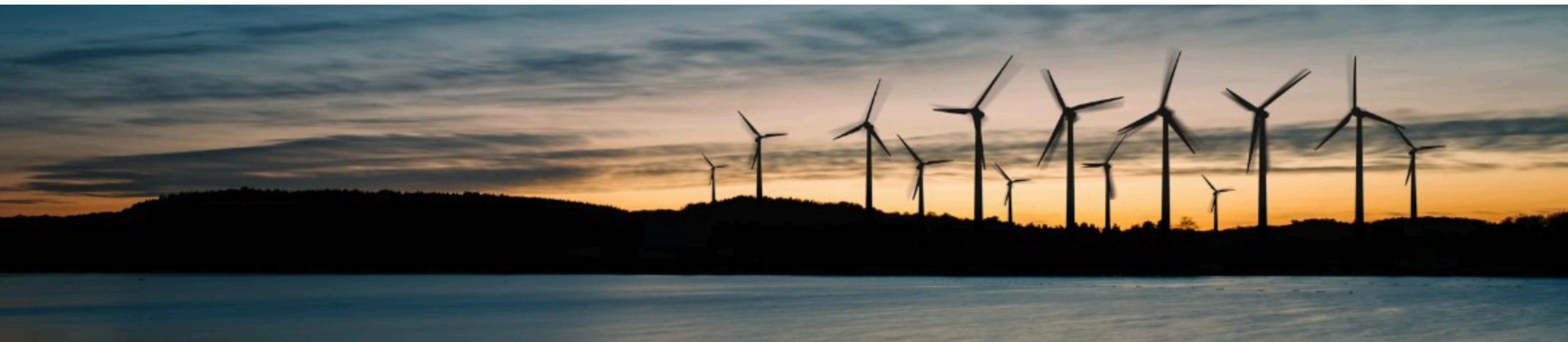


# Veers' Extension to Non-neutral Incoming Winds (VENTI)

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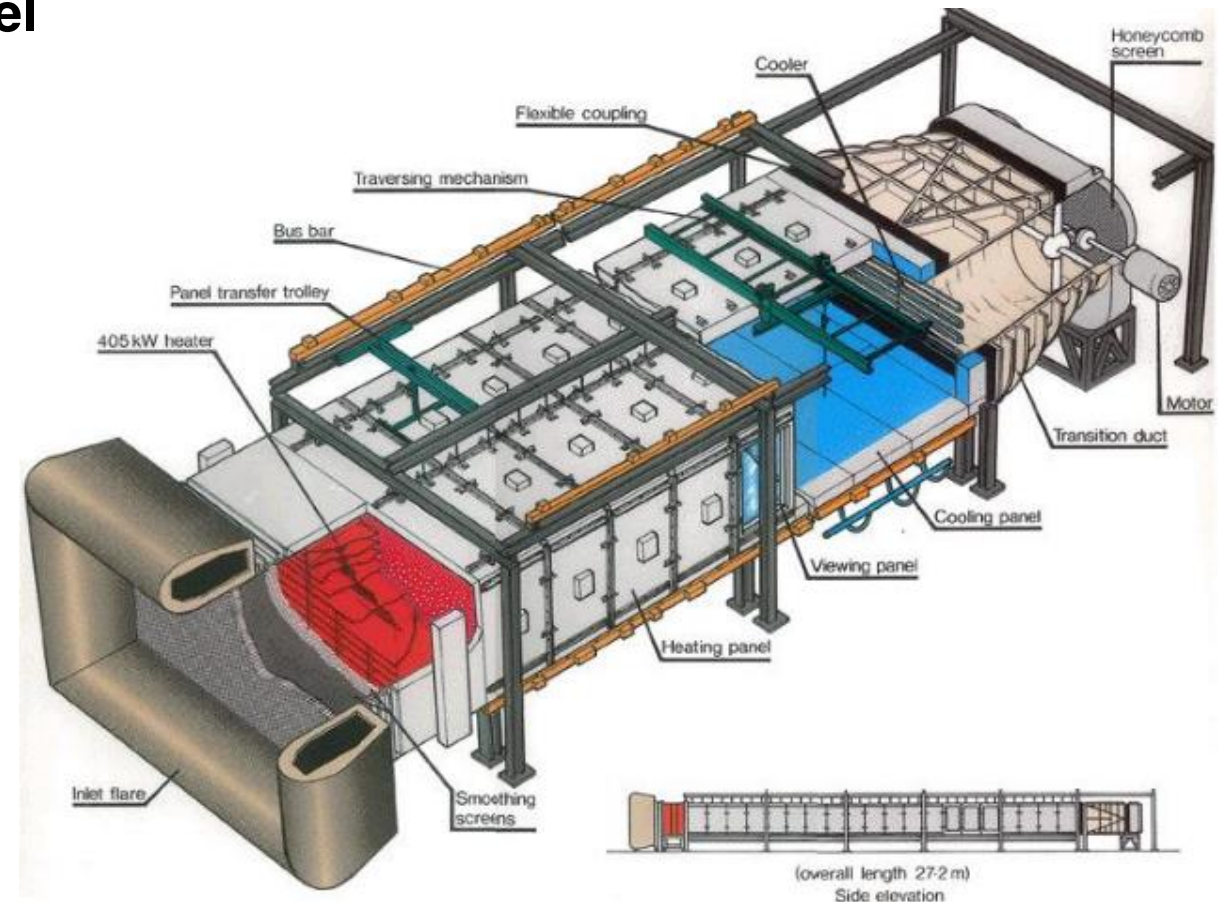
Supergen ORE - Annual Assembly - 18-22 Jan 2022



# Experimental facility and setup

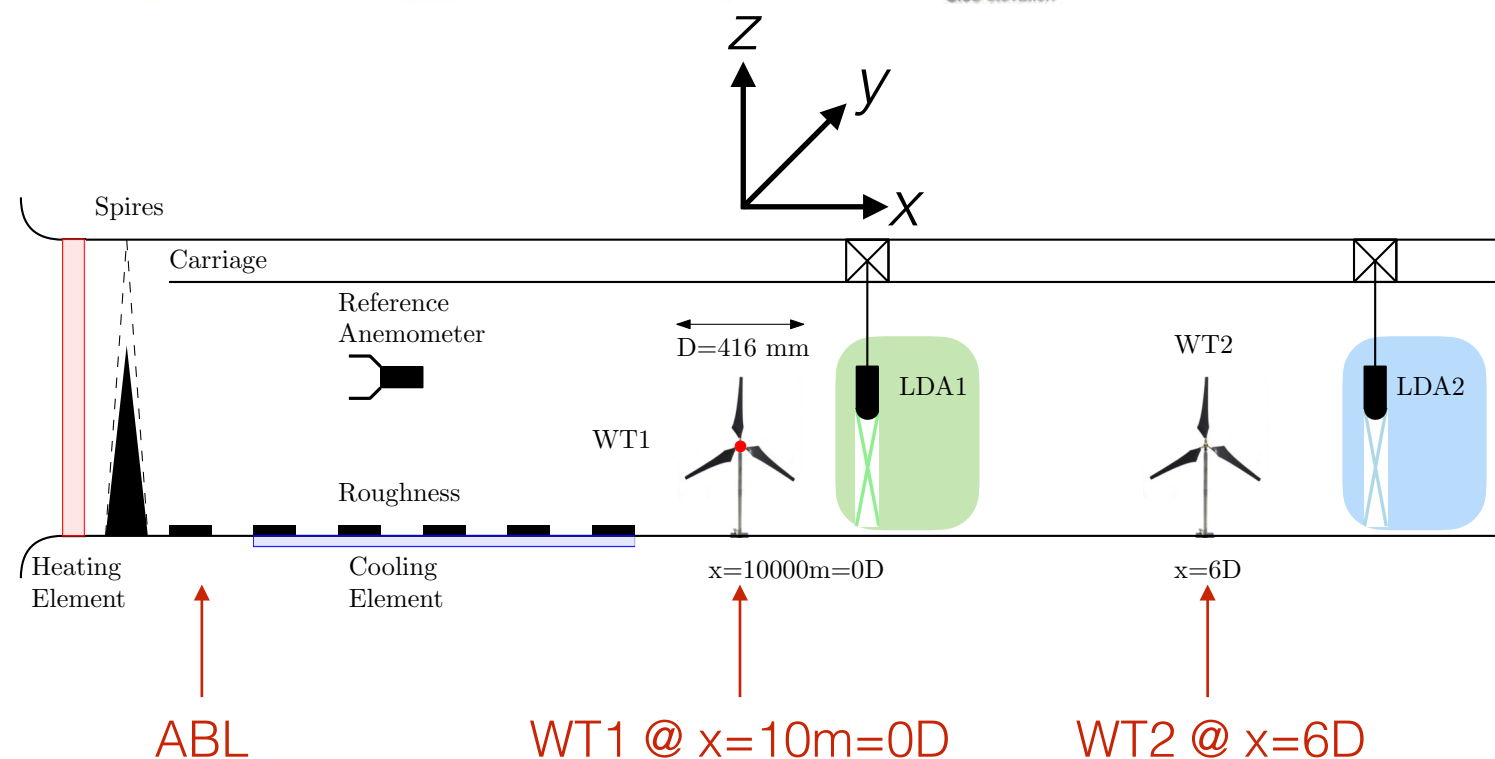
## EnFlo – NCAS & NWTF meteorological wind tunnel

- Large working section: 20 m x 3.5 m x 1.5 m
- Velocity: 1.5 m/s ( $P \propto V^3$ )
- Heating: 15 layers, 405kW inlet heater  
( $dT/dz$ )<sub>max</sub>=80C/m
- Floor cooling: 1 kW/m<sup>2</sup>, 10 °C
- 2 overhead 3-axis traverses



## Experimental setup

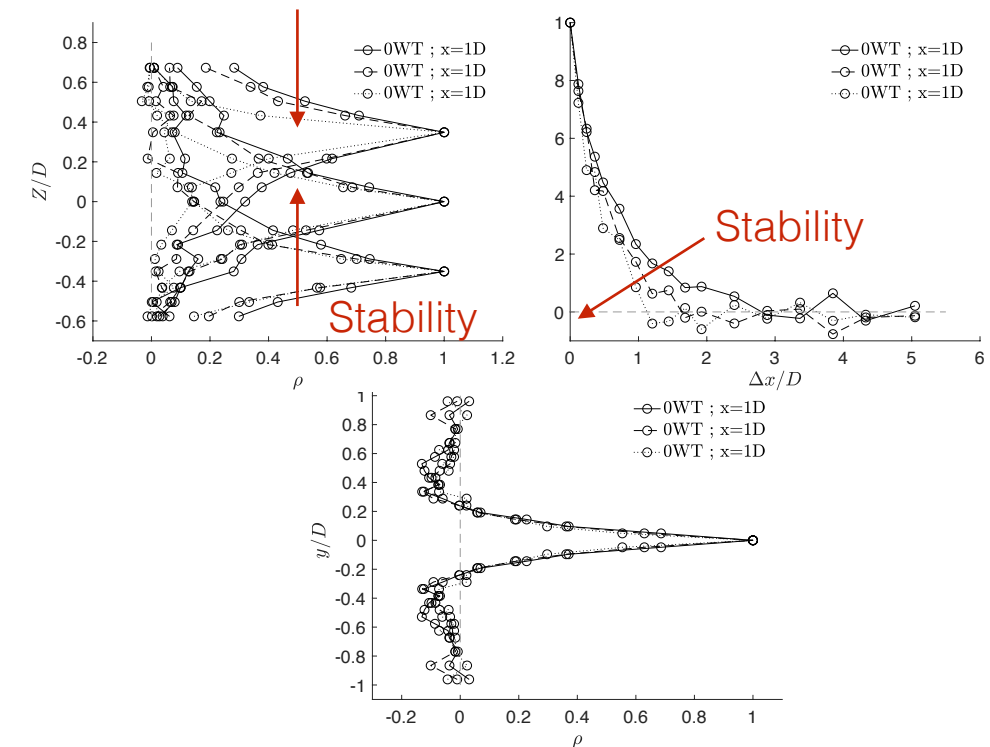
- Spires & roughness to induce a suitable ABL
- Aerodynamic parameters to match field data
- 2-point simultaneous LDA
- 3 stability conditions: Neutral, moderately stable, moderately stable (+ inversion)



# Summary results

## Effect of pure stability - velocity and correlation lengthscales (no WT)

- Effects of moderate stability are negligible on mean velocity
- **Vertical and longitudinal correlations** are reduced (**50%** and **30%**) by stability
- **Lateral correlation** is largely unchanged with stability



## Combined effect - velocity and correlation lengthscales (with WTs)

- **Lateral correlations:** presence of WTs and stability seem to have competing effects (widening vs. narrowing)
- **Longitudinal correlations:** both WTs and stability reduce longitudinal lengthscales
- **Vertical correlations:** WTs and stability reduce longitudinal lengthscales. Lower ABL is dominated by wake processes, top part of the ABL is governed by stability (not shown in the presentation)
- **Wake recovery rate** follows a power law and it is hindered by stability

