Project overview and visions

Fukushima offshore wind consortium, which consists of Marubeni Corporation (Project integrator), the University of Tokyo (Technical advisor), Mitsubishi Corporation, Mitsubishi Heavy Industries, Japan Marine United Corporation, Mitsubishi Shipbuilding & Engineering, Nippon Steel & Sumitomo Metal Corporation, Ltd., Hitachi Ltd., Furukawa Electric Co., Ltd., Shimizu Corporation and Mizuho information & Research, is proceeding with Fukushima floating offshore wind farm demonstration project (Fukushima FORWARD) funded by the Ministry of Economy, Trade and Industry.

In this project, three floating wind turbines and one floating power sub-station will be installed off the coast of Fukushima. The first phase of the project consists of world first 2MW downwind floating wind turbine, the world first 25MVA floating substation and undersea cable, and were completed on 11th of November, 2013. In the second phase, two world largest 7MW wind turbines will be installed before 2015. The detailed information is available in the project brochure [1].

Research and development

Water tank test

By using a scaled model of 2MW compact semi-submersible floating substation, water tank test was carried to clarify the response of the floaters under design wind, wave and current conditions. The optimum control method during power production for floating wind turbine was also investigated.

Metocean Measurements

The floating substation is equipped with metocean measurement devices. Wind velocities are measured by using cup anemometers, wind vanes and sonic anemometers on the mast, and the Doppler radar on the main deck. The wave and current are measured by using the wave meter and ADCP on the middle hull. The floater motion is also measured with accelerometers, GPS and gyro on the main deck, and a floater motion compensation algorithm is also developed.

Conclusions and future plan

The first phase installation of the Fukushima FORWARD project have finished in the autumn of 2013. The vision of the project can be summarised as follows.

1. Fukushima FORWARD project solves technical problems in floating offshore wind turbines.
2. Fukushima FORWARD project shows that exploitation of deep offshore wind energy is feasible in the coast of Japan.
3. The project shows that floating offshore wind energy can contribute the Fukushima’s renewable energy target that 100% of the regional energy is to be produced by renewable energy by 2040.

In addition, social acceptance of floating offshore wind energy will be discussed in the next phase of the project, including the collaboration with fishery industry, marine navigation safety and environmental impact assessment.

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Reference