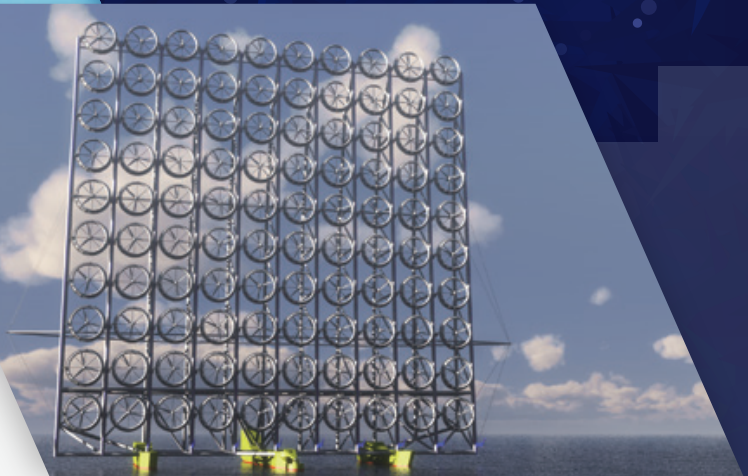




KYUSHU
UNIVERSITY

Research & Education Center for Offshore Wind

Kyushu University



※Development image





Greetings



Executive Vice President and
Senior Vice President of Kyushu University
Director of the Research and
Education Center for Offshore Wind,
Kyushu University

Susumu Fukuda

My name is Fukuda, Executive Vice President and Senior Vice President of Kyushu University (responsible for industry-academia-government-society collaboration). Kyushu University established the Research and Education Center for Offshore Wind on April 1, 2022. With the establishment of the Center, I was appointed as its Director. I am determined to devote myself to the development of the Center. I thank you in advance for your support.

In October 2020, then Japan's Prime Minister Suga declared in his policy speech that Japan would aim to reduce greenhouse gas emissions to net-zero, that is, to realize a carbon-neutral, decarbonized society by 2050. Subsequently, in December 2020, the government announced its "Vision for Offshore Wind Power Industry," in which it set a target of achieving 30 to 45 gigawatts (GW) of offshore wind power capacity installation by 2040 (more than 10 times the actual 2018 level). The government considers offshore wind power to be the trump card for making renewable energy the main source of power, and by setting the above ambitious installation target, it promises to create significant demand. It is expected that the government will use this demand as a springboard to attract and create a wind power industry, build a robust supply chain with domestic suppliers, and furthermore, with a view to developing the next-generation floating offshore wind turbine technology and other technologies for deployment in Asia, work on technological development and international collaboration.

Supported by the government's clear policy, the expansion of the offshore wind business has a clear direction; however, since almost all major Japanese wind turbine manufacturers had already withdrawn from the wind industry as of 2019, this expansion will be driven by the introduction of foreign-made offshore wind turbines. Despite these circumstances, the harsh wind conditions and social environment unique to Japan will not change, and there is a mountain of issues to be addressed, including the formation of a domestic supply chain, the shortage of wind industry personnel, energy security, and suitability for Japan's wind conditions and social environment.

Kyushu University is the only university in Japan capable of developing wind turbines combining its unique wind turbine/floating structure technology (hardware) and wind condition analysis/fluid structure analysis technology (software). Furthermore, under the Designated National University Corporation Concept, Kyushu University aims to become Japan's Green Innovation Hub, contributing to creating innovative technologies, making policy recommendations and developing human resources, and presenting innovations in wind energy technologies, including offshore wind power generation.

Kyushu University has established the Research and Education Center for Offshore Wind, aiming to become a world-class center for research and education related to offshore wind power by consolidating related research resources based on the above-mentioned offshore wind power research achievements. At the same time, Kyushu University has also decided to establish the Consortium for Offshore Wind Industry-Academia-Government Collaboration, which aims to bring together the experience, know-how, and capabilities of Japan's industry, academia, and government with the Center as its core. By establishing these two organizations, Kyushu University hopes to tackle issues related to offshore wind power and actively contribute to making offshore wind power the main source of power in Japan and to realizing a decentralized energy society. We look forward to your cooperation and encouragement in the operation of the Center. Thank you very much for your support.

April 1, 2022



Outline of the Research and Education Center for Offshore Wind, Kyushu University

It was established on April 1, 2022 as a world-class center for offshore wind-related research and education.

It will actively contribute to making offshore wind power the main source of power and to realizing a decentralized energy society.

Organization of the Center

Department of Multiscale Offshore Wind Environment Research	Department of Next-Generation Offshore Wind Turbine Research
Department of Support Structures and Offshore Power Transmission Research	Department of Carbon-Free Energy Management Research
Visiting Department	Kyushu Region Collaboration Department
Endowed and Collaborative Research Department	



Direction of Activities of the Research and Education Center for Offshore Wind, Kyushu University

Challenges toward Expanding Offshore Wind Power in Japan

Domestic supply chain formation	Human resources development for the offshore wind industry
Energy security	Suitability for Japan's wind conditions and social environment

Direction of Activities

Activity (1) Close industry-academia-government collaboration with the offshore wind power industry	Activity (2) Development of human resources who will lead the offshore wind power industry	Activity (3) Effective policy recommendations for the expansion and promotion of offshore wind power	Activity (4) Research and development of offshore wind technologies optimized for the Japanese environment
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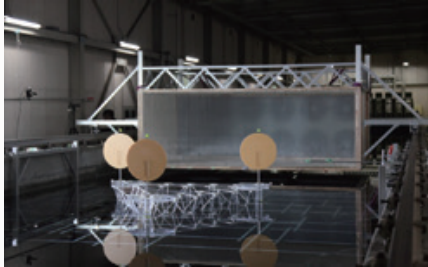
Main Members and Major Past Research Achievements



Professor Changhong Hu

(Director of the Department of Next-Generation Offshore Wind Turbine Research / Research Institute for Applied Mechanics (RIAM))

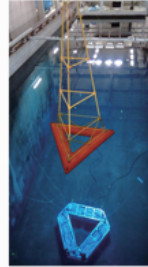
- ▶ Development of a fishery-harmonious floating offshore wind turbine (FOWT) system (Joint industry-academia research)
- ▶ Development of a bottom-mounted tidal current turbine system (NEDO, joint principal investigator), development of a floating transmission tower for offshore overhead power transmission (JST, principal investigator), development of a FOWT with multiple wind lens turbines (joint industry-academia research)
- ▶ Coupled hydrodynamic and aerodynamic analysis on FOWT (Grant-in-Aid for Scientific Research)



Experiment on a FOWT under both wind and wave conditions



Experiment on a floating transmission tower for offshore overhead power transmission



Development of a fishery-harmonious FOWT system



Professor Tomoaki Utsunomiya

(Director of the Department of Support Structures and Offshore Power Transmission Research / Graduate School of Engineering)

- ▶ Development and demonstration of mooring cost reduction for floating offshore wind power generation facilities (Ministry of the Environment, principal investigator)
- ▶ Development and demonstration of a low-cost, low-carbon removal method for spar-type floating offshore wind power generation facilities (Ministry of the Environment, co-investigator)
- ▶ Many Grants-in-Aid received for Scientific Research on development and demonstration of offshore wind power generation facilities, Award for Distinguished Contributions to Industry-Academia-Government Collaboration received from the Minister of the Environment (2014)
- ▶ Chairman of NEDO's DC Deep-sea Cable Review Committee, member of NEDO's GI Fund Project Adoption Review Committee, etc., committee member at the Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry; the Ministry of the Environment; the Ministry of Land, Infrastructure, Transport and Tourism; NEDO; Nippon Kaiji Kyokai (ClassNK); and many other organizations



1/10 model experiment of 2-MW real turbine



1/2 model of 2-MW real turbine in actual sea area demonstration test



2-MW spar-type floating wind turbine

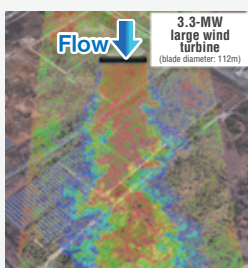


Professor Takanori Uchida

(Director of the Department of Multiscale Offshore Wind Environment Research / Research Institute for Applied Mechanics (RIAM))

- ▶ Principal investigator of multiscale wind environment research / wind turbine wake research (bottom-mounted type / floating type) and JST A-STEP (Full-scale type) (currently in progress)
- ▶ Principal investigator of the numerical wind environment prediction model RIAM-COMPACT from the RIAM, Kyushu University 10 patents held, etc.
- ▶ Industry-academia joint research, including with MEXT, JST and NEDO, covered in many newspaper accounts and TV reports, etc.
- ▶ The 54th Ichimura Award "Ichimura Award for Global Environmental Science and Contribution" received from the Ichimura Foundation for New Technology in 2022
- ▶ New Energy Award "Judging Committee Chairman's Special Prize" received from the New Energy Foundation(NEF) in 2022

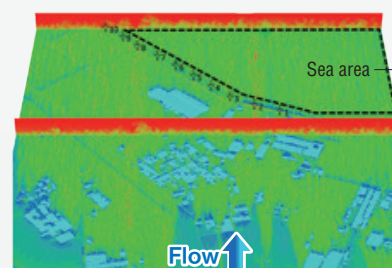
CFD in Wind Energy for the Hibikinada Seaside Industrial Area in Wakamatsu-ku, Kitakyushu City



Wind turbine wake flow



Complex turbulent flow (sea breeze)



Complex turbulent flow (land breeze)

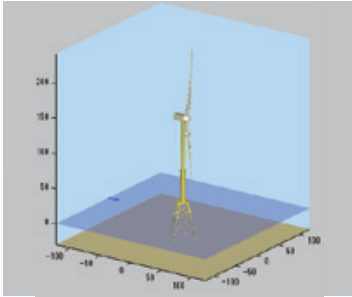
Complex turbulent flow field from buildings and existing wind turbine wakes in the coastal area reaches offshore!



Professor Shigeo Yoshida

(Department of Next-Generation Offshore Wind Turbine Research/ Research Institute for Applied Mechanics (RIAM))

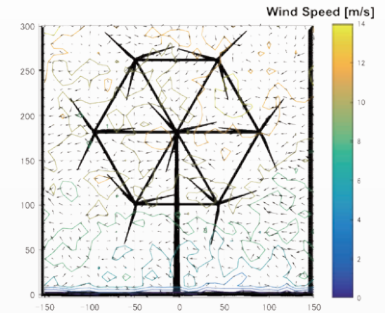
- ▶ Development and demonstration of elemental technologies of advanced floating offshore wind turbine (NEDO, principal investigator)
- ▶ Low-cost construction technologies of offshore wind turbines (NEDO, principal investigator)
- ▶ Advanced technologies for practical application of wind turbines (NEDO, recommissioned), 10 MW+ class wind turbine technologies (NEDO, recommissioned)
- ▶ Task 40 Downwind Turbine Technologies (IEA Wind, operating agent)



Two-bladed, downwind offshore wind turbine



Single-point mooring two-blade downwind floating offshore wind turbine



Large-scale multi-rotor wind turbine



Yuji Ohya, Advisor

(Visiting Department / Former Director of the Research Institute for Applied Mechanics (RIAM))

- ▶ Inventor of wind lens turbine, patents held for multi-lens wind turbine
- ▶ Awards related to wind lens turbine development: Award for Science and Technology from the Minister of Education, Culture, Sports, Science and Technology; Technology Development Award from the Japan Association for Wind Engineering; Award for Excellent Applications in Fluid Mechanics by the Japan Society of Fluid Mechanics; and Award for Distinguished Contributions to Industry-Academia-Government Collaboration from the Minister of the Environment
- ▶ Japanese government exhibition at the IMF World Bank Annual Meetings (2012), introduced in Nature: Spotlight on Fukuoka (2013), and reported in many newspapers, including Nikkei

Stage 1

2010~2015

Stage 2

2015~2025

Stage 3

From 2025



Small floating energy farm at Hakata Bay (8 kW)

Ministry of the Environment project (photo provided by Asahi Shimbun)



Medium wind lens turbines (100 kW)

Next-generation energy demonstration facility project



Multi-lens wind turbines (several 10 kW)

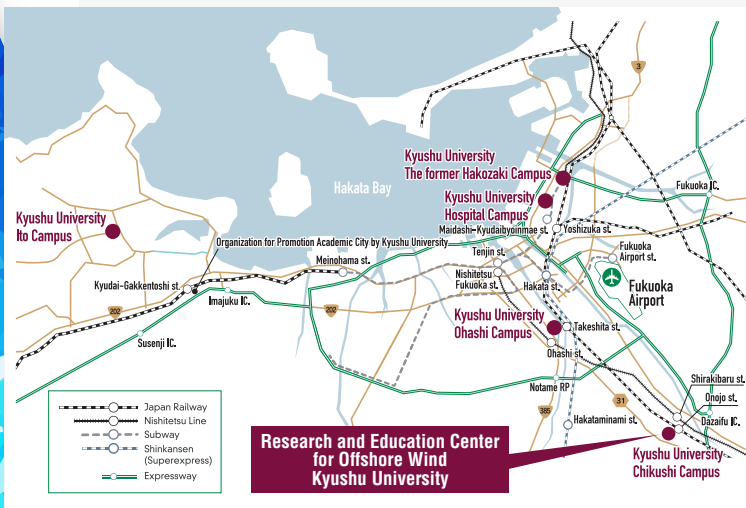
METI / NEDO project



Hydrogen generation facilities and FOWT

Medium-scale (1-MW) floating offshore wind power generation

Development of 200-kW wind lens turbine and floating body



Research and Education Center for Offshore Wind Kyushu University



GIC Bldg. 1st floor, at Chikushi Campus, Kyushu University 6-1 Kasuga-koen Kasuga-city Fukuoka 816-8580 JAPAN Tel: 092-583-7864

Access Guide

Located beside Onojo Station (rapid train stop), JR Kagoshima Line Approximately 15 min. walk from Shirakibaru Station, Nishitetsu Tenjin Omuta Line Approximately 10 min. by car on open road from the Dazaifu Interchange on the Kyushu Expressway

* Vehicles can enter only at the Kasuga-Gate (Kasuga Park side).

<https://recow.kyushu-u.ac.jp/>

