

## Far Shore Wind Climate Modelling

In the last decades, wind energy production has increased tremendously worldwide. In recent years the applicability of large scale far shore wind farms has been studied extensively, and multiple marine wind farms have become operational. This is to a large extent caused by the expectation that wind conditions at sea are more favourable for the production of wind energy. It is expected that not only the wind energy yield will increase, but also turbine fatigue loads are expected to decrease.

In scope of the FLOW-project, key knowledge for the improvement and optimization of future wind farms is required. This starts with a detailed and accurate description of the meteorological conditions wind turbines will endure during their lifetime. With the aid of observational data of several meteorological masts, the wind climate at sea will be studied. At first the observational data has to be corrected for tower shadow effects, and distributions of wind speed, shear, TKE and other relevant meteorological variables are made. Next, the lifetime conditions wind turbines will face (at hub height) have to be determined. This should include extreme value analyses (gusts) and temporal extrapolation of the data to find lifetime conditions and extreme loadings. A final step will be the specification of guidelines that can be used to determine far shore meteorological conditions for wind turbines. Here it has to be considered that observational data is not present at a site of interest, hence spatial extrapolation of available data might be required.

Combined, this study should lead to an increased accuracy of yield and loading estimates of newly planned far shore wind farms, even if observational data is not present at the site of interest.