

PROJECT DESIGN PHASE II

FUNCTIONAL REQUIREMENTS

Team ID	PNT2022TMID39504
Project Name	Predicting the energy output of wind turbine based on weather conditions

FUNCTIONAL REQUIREMENTS:

Most floating offshore wind turbines (FOWTs) have been designed in a sequential manner, with the controller being designed and optimized toward the end of the design process. Treating the controller design as an add-on to the constituent component designs does not capitalize on the inherent design coupling between the system dynamics and controller behavior, resulting in suboptimal system designs. The goal in controls co-design (CCD) is to bring all components, including the controller, together in a concurrent design and optimization approach that properly accounts for this coupling. CCD will be critical to realizing FOWT cost reductions that will position offshore wind as highly competitive with other energy sources. The Aerodynamic Turbines Lighter and Afloat with Nautical Technologies and Integrated Servo control (ATLANTIS)

program funded by the U.S. Department of Energy (DOE) Advanced Research Projects Agency-Energy (ARPA-E) seeks to develop new technology pathways for the design of economically competitive FOWTs. Within ATLANTIS Topic Area 2 (Computer Tools), the National Renewable Energy Laboratory (NREL) and collaborators from the University of Illinois Urbana-Champaign and Colorado State University have been awarded a project that will develop the Wind Energy with Integrated Servo-control (WEIS) toolset, with the goal of providing the offshore wind industry and research communities with an open-source, user-friendly, flexible tool to enable true CCD of the FOWT physical design together with the controller.