

**An Innovative Wind Project on the Development of HTS Magnet, Test Facility, Offshore Floating System, and Network Connection Technologies for 10 MW Class Wind Power System Fully Sponsored by KEPCO**

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***Abstract***— The Republic of Korea's new government announced a major shift toward renewables, including offshore wind, and a phasing out of nuclear- and coal- generated power in 2017. The announcement was that the Republic of Korea will have a 20% renewable energy target by 2030 that means approximately 65 GW from renewable energy systems will be generated considering operation rate of the systems. Therefore, large-scale wind farm should be established in Korea to achieve the renewable energy target. A floating offshore wind turbine with a superconducting wind power generator is possible to constitute the large-scale and high-capacity wind farm. This paper introduces a new wind project for developing 10 MW class High-Temperature Superconducting (HTS) magnet, test facility, offshore floating system, and network connection technologies sponsored by Korea Electric Power Corporation. First step is a design of a 10 MW floating offshore wind power system with the superconducting generator. The design process of the 10 MW superconducting generator are developed, and the modeling method for the large-scale wind farm is suggested using real time simulator. Second step is the detail design of the 10 MW floating platform in which the floating system of the wind power system is designed considering the superconducting generator. Algorithms for control systems of the superconducting wind farm are developed. Korean type large scale floating offshore wind power system platform is suggested in the last-step. The fabricated superconducting pole is tested using a performance evaluation device. The mechanical stress and electric characteristics by Lorenz force are analyzed, and economic analysis result of the floating offshore wind power system is provided. As a result, we will discuss the possibility of large scale floating offshore wind power system, and Korean type large scale floating offshore wind power system platform with the HTS wind power generator will be proposed.

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***Keywords (Index Terms)***— HTS generator, HTS field coil, Lorentz force, torque, wind turbine.

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