Cryogenic design of the EcoSwing 3.6 MW superconducting wind generator

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We report about the cryogenic design of the EcoSwing 3.6 MW superconducting wind generator. The wind generator is currently under manufacturing. While the stator of the wind generator is made up by rather conventional copper windings, the rotor is equipped with superconducting coils.

The chosen cooling approach using GM coolers with rotating cold heads is described. The thermal budget is calculated as balance between main heat sources at cryogenic temperature and cooling capacity of the cold heads.

The heat transfer inside of the cryogenic system is done by heat conduction. Two modelling approaches used for calculation of the heat flows and temperature distribution are presented for the EcoSwing rotor. Material properties for thermal connections and challenges occurring from the operation on a wind turbine are discussed.