**The Integration of Mooring System Design with Floating Wind Farm Layout Optimization**

Turbines for floating windfarms need to be moored to the seabed by using mooring lines and anchors. The problem of determining the optimal mooring design for a single turbine is not trivial. There are several design variables, including but not limited to: the number of mooring lines, the lengths of the lines, the positions of the anchors, the components of the line (material, weights, buoys, etc.) and the type of anchors. There are also design constraints related to loads, horizontal movements of the floater, line tension and perhaps also other factors. Ultimately, a mooring design will also have a total capital cost depending on its components, and then there might also be operational costs related to installation and eventually O&M.

Likely there is not just a single possible mooring design for a given turbine location, but rather a set of potential mooring designs that are feasible w.r.t. the design constraints, each with an associated cost. From the perspective of a single turbine, the final mooring design to select from this set is the cheapest one. However, from a system perspective this is not necessarily the best design to select, because the mooring designs of different turbines on the same site are not necessarily independent. More specifically, the current restrictions on mooring lines for floating wind turbines are that they should not interfere with each other or with inter- array cables. Mooring designs thus affect the cable routes and thus the cable costs, and can also affect the locations of the turbines and thus power production (through wake losses). Furthermore, anchor sharing can be used to reduce costs, but is highly dependent on the placement of the turbines.

In summary, mooring design needs to be optimized together with turbine and cable layouts. The purpose of this project is to develop an accurate mooring model that is able to generate a diverse set of mooring designs that are within the design restrictions (loads, tension, etc.), along with all relevant costs, given a specific turbine location and all relevant site data. This set of potential designs can then be included in layout optimization in order to select the optimal design for each location from a system-wide perspective.