Tohoku Electric Power Co., Inc.
Comprehensive Research Across the Entire Development Process of Floating Offshore Wind

Tohoku Electric Power Co., Inc.

Akita Floating Offshore Wind Demonstration Project

Research & Development OverviewOverview

[D-2]: Cost Evaluation of Floating Offshore Wind Power Generation Systems in Large-Scale Wind Farms

Purpose: To reduce the LCOE, this study aims to develop an integrated system-level assessment of the overall cost of large-scale floating offshore wind power generation.

[Background]
- Expanding the market for floating offshore wind power generation requires optimizing the entire system through the integration of component technologies and the achievement of globally competitive cost levels.
- It is necessary to conduct integrated design by determining optimal specifications based on the project scale, site conditions, construction methods and O&M plans, and by achieving cost reductions.

[Research Steps]
- ☐ Calculate the base-case LCOE by utilizing research results from the Green Innovation Fund Phase 1 (3), "Electrical System Technology Development of Offshore Wind Power," and the cost model developed by NEDO.
- ☐ Calculate the large-scale wind farm LCOE using the cost results from this project and research outcomes on mass production of floating foundations and O&M plans.
- ☐ Evaluate the two cases above by comparing the costs and taking into account European trends in floating wind power technologies.

[D-4]: Development of High-Precision Weather and Power Generation Forecasting Models for Imbalance Reduction and Optimization of Coordination with Real-Time Balancing Operations

Purpose: This study aims to develop weather and power generation forecasting models utilizing real site wind condition data and to optimize coordination with real-time balancing operations.

[Background]
- Power output from floating offshore wind turbines can fluctuate significantly due to both wind and wave conditions, the latter causing floating platform motion.
- Real-time balancing management after COD requires reducing imbalance volumes and costs through high-precision power generation forecasting in order to ensure stable, long-term operation.
- The challenges are to refine power generation forecasts from the preceding day through intraday gate closure and to optimize coordination with real-time balancing operations.

[Research Steps]
- ☐ Optimize high-precision weather and power generation forecasting models using real-site wind condition data measured by FLS for initial model development.
- ☐ High-precision weather and power generation forecast models, implemented for day-ahead plan formulation, are both based on AI statistical models and further refined through the accumulation of actual power generation data.
- ☐ For intraday operations, conduct near-real-time power generation forecasting and plan formulation/submission, while assessing how to optimize coordination between the two operations in light of Japan's system design and market trends.
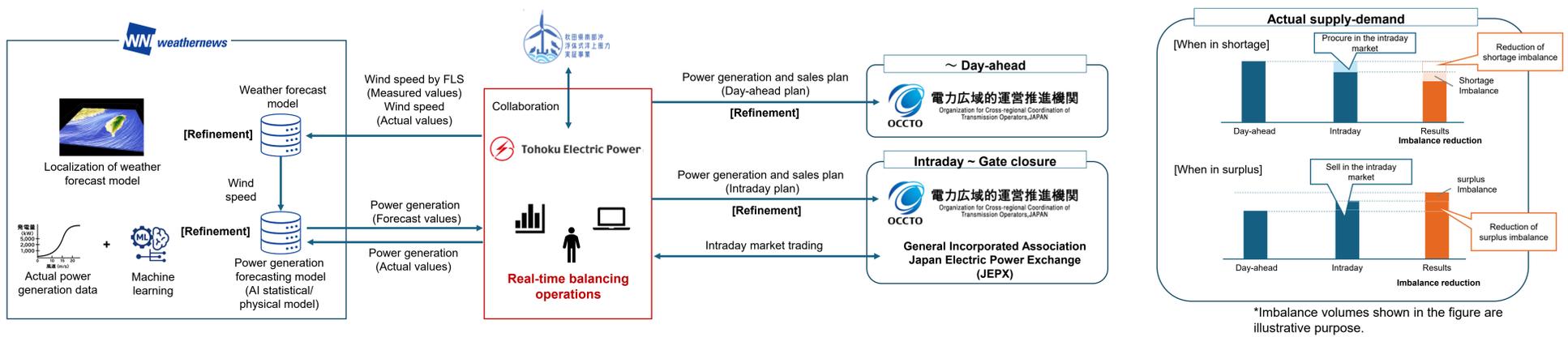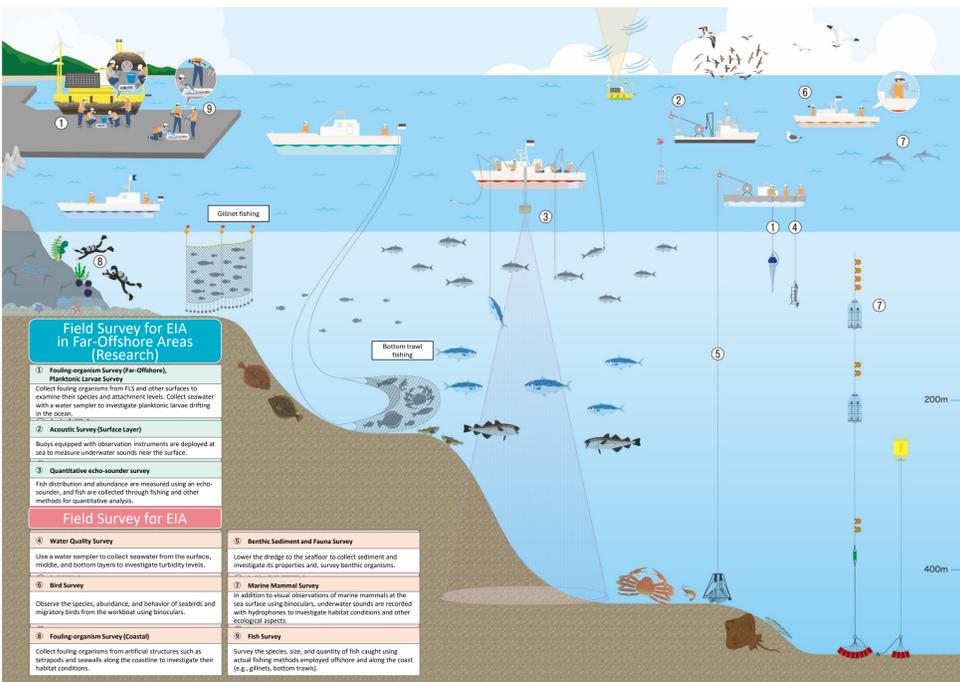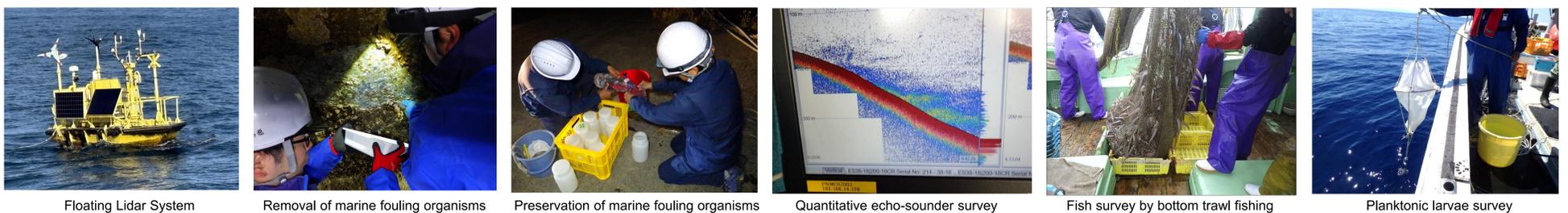

[D-5]: Rationalization and Advancement of Environmental Impact Assessment Predictions in Far-Offshore Areas toward Expansion into the EEZ

Purpose: To rationalize and advance prediction methods for environmental impact assessment in far-offshore areas.

[Background]
- Environmental impact assessments for floating offshore wind installations in far-offshore areas have few precedents, and the accumulation of scientific knowledge and prediction-method expertise is not yet sufficient, resulting in high uncertainty in environmental impact predictions.

[Research Steps]
- ☐ Develop survey methods for assessing marine fouling organisms on floating offshore wind power generation facilities (e.g., fouling-organism surveys, fish surveys).
- ☐ Develop survey methods for assessing underwater sounds (e.g., turbine noise, wave breaking sounds, mooring line sounds) from floating offshore wind power generation facilities (e.g., soundscape surveys).

| Floating Lidar System | Removal of marine fouling organisms | Preservation of marine fouling organisms | Quantitative echo-sounder survey | Fish survey by bottom trawl fishing | Planktonic larvae survey |

[Environmental Impact Assessment (EIA) surveys and fishing activities]

[D-6]: Evaluation of Fishery Impact Assessment Methods in Far-Offshore Areas toward Expansion into the EEZ

Purpose: To establish methods for assessing fishery impact in far-offshore areas.

[Background]
- Far-offshore areas where floating offshore wind is installed differ from coastal areas in fishing practices, marine environment, and inhabiting species.
- With a view to expanding floating offshore wind power generation into the EEZ, it is necessary to examine survey methods based on the characteristics of offshore fisheries and the ecology of target species.

[Research Steps]
- ☐ After surveying the operational conditions of offshore fisheries, verify the validity of the methods by assessing changes before and after the wind turbine installations in the fishing-ground environment (e.g., current conditions, water quality), fish distribution, fishing activities and catch volumes.
- ☐ Fishery impacts, environmental effects, and biological effects will be surveyed with detailed items to be developed based on the Fishery Impact Working Groups composed of local fishers and relevant local governments and agencies.

The Fishery Impact Working Group

Category	Examples of survey items	
	Survey name	Purpose
Operational impact	Catch volume survey	Assessing changes in fishery impact indicators.
	Fishing operation activity survey	Assessing changes in fishing operation activities.
Environmental effects	Fishing ground environment survey	Assessing the range and degree of environmental changes.
Biological effects	Fish distribution survey	Assessing changes in fish distribution.
	Fish behavior survey	Assessing behavior of pelagic fish around the facility.

Examples of survey items in the Fisheries Impact Assessment Methods