# Internship or BSc/MSc thesis: Optimized Control Strategies for Existing Wind Turbines by means of Hydrogen Production and Energy Storage Systems.

Many of Germany's wind turbines approach the end of their lifetime, but often they are still able of withstanding loads for several years and therefore provide a cheap and low CO2-footprint source of energy. In the framework of a German founded joint project (ABBA), involving multiple partners of the wind energy industry and academy, sowento evaluates the life-time extension benefits of already erected turbines. Part of this evaluation consist in the potential study of wind turbine control strategies in combination with energy storage forms, as the hydrogen production or the use of batteries, resulting in further life-time benefits. These elements provide additional flexibility to the entire system and the capability of energy production during periods with low demand, or low energy prices, but high availability of the wind resource. This latter results in a more profitable and efficient use of the wind resource by use of already erected wind turbines.

sowento is a successful spin-off of the University of Stuttgart with deep expertise in lidar-assisted control and offshore floating wind turbines. Our aim is realizing commercial construction of floating wind projects in the future through advanced technology: We use advanced modeling and control in order to save material, approaching minimum safety factors for a most efficient use of steel and concrete. Our vision is to advance Floating Offshore Wind Turbine (FOWT) technology for sustainability and cost-efficiency through an optimization of the dynamic characteristics. (Read more: Lidar-Assisted Control / Floating Wind)

Research challenge

The objective of this work is the potential study of an optimized wind turbine control strategy for the production of hydrogen and the use of batteries as storage systems. The work involves the research of the state-of-the-art of hybrid power plants and the identification of key factors for a profitable hydrogen production. Moreover, based on this latter, existing wind turbines control strategies must be adapted or further developed. Finally, the outcome of the new operation management should be verified in simulations.
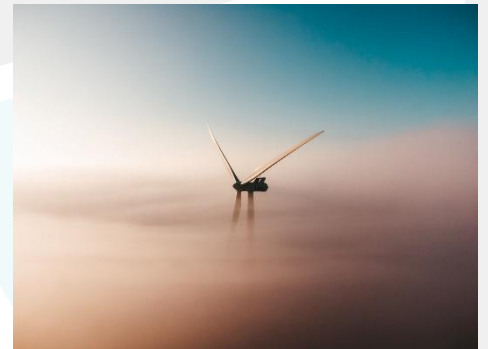
The main research questions are the following:

- Hybrid Power Plants state-of-the-art research. Existing control strategies and future perspectives.
- Further development of wind turbines control strategy in combination with hydrogen production and storage systems.
- Results verification by MATLAB or aero-elastic simulation tools.

Candidate Profile

For a successful completion of the internship/thesis project, applicants should have an understanding of wind energy, control engineering and programming. Knowledge in MATLAB or Python is required.

Contact

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