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EcoSwing – Development, test, installation, and commissioning of a 3 MW superconducting wind power generator

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In the EU funded EcoSwing project the world's first large-size superconducting lightweight multi megawatt wind turbine generator was designed, built and tested in a real wind turbine.

In order to realize this generator a technology to produce high quality HTS coils for reliable industrial use was developed and successfully qualified. Due to the high magnetic fields generated by the superconducting coils in the rotor a decrease of diameter from 5.4 m to 4 m and corresponding weight reduction was achieved.

In 2018 the generator was first tested in a nacelle test rig on ground and then installed on an existing wind turbine with 128 m rotor diameter in a demanding coastal site in Western Denmark. There, the previously installed PM direct drive generator was replaced with the much smaller superconducting EcoSwing generator. During commissioning early 2019 in total 650 h of operation were achieved and power up to 3 MW was delivered to the grid. Electromagnetic characteristics were met or even exceeded expectations. Cooling of the rotor was reproducible demonstrating the reliable performance of the cryocoolers.

An overview on the design, manufacture, and operation will be given, and main design features will be explained with a special focus on the superconducting coils and cryocooling.

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