Project management agency for the

Federal Ministry
for Economic Affairs
and Energy

Projektträger Jülich
Forschungszentrum Jülich

A VIEW BACK ON 10 YEARS OF RESEARCH AT ALPHA VENTUS - FROM THE PERSPECTIVE OF THE FUNDING AGENCY

Daniela Bizjak

INITIATION

- A view back on 15 years

- 2005 - Stiftung OFFSHORE-WINDENERGIE was founded
- 2006 - the three Power companies EWE, E.ON & Vattenfall agreed to set up and run an offshore test field
  - DOTI „Deutsche Offshore-Testfeld- und Infrastruktur-GmbH & Co. KG“ was founded
- 2008 - transformer substation constructed
- 2009 - start of turbine construction
- Nov. 2009 all 12 turbines installed

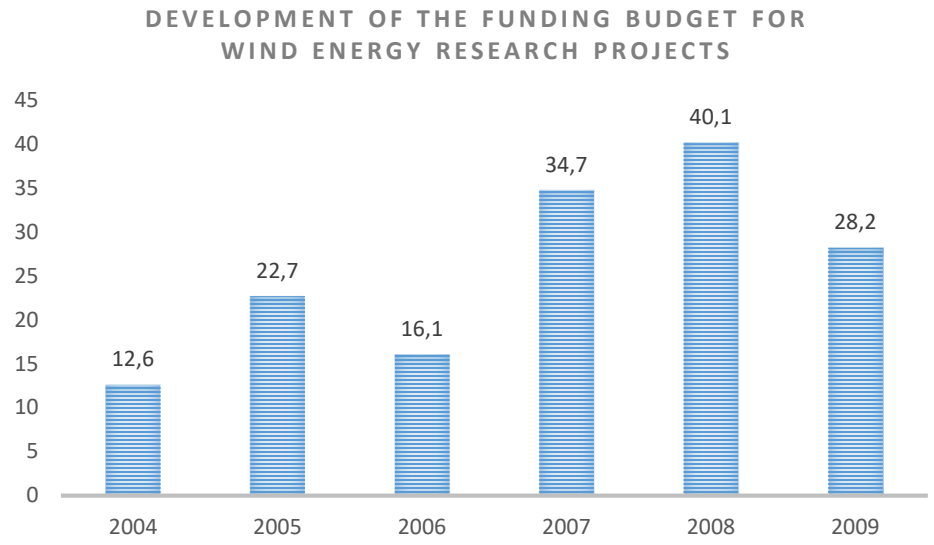
- 27.4.2010 commissioning of alpha ventus took place

5TH ENERGY RESEARCH PROGRAMME OF THE FEDERAL GOVERNMENT (2005-2011)

- The funding of RAVE (Research at alpha ventus) took place in the 5th Energy Research Programme of the Federal Goverment

- Main emphasis on expansion of offshore wind
- Goal: reach an offshore wind capacity of 25 GW by 2030
- Funding budget for research projects for renewable energies increased by 46% compared to 1998

FUNDING BUDGET FOR RESEARCH PROJECTS FOR WIND ENERGY



Development of the funding budget for wind energy research projects in million Euro

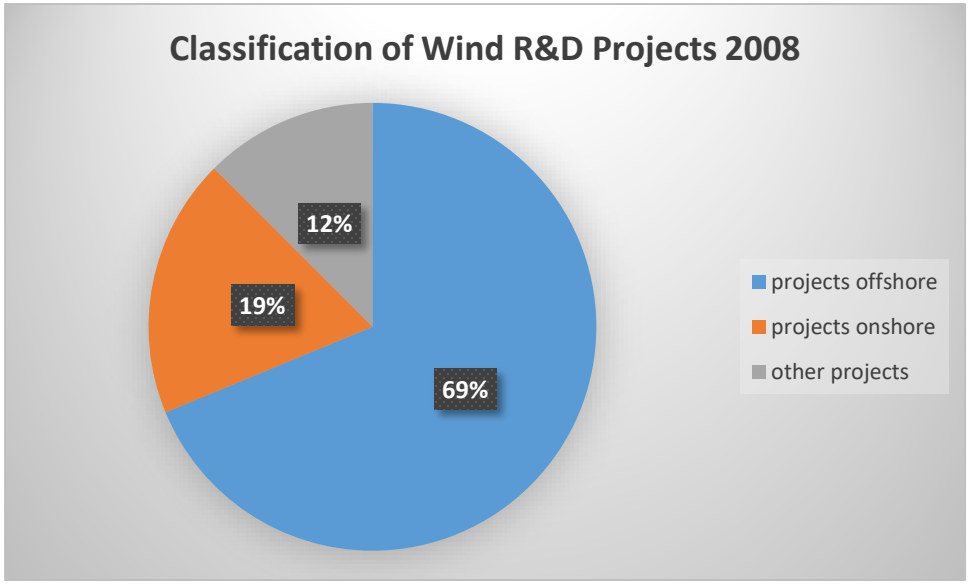
ALPHA VENTUS – PURSUED GOALS

- Prove that generating power from wind at sea will be economically feasible
- Perform research at commercial prototypes
- Perform research measurements in a commercial wind farm

- Goals should be achieved:
  - Proof of the offshore suitability of the 5 MW turbines
  - Further development of the system technology
  - Investigation of open questions about offshore wind energy use
  - Expansion of research potential in Germany

ALPHA VENTUS - R&D PROJECT– FUNDING

- Funding budget at the test field about 50 million € over a period of 5 years



ALPHA VENTUS – RAVE PROJECTS

- 2007: 14 RAVE-R&D Projects were funded
  RAVE - coordination project started work
- 2008: 6 RAVE-R&D Projects
  RAVE- Measurement service project got started
- 2009: another 5 projects started
- All together over **40 million €** for research projects in alpha ventus (2009)

- To date, almost **117 million €** have been spent on RAVE

ALPHA VENTUS, A KEY MILESTONE ?

- Aim: to prove the feasibility and to accelerate the expansion of offshore wind
- It worked!
- Alpha ventus fed 2,1 TWh in german grid (till today)
- Today the installed offshore wind capacity amounts 7,7 GW Offshore
- Approval procedures established

- Current size of newly installed / planned turbines: 8-10 MW

RAVE DATA

- RAVE has collected a long-term and unique data set of in-situ measurements
- Data is stored in a data base, the RAVE research archive, maintained by BSH
- Data available for research purposes

- Research projects today:
  - X-Wakes – Interaction of the wakes of large offshore wind farms and wind farm clusters with the marine atmospheric boundary layer
  - Park Cast - Optimization of very short-term power forecasts of offshore wind farms using long-range lidar measurements and data assimilation

OUTLOOK

- Offshore wind energy continues to benefit from the experience alpha ventus has gained
- In the future, research funding will continue to focus on contributions towards reducing costs and making wind power more reliable

- 7th Energy Research Programme of the Federal Government (2018)
  - Strategically important R&D topics:
    - questions about demolition and reusability
    - minimising the loads
    - better understanding of the incoming wind
    - a careful farm layout

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