

# Winds of the North Sea in 2050

## Publieke samenvatting / Public summary

Given the ambitious targets of up to 60GW for wind energy in the Dutch North Sea, it is vital that we better understand the interactions between a large-scale roll-out of wind energy and the atmosphere. Global blockage, farm-to-farm interactions, deep array effects and limits to yields, because the vertical exchange of momentum can no longer compensate for wake effects, are a few examples of topics that are currently high on the agenda in the wind energy sector. At the moment, there are no wind atlases that include these effects and there is a lot of uncertainty about how much large-scale wind energy will affect weather and climate.

## Objective

The Winds of the North Sea in 2050 (WINS50) project wants to reduce uncertainty about the interaction of large-scale offshore wind in the North Sea and the atmosphere. The objectives of the project are to supply the wind energy sector and policymakers with the most up-to-date wind atlas that incorporates existing and future wind farms, to develop a high resolution (100m) weather model covering the entire part of the Dutch North Sea that can be used for operational forecasting and wind resource assessments, to increase the understanding of the possible future wind climate of the North Sea, to provide decision making support for policymakers and to develop tools and provide datasets for additional integration studies such as for energy storage needs, electricity network planning and ecological studies.

## Short description

### Projectinformatie / Project information

#### Projectnummer / Project number

TEWZ119007

#### Subsidiebedrag / Grant amount

€ 701.909,00

### Algemene informatie / General information

#### Penvoerder / Secretariat

Whiffle B.V.

### Publicaties en materialen / Publications and attachments

- 04.06.2020

**Winds of the North Sea in 2050  
(Presentation Matchmaking Day  
2020)**

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The HARMONIE weather model will be run for 2019-2021 to produce winds undisturbed by wake effects (extension of the DOWA) and disturbed winds (wake-DOWA). Computational capabilities of the high-resolution GRASP weather model will be extended to allow for simulations for the entire Dutch North Sea. Wake-parametrisations will be further improved. Data produced with HARMONIE and GRASP will be made available to the wind energy sector and used to perform in-depth studies on uncertainties in wake modelling and the interactions of large-scale offshore wind energy and the atmosphere.

## Results

The project delivers two types of results: 1) improvements in the weather models that Whiffle and KNMI use and 2) data and reports that will directly be disseminated (free of charge) to the public.

- HARMONIE data without wake effects
- HARMONIE data with wake effects
- GRASP LES (100m) data for the entire North Sea
- Report on the effects of large-scale wind energy on the atmosphere of the North Sea, including sensitivity studies on the limits to wind power extraction, effects of power density and intermediate scenarios between the 2020 capacity and 2050 capacity.
- Report on the sensitivity of the HARMONIE data for different wind farm wake parametrisations to assess the uncertainty introduced by these wake parametrisations.
- Wind power production time series per wind farm zone. These will facilitate other research that targets the integration of wind energy in the electricity/energy system.

This project is done in close cooperation with [KNMI](#).

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