

# MECHANICAL ENGINEERING

## DM 117/ENI - Fatigue behavior study on floating offshore wind turbines

<b>Funded By</b>	ENI S.P.A. [Piva/CF:00905811006] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [Piva/CF:97429780584] Politecnico di TORINO [Piva/CF:00518460019]
<b>Supervisor</b>	BRACCO GIOVANNI - giovanni.bracco@polito.it
<b>Contact</b>	
<b>Context of the research activity</b>	<p>Wind energy has obtained an additional steering in the last decade, with projection of the main market from onshore to offshore. In the field of floating wind energy systems, one of the main concerns is durability in the marine harsh environment, in particular due to the possibile extra loads given from the substructure.</p> <p>Progetto finanziato nell'ambito del PNRR - DM 117/2023 - CUP E14D23002030004</p>
<b>Objectives</b>	<p>Offshore wind energy has a wide potential as it is able to provide for almost 14 times the current global electricity demand. Most of this potential is located where deep water is present, implying the necessity of floating structures which are becoming ever more mature under the strong interest of several companies of the renewable energy sector. The activities of this doctorate will mainly focus on the fatigue resistance study on floating offshore wind energy systems. Starting from the definition of some case studies of turbines and substructures, there will be a subsequent evaluation of the stresses acting on the main components such as tower, blades, substructure and moorings. In particular, the impact of the several control logics will be deeply analyzed. Concerning the substructures and the moorings, the goal will be to reduce the costs implementing the fatigue behavior directly inside the design loop; On the other hand, regarding the wind turbine, the aim will be to reduce the stresses and the fatigue on the actuators thus reducing the operational costs. PNRR in Mission 2, Component 2 "Renewable Energy, Hydrogen, Sustainable Grid and Mobility" focuses on the very important theme of electricity production using innovative plants, such as floating offshore wind plants.</p>
<b>Skills and competences</b>	

**competencies  
for the  
development of  
the activity**

Modelling capabilities on Matlab/Simulink  
Basics of offshore and onshore wind energy systems