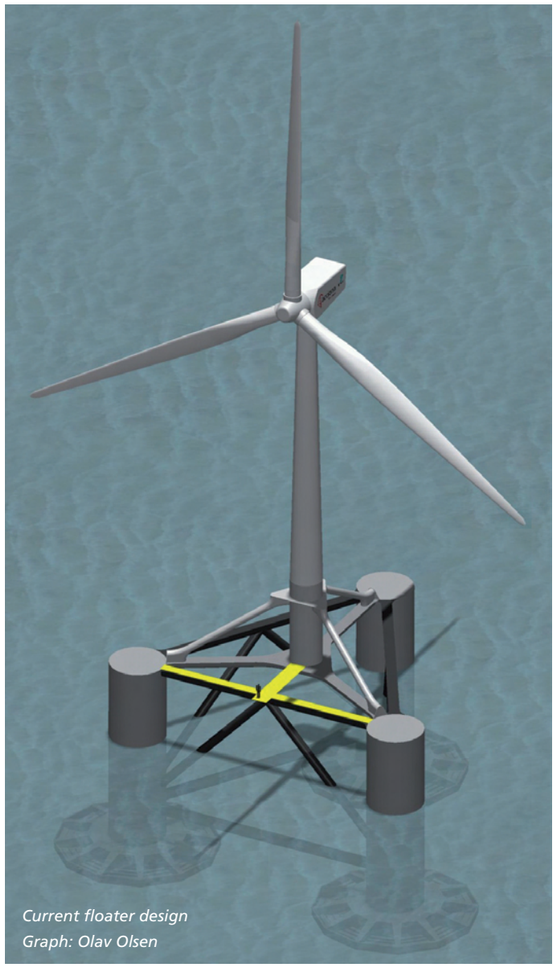
Project start Late 2010	Structural design milestone Late 2011	Commissioning Summer 2013	Project end Nov. 2015
Design	**Fabrication**	**Installation and commissioning**	**Operation, research and development**

PROJECT TIMELINE & CONSORTIUM

The EPC (Engineering, Procurement and Construction) process in HiPRWind draws upon the strong industry participants such as Acciona, IDESA, Vicinay Cadenas, Technip and ABB, supported by a design team including Olav Olsen, TWI and Bureau Veritas. The first year of the project has been dedicated to finding a technically and economically sound solution for the floating test platform.

During the fabrication and installation / commissioning phase, a well-proven 1.5 MW turbine will be adapted for offshore operation. The operational research phase is defined for two years and involves all the Consortium members including the R&D and SME participants.



Current floater design
Graph: Olav Olsen

Preliminary design for a 10 MW turbine		
Turbine rated power	10	MW
Rotor diameter	163	m
Hub height above SWL	117	m
Floater dimensions		
Operating draft	24	m
Operating displacement	16300	t
Ballast water in operation	5000	t
Column center distance	63	m
Structural steel weight floater	5000	t
Heave period	20	sec

THE CONSORTIUM

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

R&D SMEs
Olav Olsen (Norway)
Wölfel berat. Ing. (Germany)
Micromega (Belgium)
1-Tech (Belgium)

Universities
NTNU (Norway)
University Siegen (Germany)

Research org.
Fraunhofer IWES and IZFP
SINTEF (Norway)
Narec (UK)
Tecnalia (Spain)
TWI (UK)

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HiPRWind (read "hyperwind") is an EU project introducing a new cross-sectoral approach to the development of very large offshore wind turbines. Focused on floating systems, this 5-year pan-European R&D effort will develop and test new solutions for enabling offshore wind technologies at an industrial scale. The project is designed with an "open architecture, shared access" approach in that the consortium of 19 partners will work together, to develop innovative structural solutions and component technology for very large wind power installations in medium to deep waters. Results of general interest will be shared within the broader R&D community working on future wind energy solutions.

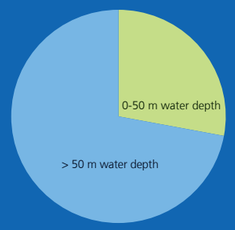
EU OFFSHORE WIND RESOURCES:

< 50 m depth
3000 TWh[1]

> 50 m depth
8000 TWh[2]

EU electricity production:
2010 3500 TWh
2020 3850 TWh
2030 4250 TWh

Source:
[1] EEA wind report, 2009
[2] ORECCA project, 2011

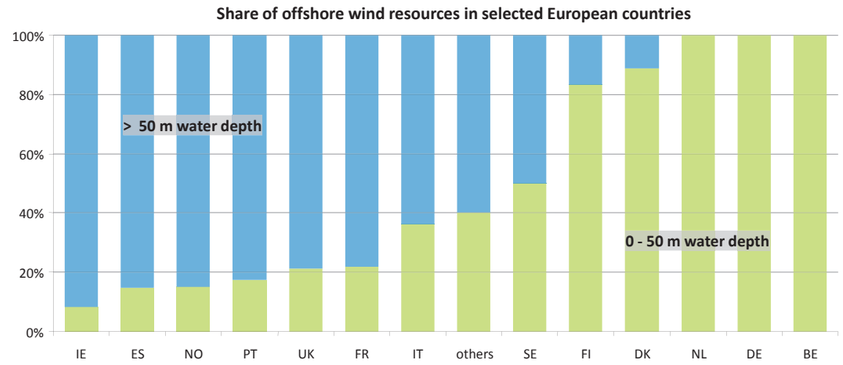


EXPECTED IMPACTS OF HYPERWIND:

- Showcases European know-how
- Delivers R&D results for the benefit of the industry and the research community
- Promotes a Spanish test location with proposed installation at BiMEP
- Encourages international collaboration across borders and sectors
- Provides a forum for the floating wind community

OFFSHORE WIND RESOURCES

Europe has huge yet untapped offshore wind resources in water depths in excess of 50 m, where foundations fixed to the sea bed are technically and/or economically unfeasible. The utilisation of these resources requires innovative floating foundation designs, high power and high reliability turbine technologies in order to be cost-efficient. The European Commission is funding a range of activities from research to demonstration of floating wind turbines in cooperation with National activities in several countries.



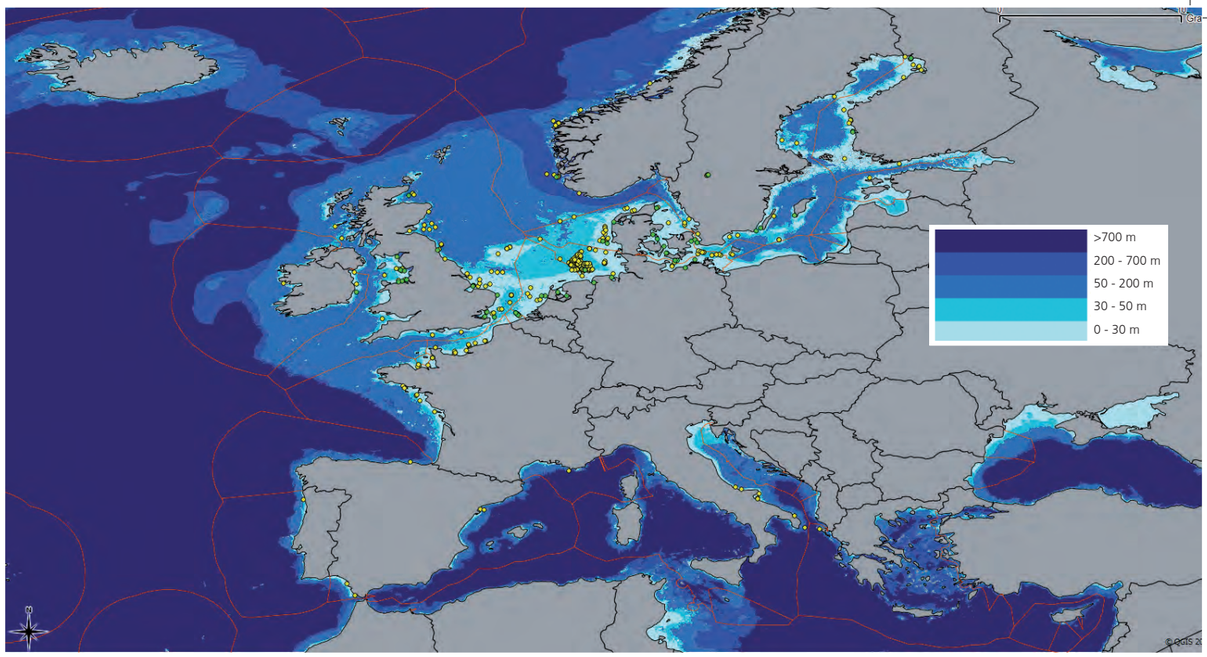
The deployment of large wind turbines on fixed structures is limited to 50 m water depth today. Floating wind turbine technologies are needed for all deeper areas. In many parts of Europe e.g. off the coasts of Ireland, Portugal, Spain, Norway, UK, and France there are significantly larger offshore wind resources available in waters deeper than 50 m but still relatively near to the shore. In other markets such as the US, Canada, Japan and future markets on the Southern hemisphere, the continental shelf is even smaller and floating technology is key to commercialising offshore wind.

THE HYPERWIND PROJECT: THE NEXT STEP

Together with European partners from industry and research, Fraunhofer IWES is coordinating the HiPRWind project to develop new structural, component, monitoring and control engineering solutions that will enable very large wind power installations in deeper waters than possible today.

To gain real sea experience and data, a fully functional floating wind turbine will be deployed at a European ocean test site. This MW-scale test installation is approximately 1:10th scale of future commercial systems (see graph next page). In this way, the project will overcome the current gap in technology development between small scale tank testing and full scale offshore deployment. The HiPRWind project will make use of existing test locations which offer a favourable permitting situation and infrastructure such as grid connection and monitoring facilities already in place.

As a world's first large scale real sea floating wind turbine facility dedicated to shared-access research and testing, the installation will allow to address critical issues of deep offshore wind technology such as innovative floater designs, efficient installation methods, advanced control engineering solutions and grid integration aspects of floating wind turbines. At the same time this research adresses the need for extreme reliability of components. Innovative engineering methods will be applied to selected development challenges such as large rotor blade designs, structural health monitoring systems, reliable power electronics and control systems. Built-in active control features will reduce the dynamic loads on the floater in order to save weight and cost compared to existing designs. HiPRWind will develop and test novel, cost effective approaches to floating offshore wind turbines at the MW-scale.



Map shows available areas for floating platforms and fixed foundations and existing (green) and planned (yellow) offshore wind farms

HiPRWind will significantly reduce the risks and costs of commercialising deep water wind technology. Results of general interest will be shared within the broader R&D community working on future wind energy solutions. HiPRWind is the largest EU funded offshore wind project to date and runs for 5 years.

CONTENT OVERVIEW

HiPRWind contains ten integrated Work Packages (WP's). In WP 1, the floating support structure and its moorings system will be designed, whereas WP 2 is focused on the construction of the full MW-scale unit, its assembly at port facilities and installation at the offshore test site. WP 3 covers the coordination and operation of the platform related research and sea testing. Within WP 4 to 7, critical aspects of the floating wind turbine are investigated, such as the structure and its system dynamics, the controller, condition and structural health monitoring systems, and the rotor based on innovative blade designs and features. High reliability power electronics will be designed, assembled and tested in the lab at a multi-MW scale. The R&D results all feed into WP 8 which is dedicated to identifying and refining new concepts for very large offshore wind turbines. The project also has dedicated WPs for dissemination and IPR exploitation, addressing also non-specialist and non-technical target groups and for project management drawing on both research and industry consortium members.

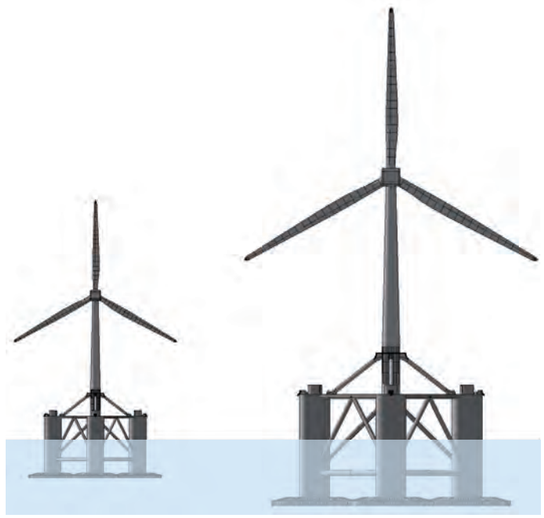


Figure shows the scale of the HiPRWind platform in relation to a full scale 10 MW installation. See table on next page for details.