HiPRWind

Large floating turbines for intermediate water depths

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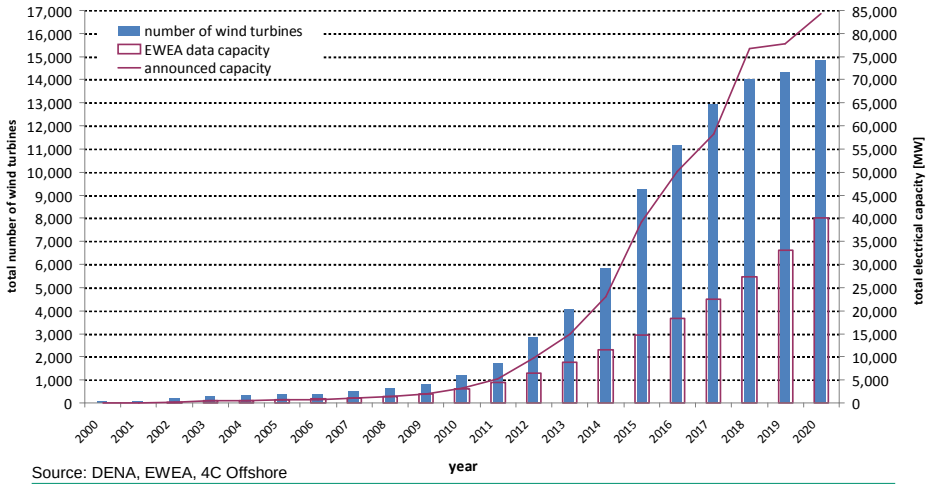
European offshore wind market development: EWEA scenario and "project pipeline"

ORECCA



Source: DENA, EWEA, 4C Offshore

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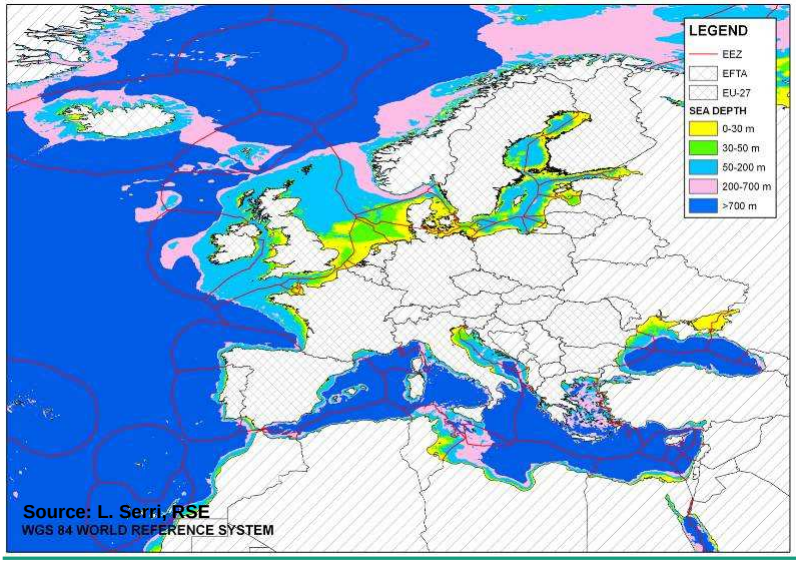
European EEZs and bathymetry map



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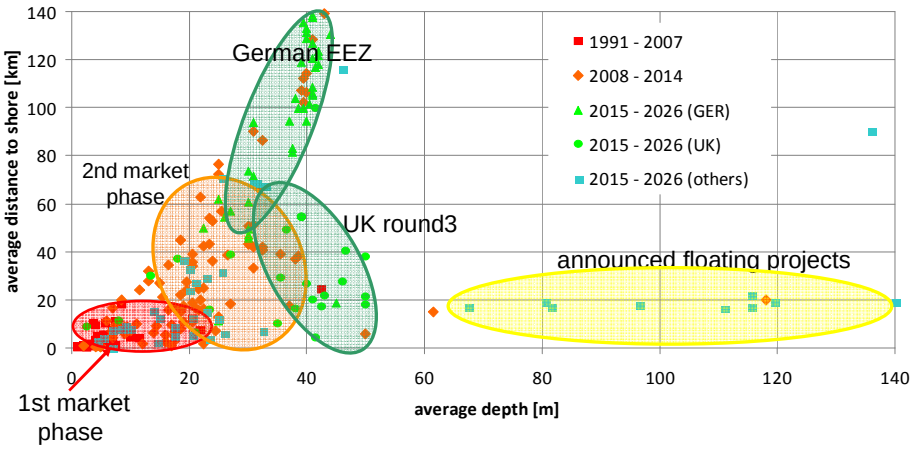
Development phases of the EU offshore wind market in terms of water depth (m) and distance to shore (km) up to 2025



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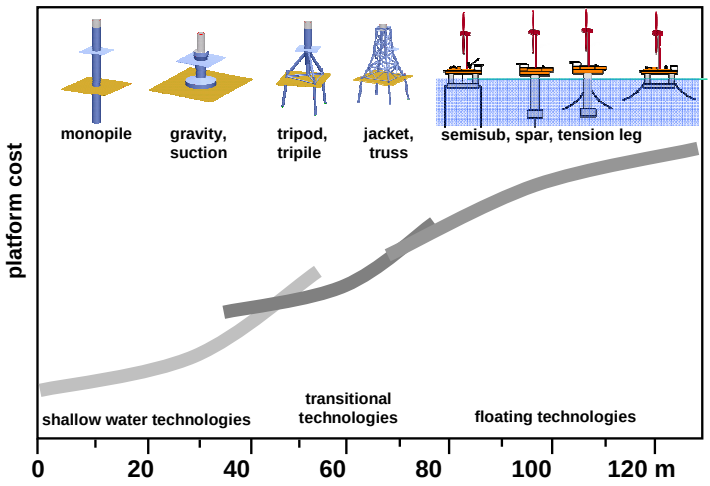
Platform technologies change with water depth



Source: NREL, NTNU

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Floating concepts: project examples

…and many more…

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Call FP7-ENERGY-2010-1

- Topic ENERGY.2010.2.3-1: Cross-sectoral approach to the development of very large offshore wind turbines
- Collaborative project, where „the active participation of stakeholders involved in harsh environment industrial developments is essential to achieving the full impact of the project."
- Scope
  - Testing at industrial prototype scale to develop 10 MW range OWT
  - Treat bottleneck issues such as maintenance, power stability, weight/size limitations
  - Advanced power electronics and ICT sub-systems
- 1st deadline on 15th October 2009
- 35 M€ available for 6 distinct topics in 3 different research areas

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HiPRwind: key facts and figures

„High Power, high Reliability offshore wind technology"

Project coordinator: Fraunhofer IWES

SEVENTH FRAMEWORK PROGRAMME

- Funded under the European Commission's 7th Framework Programme
  - Main source for European R&D funding, 50+ billions € over 7 years
  - Theme ENERGY.2010.2.3-1: Cross-sectoral approach to the development of very large offshore wind turbines
  - Involvement of offshore industry stakeholders required
- Project start date: November 1, 2010. End date: October 31, 2015
- Total budget ~ 20 million €, total EC-funding 11 million €
- 1130 man months over 5 years

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Programme

- **Aim:**
  install and operate a floating MW-class wind turbine for research purpose
- **Potential Location:**
  Bay of Biscay, off Bilbao in Spain
- **Industrial challenge: design, procurement, construction and installation of the floating WT within three years of project start and within the available budget**
- **Research prospects: „unrestricted“ access to data from experiments on a real wind turbine in harsh offshore conditions during at least two years**

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Work plan

Main research topics:

- Floater and mooring systems
- Controls, power and grid
- Condition and structural health monitoring
- Advanced rotor concepts

Timing:

- 1st year: design of the floating platform and of the research equipment
- 2nd and 3rd year: procurement, construction and installation of the floating WT
- 4th and 5th year: WT operation and maintenance for experimental research

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Consortium: Partner Types

A strong consortium with experience in offshore developments:

Industry

Acciona Energia (Spain)
Acciona Wind Power (Spain)
Technip (France)
ABB (Switzerland)
Bureau Véritas (France)
Mammoet (Netherlands)
IDESA (Spain)
Vicinay Cadenas (Spain)

Universities

NTNU (Norway)
Universität Siegen (Germany)

R&D SMEs

Olav Olsen (Norway)
Tecnalia-Robotiker (Spain)
The Welding Institute (UK)
Wölfel berat. Ing. (Germany)
Micromega (Belgium)
1-Tech (Belgium)

Research organisations

Fraunhofer IWES and IZFP
SINTEF (Norway)
Narec (UK)

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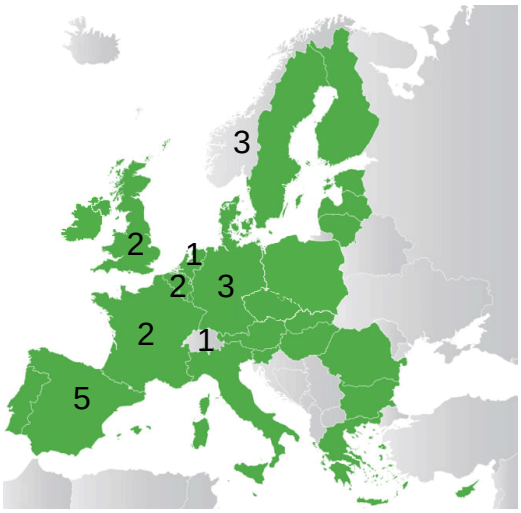
Consortium: Nationalities and partners/country



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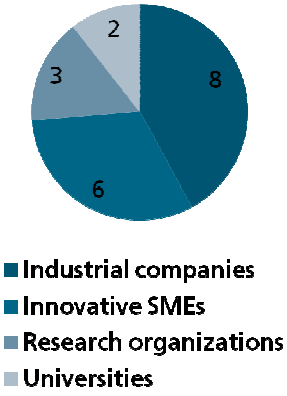
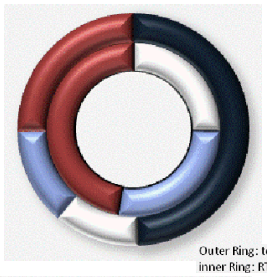
Consortium: Cross-sectoral composition

Partners by category



Budget distribution



Outer Ring: total budget: WP1-10
inner Ring: RTD budget: WP1,3-8

Industry: demo part (WP 2)
industry: SMEs
Industry: other
Research instutes

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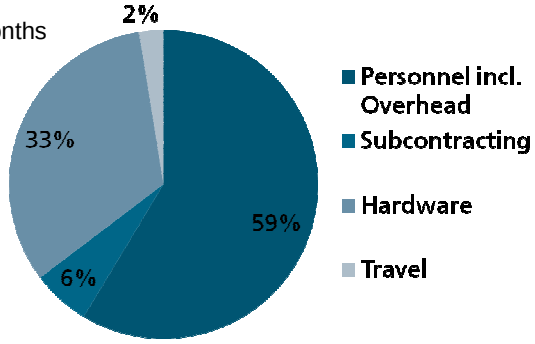
Budget overview

Total budget	19.8 M€
EC funding	11.0 M€
Work volume	1130 Man-months

Total budget by type of costs



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Challenges in the design process

- Iterative design process
- Competences, contributions and roles of the partners
- Available software tools, interfaces between the tools and partners
- Design framework (Metocean, wind turbine, budget, …)
- Requirements for wave tank testing of a physical model
- Turbine modification vs platform stability; Moorings and station keeping
- Assembly, Installation and Commissioning Procedures
- Operation and Maintenance concept
- Generation of a reliable budget for manufacturing, assembly, installation and operation
- Certification and Permitting requirements for the offshore site
- ….