

Project Title: Turbulence Measurement over Complex Terrain using Doppler Lidar

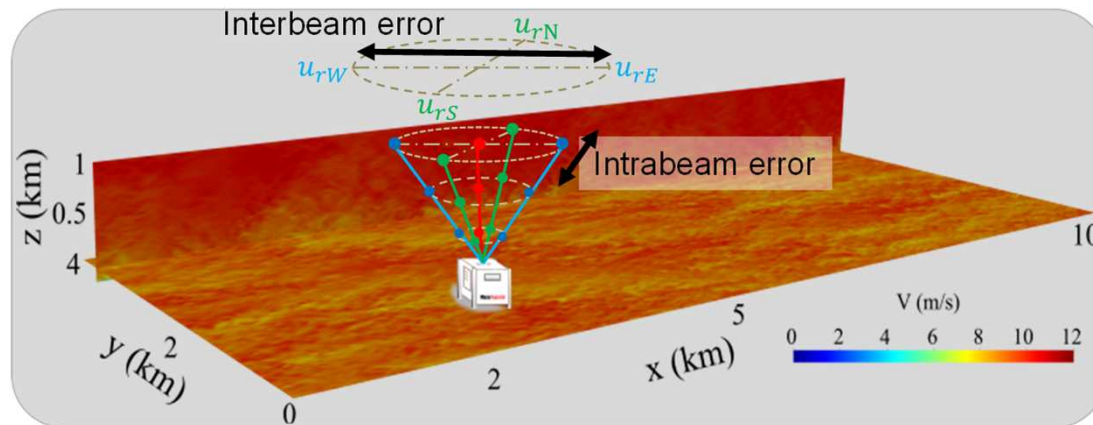
(2024-2027*) *scheduled

Entrusted Parties: Ashikaga University, Kindai University



Outline of the Project

- Turbulence measurements using Doppler lidar contain errors. Over flat terrain, a correction method based on a statistical turbulence model has been proposed, but further testing is required. There is currently no correction method for measurement over complex terrain. This project aims to solve both of these issues.
- This project will undertake high-resolution computational fluid dynamics analysis to clarify the causes of the measurement errors and propose a correction method for them.



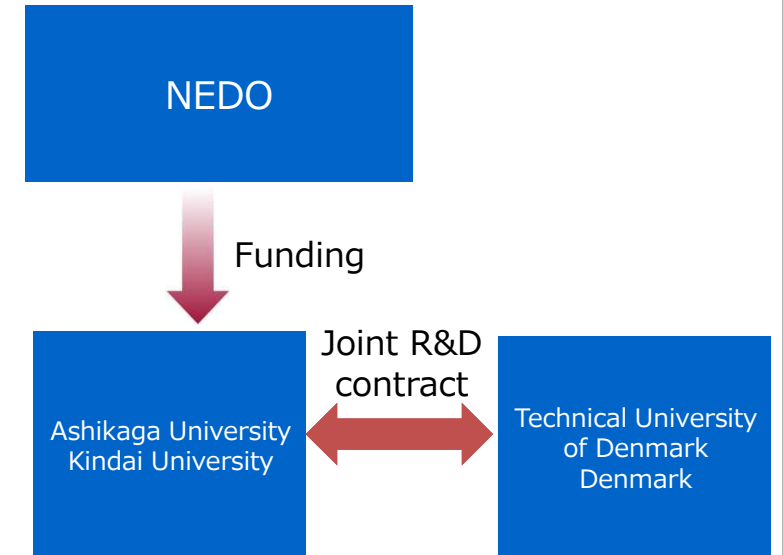
Significance of International R&D

The Technical University of Denmark (DTU) is a leading institute in wind energy research with extensive experience studying turbulence characteristics.

The following three areas will be covered by DTU in this project.

1. The improvement of statistical turbulence models
2. Providing measurement data for testing
3. Turbulence measurements using continuous-wave lidar

Project Scheme



Expected Outcomes

This research would allow turbulence measurement over complex terrain using ground-based Doppler lidars which could replace met masts (wind observation masts) when designing onshore wind turbines. It would be possible to measure turbulence up to higher altitude and reduce the uncertainty in the estimation of turbulence intensity. Furthermore, accurate measurement of turbulence intensity during the wind turbine operation would improve accuracy of equipment lifespan predictions.