Initiatives for Expanding the Introduction of Wind Power Generation

Background

Since the publication of the Fourth Strategic Energy Plan in 2014, offshore wind power has been regarded as essential for Japan, where suitable sites for onshore wind power are limited. As a result, projects for fixed-bottom offshore wind turbines have been progressing.
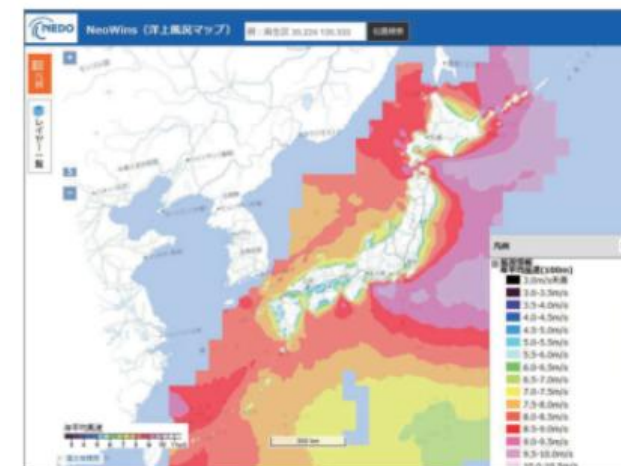
Recently, a law partially amending the Act on Promoting Utilization of Sea Areas for Renewable Energy was enacted, expanding its application to the Exclusive Economic Zone (EEZ). Offshore wind power is therefore expected to continue growing significantly.

Implemented Projects

As various policies are being introduced to achieve offshore wind power deployment targets, expanding the use of wind power requires not only the development of wind turbines themselves but also the establishment of wind condition observation methods and the preparation of wind condition maps necessary for project planning by developers.

NEDO is supporting information collection and technology development to accelerate the commercialization of offshore wind power, including the establishment of offshore wind observation methods and the development of wind condition maps.

Offshore Wind Condition Map (NeoWins)

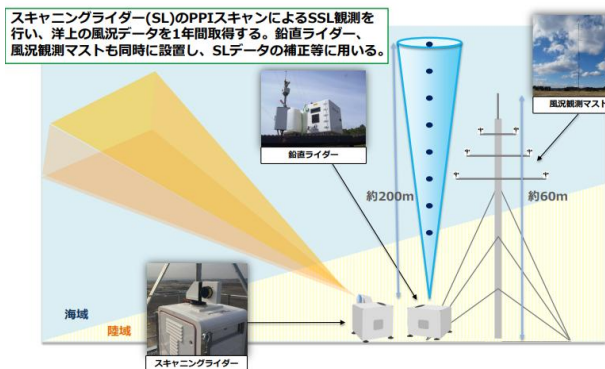# Wind Power Introduction Support Project / Offshore Wind Farm

Current Research and Development Themes

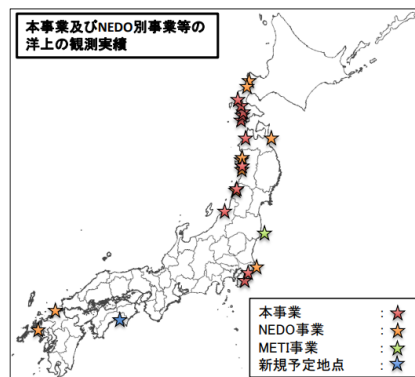### Basic Survey for Offshore Wind Condition Map Revision
Project Operators: : Japan Weather Association

NEDO has published NeoWins (Offshore Wind Condition Map), but there is a strong demand for providing more reliable wind condition information, and a revision of NeoWins is required.
To support the revision of NeoWins, observations are being conducted in multiple sea areas with the aim of obtaining wind condition data from actual offshore environments.

Overview of Wind Condition Observation Methods

Offshore Observation Records from This Project and Other NEDO Projects

Research and Development on Observation and Evaluation Methods for Wind Turbine Wakes
Project Operators : Toshiba Energy Systems Corporation, The University of Tokyo, National Institute of Advanced Industrial Science and Technology, Japan Weather Association, Wind Energy Consulting Co., Ltd., Nippon Kaiji Kyokai (ClassNK),

While investigating observation methods for wind turbine wakes and assessing technology development needs that contribute to improving wind farm power generation efficiency, this project conducts observations and evaluations of wind turbine wakes using offshore wind farms and other facilities. By presenting guidelines for wake observation methods that take Japan's unique natural environment into account, the goal is to enable efficient power generation in future offshore wind farms.

Integrated Wind Turbine Installation

Wind Power Introduction Support Project / Offshore Wind Farm Development Support Project / Research and Development for Establishing Offshore Wind Condition Observation Methods

Overview & Objectives

To clarify wind turbine design and the feasibility of wind power projects, it is essential to obtain highly accurate wind condition data around the installation site. While reliable observation methods have been established for onshore and coastal areas, observation techniques for offshore locations required for floating offshore wind power remain undeveloped.

This project consists of Parts I–IV and aims to establish wind condition observation technologies and identify challenges using three different methods. Based on the knowledge gained, we will update the "Offshore Wind Condition Observation Guidebook (published in 2023)" and present recommended practices for wind condition observation in offshore areas.
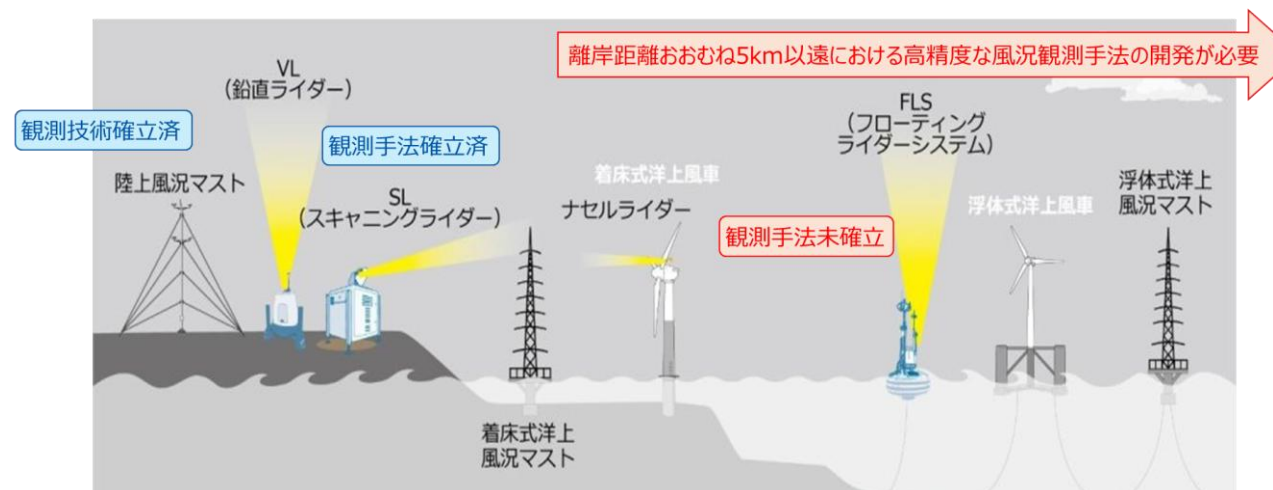

Illustration of Wind Condition Observation

Wind Power Introduction Support Project / Offshore Wind Farm Development Support Project / Research and Development for Establishing Offshore Wind Condition Observation Methods

Current Research and Development Themes

Offshore Wind Condition Observation I : Establishing Offshore Wind Observation Methods Using FLS
Project Operators: : FLOWRA, Ashikaga University, The University of Tokyo, National Institute of Advanced Industrial Science and Technology, Wind Energy Consulting Co., Ltd.

We aim to establish observation technology using buoy-type Floating LiDAR Systems (FLS).By utilizing data on wind conditions and motion observed with moving FLS units (EOLOS/FUGRO) and applying physical models and machine learning models for accuracy improvement and correction, the goal is to achieve highly precise wind condition observations.

EOLOS

FUGRO

Offshore Wind Condition Observation Ⅱ : Identification of Issues and Trend Analysis Related to Offshore Wind Condition Observation
Project Operators : Japan Weather, Kobe University, National Institute of Advanced Industrial Science and Technology

Through the establishment of a turbulence intensity observation method using VL applicable even at high altitudes, the demonstration of long-distance SL, the demonstration of FLS in deep waters, and other elemental technologies, as well as research and development integrating these achievements, we aim to identify and resolve practical issues related to offshore wind and meteorological-oceanographic observations that contribute to the deployment of floating offshore wind power in the EEZ.

VL

SL

FLS（MIA）

NEDO Project Wind Power Introduction Support Project

Contact Information NEDO Renewable Energy Department, Wind & Marine Unit
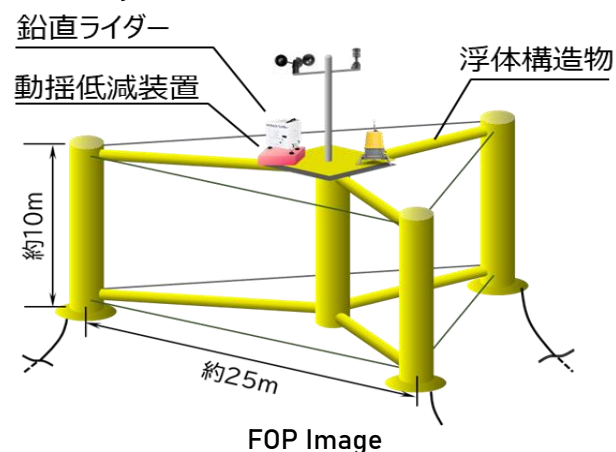wind_tyakushou@ml.nedo.go.jp

Wind Power Introduction Support Project / Offshore Wind Farm Development Support Project / Research and Development for Establishing Offshore Wind Condition Observation Methods

Current Research and Development Themes

Offshore Wind Condition Observation Ⅲ : Study on the needs and observation methods for direct observation of wind conditions offshore
Project Operators:：Kyuden Mirai Energy Co., Ltd., Kobe University, Rera Tech Inc., Cosmo Eco Power Co., Ltd.

We aim to establish observation technology using a floating offshore platform (FOP) with reduced motion. As a wind condition observation method close to direct measurement, the objective is to compare and verify wind data observed by equipment equipped with a vertical lidar mounted on an FOP with motion reduction devices and by a high-altitude wind measurement mast, thereby clarifying its practicality.

鉛直ライダー
動揺低減装置
浮体構造物
約10m
約25m

FOP Image

High-Altitude Mast Image

Offshore Wind Condition Observation Ⅳ : Baseline Survey
Project Operators：Wind Energy Consulting Co., Ltd., The Nippon Kaiji Kyokai (ClassNK)

The purpose is to update the "Offshore Wind Condition Observation Guidebook" by utilizing the research results from R&D items (I–III) as a reference for practitioners conducting wind condition observations necessary for offshore wind farm planning and turbine design, and to newly add recommended practices for offshore wind condition observation.

洋上風況観測ガイドブック

Offshore Wind Condition Observation Guidebook (Published by NEDO)

NEDO Project   Wind Power Introduction Support Project