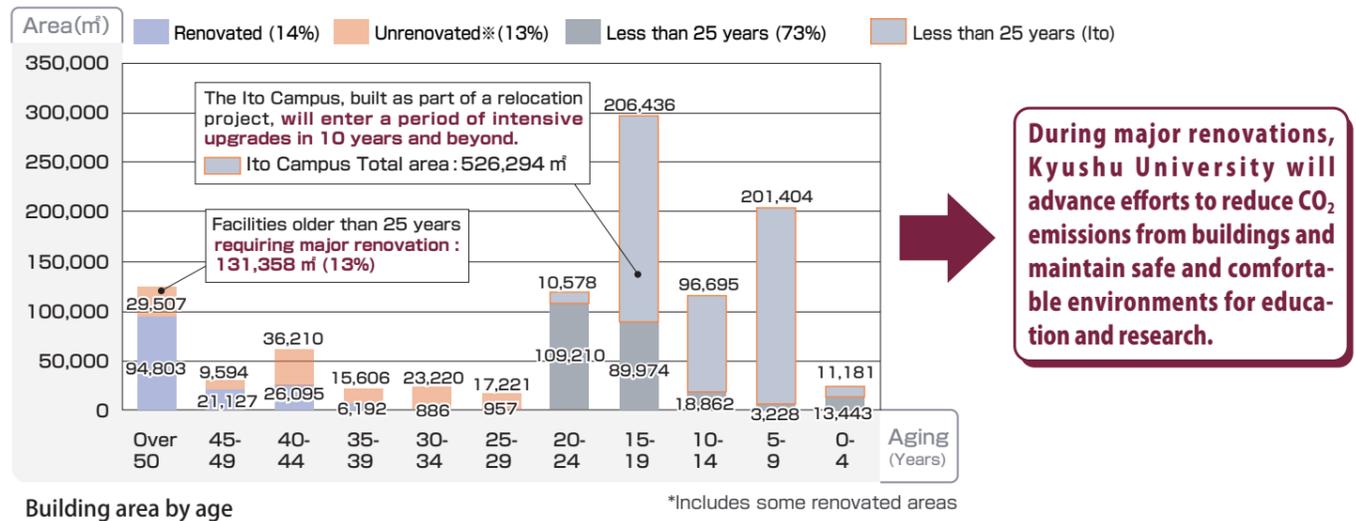


Kyushu University will implement six measures to achieve campus decarbonization and address the following challenges.

## Challenges

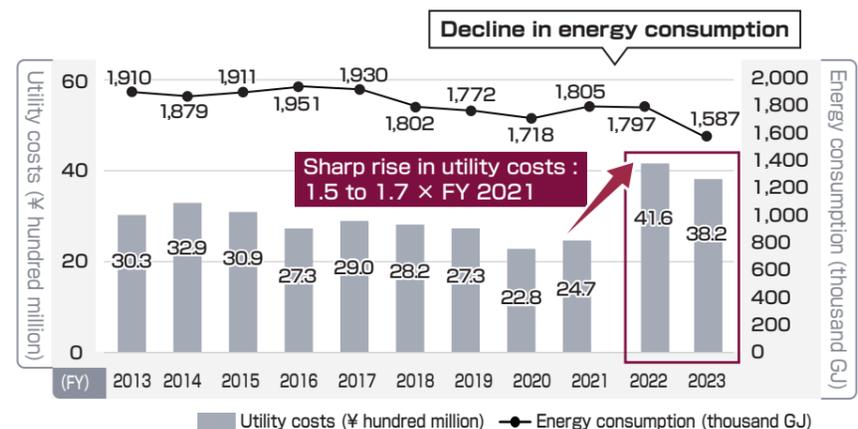
### 1 Facility deterioration

The Ito Campus was developed as part of a relocation project. In 10 years and beyond, many facilities will need intensive upgrades. Aging is also advancing at major campuses other than the Ito Campus.



### 2 Soaring utility costs

Utility costs are soaring due to the global surge in fuel prices. Energy-saving measures should be implemented while considering the possible impacts on education and research activities, as well as heatstroke prevention. To realize a decarbonized society, it is essential to optimize energy use and promote a shift to non-fossil energy sources.



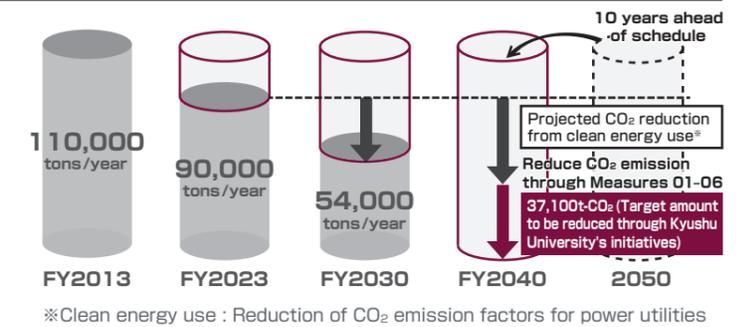
Trends in energy consumption and utility costs at Kyushu University

- **Target area** : Main campuses (Ito, Maidashi, Chikushi, Ohashi, Beppu, Hakozaki)
- **Target energy sources** : Electricity, gas, and heavy oil

## Targets

### Target for CO<sub>2</sub> emissions reduction through Kyushu University's initiatives

Accounting for reductions from power providers' decarbonization, Kyushu University's initiatives will cut annual emissions by 37,100 t-CO<sub>2</sub> by fiscal 2040.



## Six measures

### Policy 01 Energy-saving measures for facilities

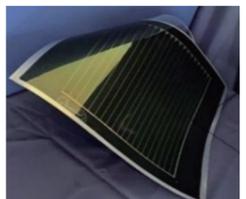
- LED lighting conversion and air conditioning efficiency improvements as outlined in the Infrastructure Long-Life Plan within the individual facility plans.
- Targeting ZEB standards through new construction, renovation, and full renovation (Nearly ZEB for new and renovated buildings; ZEB Ready for full renovation).



Projected CO<sub>2</sub> Reduction  
 FY2030 ·· 6,000t - CO<sub>2</sub> / year    FY2040 ·· 9,500t - CO<sub>2</sub> / year

### Policy 02 Introduction of energy generation systems

- Aim to install approximately 3MW of energy-generating systems by fiscal year 2040.
- Explore the use of new technologies such as perovskite solar cells.



Projected CO<sub>2</sub> Reduction  
 FY2040 ·· 600t - CO<sub>2</sub> / year

Perovskite solar cell (Lightweight and flexible) (Source: Agency for Natural Resources and Energy website)

### Policy 03 Promotion of Wood Utilization

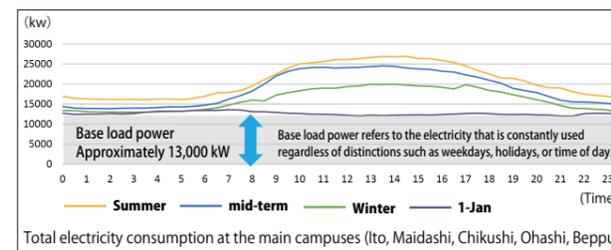
Consider incorporating wood elements into parts of the buildings when constructing, reconstructing, or renovating campus buildings. At the same time, evaluate the use of timber from University Forests, including thinning wood, with attention to economic feasibility and educational and research objectives.



Ito Guest House    Forestry Agency Director-General Award for the Wood Utilization Competition

### Policy 05 Reduction in base load power

Analyze base load power and reduce wasteful electricity use.



Projected CO<sub>2</sub> Absorption  
 FY2040 ·· 1,000t - CO<sub>2</sub> / year

### Policy 04 CO<sub>2</sub> Absorption by Forests

Maintain approximately 7,100 hectares of University Forests, the School of Agriculture in Hokkaido, Fukuoka, and Miyazaki as CO<sub>2</sub> sinks through appropriate management.



Hokkaido research forest    Fukuoka research forest    Miyazaki research forest

Projected CO<sub>2</sub> Absorption  
 FY2040 ·· 26,000t - CO<sub>2</sub> / year

### Policy 06 Energy-saving measures in operational aspects (behavioral change)

- Energy conservation measures involving students
- Review of air conditioning system operations
- Development of building design guidelines



Energy-saving application (in progress)    Energy-saving application (brochure)

Kyushu University aims to achieve carbon neutrality across all its campuses by comprehensively advancing these six measures.

# A campus serving as a hub for co-creating a decarbonized society

## Campus-based demonstration project

### 1 Hydrogen Campus (Hydrogen Bus Operation)

Kyushu University has built a hydrogen station at the Ito Campus that uses zero-emission power sources to produce hydrogen. Fuel cell buses powered by this hydrogen operate on campus. Their design showcases the future of energy and creates opportunities for learning and reflection.



Hydrogen fuel cell bus (Designed by students from the Graduate School of Design and the Graduate School of Integrated Frontier Sciences)



Hydrogen station (Training for engineers and researchers)

### 2 Smart CO<sub>2</sub> capture and utilization system

Kyushu University is driving innovations through **cross-disciplinary technology integration** in the greenhouse at the Ito Campus. The university is researching an unprecedented 'Smart CO<sub>2</sub> Capture and Utilization System' for greenhouse horticulture. The project integrates advanced CO<sub>2</sub> capture and storage technologies from **the Graduate School of Engineering, I<sup>2</sup>CNER, and the Platform of Inter-/Transdisciplinary Energy Research (Q - PIT)** with smart agriculture and CO<sub>2</sub> utilization technologies from **the Graduate School of Agriculture**. The system captures and stores CO<sub>2</sub> emitted from heaters at night and reuses it during the day to boost crop photosynthesis.



Demonstration experiment in the greenhouse (Integration of cross-disciplinary technologies)



CO<sub>2</sub> capture and storage system for CO<sub>2</sub> emitted from heaters (Technology developed by the Faculty of Engineering)

## Carbon sequestration through wood utilization

### 1 Wooden buildings

The use of wood in buildings contributes not only to creating comfortable and healthy indoor environments but also to reducing and sequestering CO<sub>2</sub> emissions. Kyushu University promotes the use of wood in the construction of campus facilities.

The Ito Guest House was built with timber from Fukuoka Prefecture, featuring a design that blends with nature and reflects Japan's tradition of hospitality for welcoming researchers worldwide. Furthermore, the Faculty of Agriculture Centennial Commemorative Exchange Space was completed in March 2025 and features **timber sourced from the University Forest, School of Agriculture**.



Faculty of Agriculture Centennial Commemorative Exchange Space



Ito Guest House

## Reducing environmental impact

### 1 Sustainable buildings

The high-rise buildings (West Buildings 1-5) incorporate natural ventilation, daylighting, and solar power generation systems for sustainability. Furthermore, the Carbon Neutral International Research Facility was designed to convey a message of environmental responsibility. It houses **ICNER and the Next-Generation Fuel Cell Industry-Academia-Government Collaboration Center**, which conducts research contributing to a decarbonized society.



Carbon Neutral International Research Facility

### 2 Improved thermal insulation through rooftop greening

The Central Library, featuring a large-scale space, reduces air conditioning loads by improving insulation through rooftop greening. The rooftop's green design creates an open space that integrates the building with the natural environment.



Central Library

### 3 Balancing regional electricity demand (Demand response)

During periods of expected power shortages, such as extreme heat or disasters, Kyushu University helps maintain a stable electricity supply and balance local demand by operating standby generators at the Ito Campus.



Energy Center (Standby Generator)

## Toward promoting energy creation

### 1 Solar power generation facilities

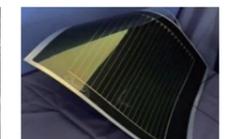
At the Ito Campus, Kyushu University is considering installing floating solar panels on regulating ponds and introducing next-generation perovskite solar cells with lightweight and flexibility on building walls and other surfaces.

### 2 Wind power generation facilities

Kyushu University has installed wind power generation facilities that utilize a natural and environmentally friendly source, and is using them as part of its environmental education program.



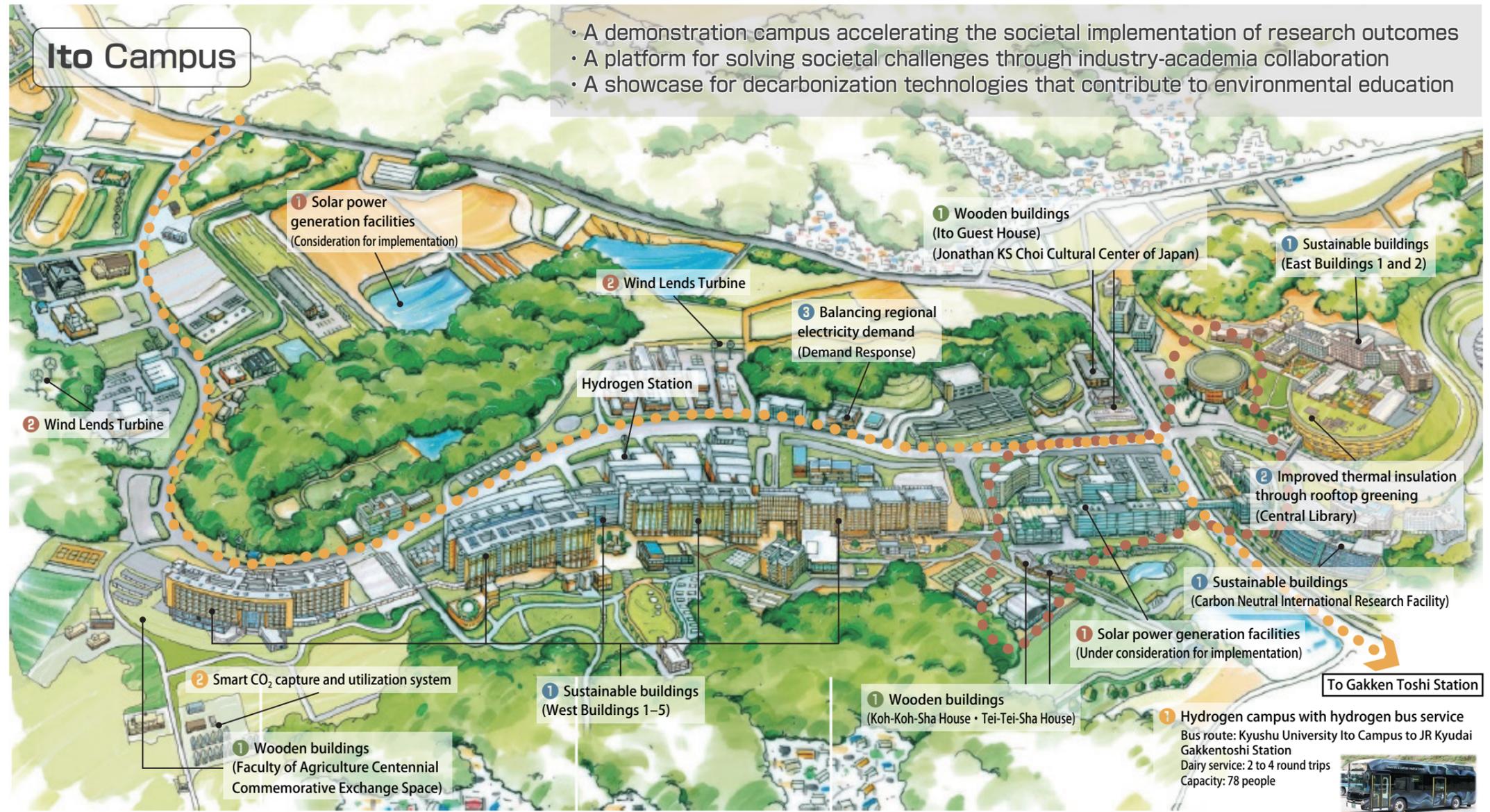
Floating solar power panels (Image)



Perovskite solar cell (Under consideration for implementation) (Source: Agency for Natural Resources and Energy website)

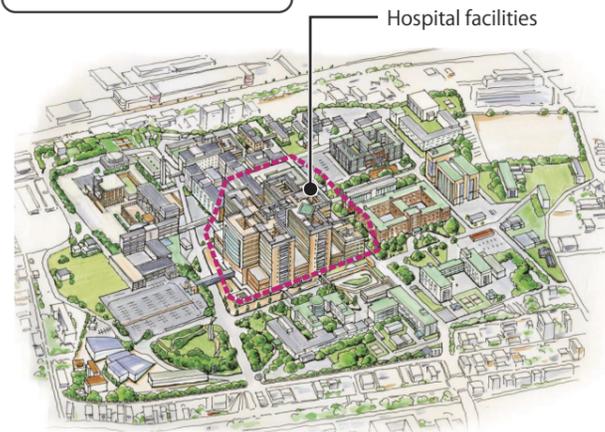


Wind Lends Turbine



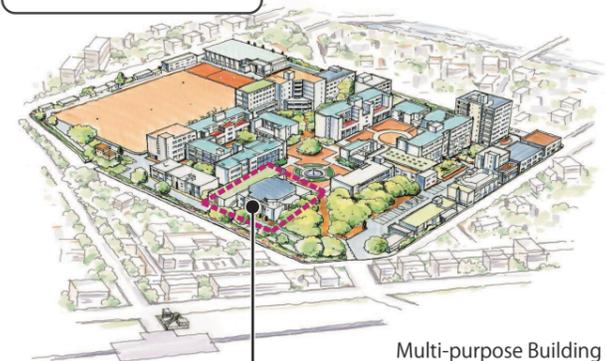
- A demonstration campus accelerating the societal implementation of research outcomes
- A platform for solving societal challenges through industry-academia collaboration
- A showcase for decarbonization technologies that contribute to environmental education

### Maidashi Campus



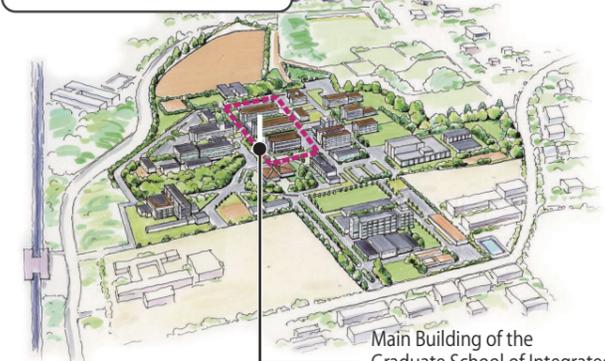
Hospital facilities

### Ohashi Campus



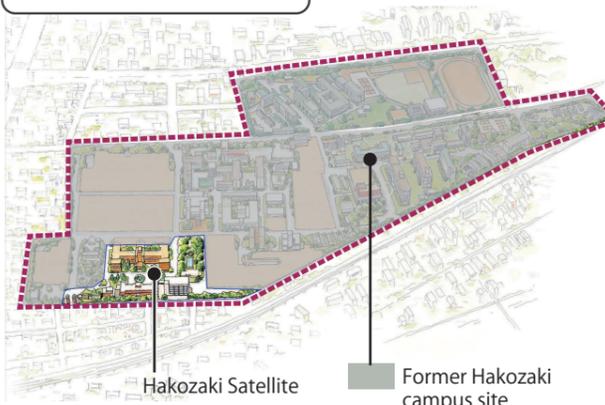
Multi-purpose Building (Social Art Lab)

### Chikushi Campus



Main Building of the Graduate School of Integrated Science and Engineering

### Hakozaki Satellite



Hakozaki Satellite

Former Hakozaki campus site

## Reducing environmental impact

### Electrifying heat source systems

Hospital facilities are upgrading to high-efficiency equipment due to high energy use. Efforts to advance energy savings and decarbonization include upgrading city gas absorption chillers that produce chilled water for air conditioning to high-efficiency electric turbo chillers.



Absorption-type refrigeration unit powered by city gas and heavy oil



Turbo-type refrigeration unit powered by electricity

## Reducing environmental impact

### Advancing ZEB retrofits for existing facilities and ZEB construction

Kyushu University promotes building decarbonization in its renovation projects, while ensuring safe and comfortable environments for education and research. In fiscal 2023, the Multi-purpose Building completed a major renovation to meet ZEB Ready standards. In fiscal 2024, the main building of the Interdisciplinary Graduate School of Engineering Science completed a renovation to meet ZEB Ready standards.



(Ohashi) BELS evaluation report for the Multi-purpose Building



(Ohashi) Renovation of the Multi-purpose Building Completed in fiscal 2023



(Chikushi) Renovation of the main building at the Interdisciplinary Graduate School of Engineering Sciences Completed in fiscal 2024

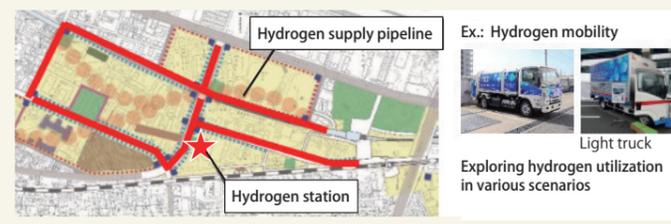
ZEB Ready (67% reduction)

Driving ZEB retrofits forward

## Social Implementation

### Social Implementation of Hydrogen Technology

Hydrogen technology research results from the Ito Campus will be socially implemented at the former Hakozaki campus site. Kyushu University is participating in discussions with national and local governments to promote the development of hydrogen infrastructure by municipalities and private-sector entities. Plans include the construction of Japan's largest-scale hydrogen supply pipeline and the operation of hydrogen mobility vehicles.



Hydrogen supply pipeline

Ex.: Hydrogen mobility



Light truck Exploring hydrogen utilization in various scenarios

Hydrogen station



## University Forests, the School of Agriculture

Kyushu University owns approximately 7,100 hectares of University Forests, the School of Agriculture in Hokkaido, Fukuoka, and Miyazaki, making it the third-largest among National University Corporations. Each research forest has a management plan and ensures proper maintenance and management, serving as a CO<sub>2</sub> sink. The international rules for calculating CO<sub>2</sub> absorption by forests (GHG Protocol) have not yet been established. According to the formula provided by the Forestry Agency, these forests are estimated to absorb approximately 26,000 tons of CO<sub>2</sub> annually.



Hokkaido research forest 3,713ha

Fukuoka research forest 464ha

Miyazaki research forest 2,916ha

Category	Area (ha)	CO <sub>2</sub> Absorption Capacity (tons/year)
Planted forest	2,020	12,000
Natural forest	4,950	14,000
Others	120	0
<b>Total</b>	<b>7,090</b>	<b>26,000</b>

CO<sub>2</sub> Absorption by Forests  
Forestry Agency "Method for Estimating CO<sub>2</sub> Absorption by Forests"  
(Kyushu University estimated this using a formula established on December 27, 2021.)

## Driving decarbonization through organizational collaboration

Kyushu University, as a whole, contributes to realizing a decarbonized society through collaborations led by the following entities: **Campus Planning and Facilities Management Committee**, which develops campuses that support education and research while driving decarbonization; **the Integrated Initiative for Designing Future Society**, which offers solutions to societal challenges centered on decarbonization and designs processes to achieve them; and **Q-PIT**, where more than 200 researchers across diverse energy fields collaborate to create innovation through integrated knowledge and address societal challenges.

Contribution to realizing a decarbonized society

To society

Missions of the Integrated Initiative for Designing Future Society and Q-PIT

1. Addressing societal challenges and presenting process designs
2. Developing technologies contributing to decarbonization

Provide a venue for demonstration experiments

Mutual feedback

Bringing research technology back to campus

Missions of the Campus Planning and Facilities Management Committee

1. Campus development that supports education and research
2. Ensuring safe and comfortable environments for education and research while promoting campus decarbonization



## A university that drives social change with integrative knowledge

### Case study : Initiatives contributing to the promotion of hydrogen energy

#### World-leading research and development centers are concentrated on the Ito Campus.

- The International Research Center for Hydrogen Energy acts as an incubator for hydrogen and fuel cells.
- The Research Center for Hydrogen Industrial Use and Storage conducts intensive research on hydrogen-exposed materials.
- The Next-Generation Fuel Cell Research Center is a comprehensive industry-academia collaboration hub housing various enterprises.
- The International Institute for Carbon-Neutral Energy Research stands as a top-level global institute focusing on carbon neutrality.

#### Industry-academia-government collaboration

- Designated as a Green Asia International Strategic Comprehensive Special Zone
- Participated in the Fukuoka Prefecture Hydrogen Green Growth Strategy Conference, and carried out activities associated with human resource development, social implementation, and awareness-raising related to hydrogen, in cooperation with local governments and corporations

#### Implementation in local communities

- Demonstration operation of large hydrogen fuel cell buses (Between the Ito Campus and the JR Kyudai Gakkentoshi Station)  
※Kyushu Electric Power Co., Inc. (Joint), Showa Bus Co., Ltd. (Cooperation)
- Participation in the Hydrogen Infrastructure Development Plan for the Former Hakozaki campus site

#### Contributed to the enactment of energy-related legislation

- Faculty members from Kyushu University were invited as expert witnesses during Diet deliberations on the revised Energy Conservation Act and the Hydrogen Society Promotion Act, which designate hydrogen and other sources as non-fossil energy. They contributed to the development of related legislation by providing insights drawn from domestic and international energy trends as well as research conducted at Kyushu University.



Hydrogen fuel cell bus launch ceremony  
(President of Kyushu University, Governor of Fukuoka Prefecture, Private Sector Representative)  
(Source : Fukuoka Prefecture website)



Expert witness to the House of Representatives Committee on Economy, Trade and Industry (March 29, 2024)  
(Source : Live Internet broadcast of the House of Representatives)