HEADING OFFSHORE – TARGETS, MEANS, STATUS

An outlook on Germany's offshore deployment

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IEA workshop "From Roadmaps to Implementation"



AGENDA

- About Fraunhofer IWES
- Motivation
- BMU lead study
- Legal framework
- Status



© new energy



IEA workshop roadmaps / Nov. 2-3, 2009 / Paris

THE FRAUNHOFER COMMUNITY IN GERMANY

60 institutes

- Research Institutes
- Working Groups
- Branch Laboratories
- Application Centers
- Figures 2009
 - Staff 17000
 - Budget 1500 Mio. Euro





INSTITUTE FOR WIND ENERGY AND ENERGY SYSTEM TECHNOLOGY

Fraunhofer IWES – Bremerhaven branch

- Competence center rotor blade
- Drive train and nacelle
- Elasticity und dynamics of turbine and components
- Technical reliability
- Offshore site analysis wind, sea, soil
- Support structures and foundations
- Aerodynamics





INSTITUTE FOR WIND ENERGY AND ENERGY SYSTEM TECHNOLOGY

Fraunhofer IWES – Kassel branch

- Control Engineering and Energy Storages
- Energy Economy and Grid Operation
- Systems Engineering and Grid Integration
- Bio Energy Systems Technology





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MOTIVATION Global Challenges

- Increasing energy demand
- Limited resources
- Rising energy cost
- Global Warming
- Sustainable energy supply

- Limitations of presentation
 - Germany
 - Wind energy offshore





BMU LEAD STUDY 2008

"Strategy to increase the use of renewable energies"

- Scenario how to reduce CO₂ emissions to 20% of the 1990 baseline by 2050
- Interim targets for
 - CO₂ emissions reductions
 - Energy productivity improvements
 - Specific contributions of renewable energy for 2020
- Structural changes in energy supply





BMU LEAD STUDY 2008

Development of renewable electricity generation to 2030

Targets

- 2020 → 30% RE
- 2030 → 50% RE
- 2050 → 80% RE
- Bulk load from
 - Wind onshore
 - Wind offshore
 - Biomass
- Offshore Installations
 ~ 20 25GW by 2030





WIND ENERGY DEVELOPMENT Germany, Europe and World

- installations
 Sep 2009
 25 GW onshore
 ~0.1 GW offshore
- Electricity prod End of 2008
 40 TWh el.
 8% of electricity demand





WHY OFFSHORE?

- Independence from energy imports (oil, gas, coal, nuclear)
- Achievement of profound offshore technology know how
- Building up offshore industry





LEGAL FRAMEWORK & OTHER MEANS TO ACHIEVE TARGETS Overview

- Renewable Energy Law
- Infrastructure Planning Acceleration Act
- Research activities, e.g.
 - dena Grid study I, II
 - Platforms FINO 1, 2, 3
 - RAVE-Initiative
 - initiating a wind energy research center
- Supports for restructuring of port facilities "offshore ready"
- Maritime planning ordinance (9/2009)





LEGAL FRAMEWORK & OTHER MEANS TO ACHIEVE TARGETS Renewable Energy Law

Offshore regulations - in a nutshell

- Feed in tariff: 13 c€/kWh min. 12 years, later 3.5 c€/kWh
- Early bird bonus: installations before end of 2015 + 2 c€/kWh
- Site dependant prolongation of initial remuneration for distances > 12nm AND water depths > 20m
 → +0.5 months for each full nautical mile

 \rightarrow +1.7 months for each additional full meter of water depth





LEGAL FRAMEWORK & OTHER MEANS TO ACHIEVE TARGETS

Infrastructure Planning Acceleration Act

The "Offshore Power Plug" Important regulations

- Speeding up licensing procedures for cable routes close to the coast
- to provide and operate grid connections to offshore substation
- to cover expenses for the cables to offshore wind farms (start of construction before 2012)
- Expenses might be allocated to system usage fees by all other German TSOs





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LEGAL FRAMEWORK & OTHER MEANS TO ACHIEVE TARGETS Offshore research platforms

- North Sea
 - FINO 1 (2003)
 - Amrumbank West (2005)
 - FINO 3 (2009)
- Baltic Sea
 - FINO 2 (2007)
 - Sky 2000 (2003)
 - Arcona Becken (2007)





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ADDING VALUE

to structurally weak areas

- +3000 new jobs by major firms only in Lower Saxony and Bremen regions
- Turbines
- Blades
- Foundations
- Towers
- Grid
- Services





NORTH SEA (GERMANY)

Continental shelf and exclusive economic area





NORTH SEA (GERMANY) Pattern of utilisation (EEZ, Germany)

- Shipping routes
- Oil & gas rigs
- Pipelines & cables
- Sand & gravel expl.
- Military areas
- Research platforms
- Offshore wind farms
- Protective areas





SITUATION FOR OFFSHORE DEVELOPMENT IN GERMANY

Far – deep - rough





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OFFSHORE TEST FIELD ALPHA VENTUS facts and figures

- EEZ North Sea
- 45 km north of Borkum
- 70 km to onshore grid connection
- 30 m water depth





LAYOUT OF ALPHA VENTUS





The RAVE Research Initiative

Joint research, development and testing at alpha ventus

Initiative of the Federal Ministry Environment

- Support of accompanying research in at alpha ventus
- Budget: ~50 M€ within five years
- 2009: 25 projects approved, budget ~35 M€
- targets
 - Verification of offshore performance capability of 5 MW turbines
 - Further development of offshore technology
 - Study important issues of offshore wind energy use
 - Expansion of Germanys research potential





Federal Ministry for the Environment, Nature Conservation and Nuclear Safety





RAVE RESEARCH TOPICS

- Sensors, instrumentation and measurements
- Foundation and Support Structures
- Turbine Technology and Monitoring
- Grid Integration
- Ecology and Safety
- Operation and Coordination





SUMMARY Offshore wind energy

- hugh potential
- offers promising perspectives
- can contribute significantly to the energy supply
- can create new industry sector

but ...

- there are many challenges that have to be solved
- joint efforts and cooperation in an international scale are needed!

