Floating wind – the future of offshore wind energy

Efficient numerical method for design of floating wind turbines

Offshore wind is the fastest growing energy market today regardless of resource and is one of the key solutions to enable transition to green energy. Today offshore wind farms are found in near shore shallow waters with wind turbines installed on bottom-fixed foundations sitting on the seafloor. However, most the offshore wind resources are in deeper waters and in fact 80% of the offshore wind potential in Europe is waters where bottom-fixed wind turbines are not economically feasible for. Floating wind turbines is recognized as the next generation solution to harvest wind energy with a huge potential by accessing wind resources in intermediate and deep-sea areas (water depth of 100 - 200m+) that has previously not been feasible through traditional foundation designs.

Although floating wind turbines are already proven to be technically feasible, as demonstrated by the pilot projects and pre-commercial wind farms already built and under development, the technology still needs to show that it can produce and offer electricity at a competitive price level. Further cost reductions are required and in particular for the design and fabrication of the floater. The methodology and tools available to designers today are time consuming and very computational demanding, leading to longer project execution times and allowing for fewer design iterations and potentially losing out on needed design optimizations and cost reductions.

COWI together with its partners NTNU, DTU and DNVGL, takes the initiative in this innovative research project to develop a technically robust design methodology for floating wind turbines. The aim is to develop a more efficient numerical method which can facilitate the whole design process of floating wind turbines. The focus is to improve time efficiency and cost reduction. A key enabler is to develop uncoupled analysis approaches that allow the designers of the floater and the turbine supplier to progress their design with less interaction and less sharing of data. Pilot work in this regard has been made at NTNU and DTU and are showing promising results.

The outcome of this project will support the offshore wind industry to realize the ambition for wind energy production in intermediate and deep water and to reach commercialization for floating wind by the end of this decade or sooner.