

# RAVE

The research initiative RAVE carries out research and development work on the first German offshore wind farm alpha ventus. The experience and knowledge generated contribute to the advancement of offshore wind power.

In more than 35 research projects, more than 60 partners from science and industry have been working on a wide range of research questions since 2008. The topics range from the further development of turbines and foundations to the optimization of operations.

[www.rave-offshore.de](http://www.rave-offshore.de)

Photo©DOTI | Matthias Ibeler, 2009

Supported by:



Federal Ministry  
for Economic Affairs  
and Climate Action

on the basis of a decision  
by the German Bundestag

Co-ordinated by:



**Fraunhofer**  
IWES

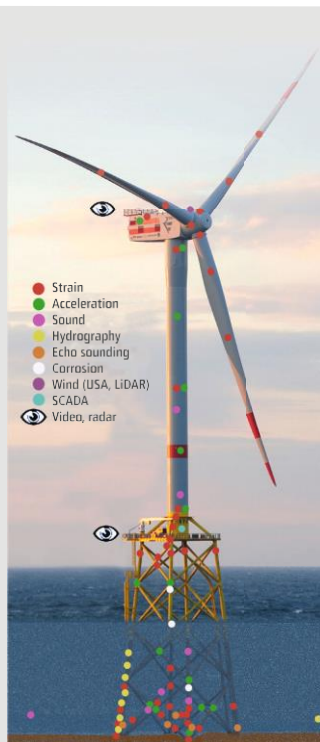
Dr. Bernhard Lange  
[bernhard.lange@iwes.fraunhofer.de](mailto:bernhard.lange@iwes.fraunhofer.de)  
[www.iwes.fraunhofer.de](http://www.iwes.fraunhofer.de)

**RAVE**   
RESEARCH AT ALPHA VENTUS

**Measurement Data**

## Senvion 5M

Turbines AV04 and to a lesser extent AV05 are equipped with strain and acceleration sensors in nacelle, rotor, tower and support structure as well as with a multitude of other sensors. Also data from the turbine SCADA system have been recorded. The measurements are collected and supervised by GL Garrad Hassan Deutschland GmbH.



Photo©DOTI | Matthias Ibeler, 2009

## Fino 1

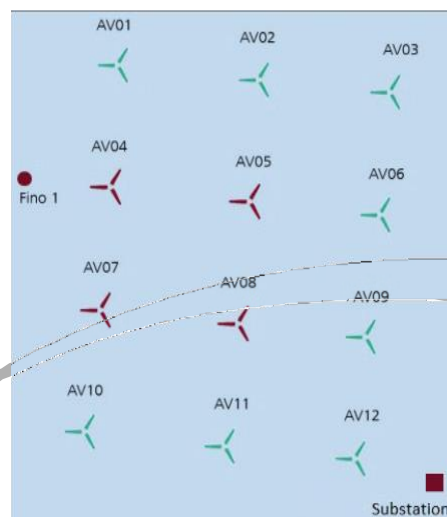
The Fino 1 platform captures and records a wide range of different meteorological and oceanographic parameters, e.g. wind at heights between 30 m and 100 m.

Photo©Bundesamt für Seeschifffahrt und Hydrographie (BSH)



## Measurements in RAVE

Measurements have been collected in the scope of RAVE since 2009. The data collected in RAVE contain measurements over the course of many years from two turbine models, two support structures, substations, Fino 1 measuring mast and within the area of the wind farm. At times, there were more than 1,200 measuring channels operating simultaneously, which up to now have generated more than 50 TB of data.



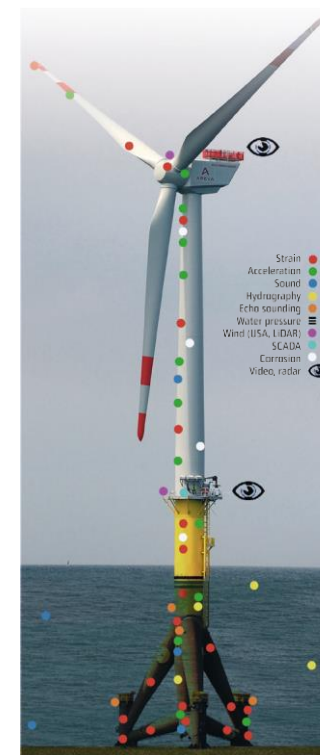
Graphic©Fraunhofer IWES

## Grid connection measurements

The alpha ventus wind farm is connected to the onshore "Hager Marsch" substation via an offshore substation and a transmission cable. Different electrical parameters are recorded at both substations.

## Adwen 5000M

The structural dynamic measurements on the AV07 and AV08 turbines are performed by UL International GmbH. The sensor sites can be grouped into four categories: nacelle; rotor; tower; and support structure. A large number of other sensors and SCADA data are also available.



Photo©Stiftung OFFSHORE-WINDENERGIE

## Data access

RAVE's goal is to promote research into offshore wind energy and make this completely unique data available for research purposes. All the measurements are stored in the RAVE data archive operated by the Federal Maritime and Hydrographic Agency (BSH); users can download the data from this data archive for research purposes, subject to signature of the RAVE data usage agreement. For more details, see [www.rave-offshore.de](http://www.rave-offshore.de) or use the QR code below.

