

IREC^R

Institut de Recerca en Energia de Catalunya
Catalonia Institute for Energy Research



Project ZÈFIR Test Station

Offshore Wind Turbine Test Station off the coast of Tarragona

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Director

CEICS FORUM 2011
Tarragona, 11 November 2011

OUTLINE OF THE PRESENTATION

1. Presentation of IREC
2. Current situation of Offshore Wind
3. ZÈFIR Test Station

PRINCIPLES

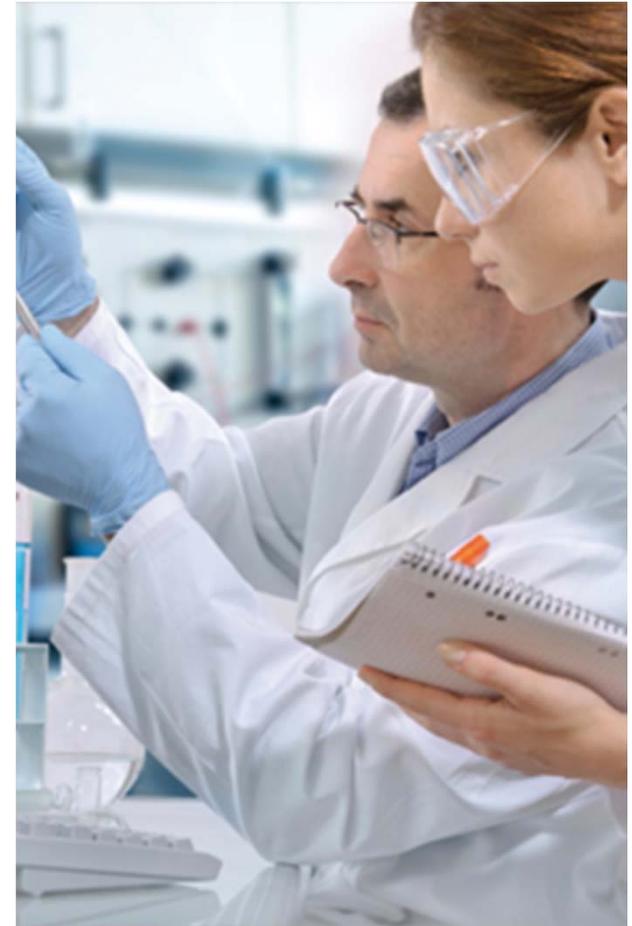
Mission

Contribute to the **sustainable development** of society and enhance corporate **competitiveness** via:

- **Innovation and development of new technological products;**
- **Medium and long-term research;** and
- **Development of scientific and technological know-how** in the field of energy.

Vision

Become a **center of excellence** and an **international benchmark** organization in the established technological fields of action through Research, Technology Development and Innovation (R+TD+i), working in coordination with the **Administration**, the **Industry** and **Universities**.



GOVERNING BODY

IREC is governed by a Board composed of:

- Catalan Ministry of Enterprise and Labour
- Catalan Ministry of Economy and Knowledge
- Spanish Ministry of Science and Innovation (CIEMAT)
- Spanish Ministry of Industry, Tourism and Commerce (IDAE)
- University of Barcelona UB
- Technical University of Catalonia UPC
- Rovira I Virgili University in Tarragona URV
- ENDESA
- GAS NATURAL FENOSA
- Fundación REPSOL
- ENAGÁS
- Compañía Logística de Hidrocarburos CLH
- ALSTOM Wind



TECHNOLOGICAL AND RESEARCH AREAS

Reference Area: **ENERGY EFFICIENCY**

**Zero Emission
Buildings and
cities (NZEB)**

Lighting

**Microgrids and
Electrical Vehicle**

Technological and Knowledge Areas:

**Advanced
Materials**

**Power
Electronics**

Bioenergy

**Offshore
Wind**

OFFSHORE WIND WORLDWIDE

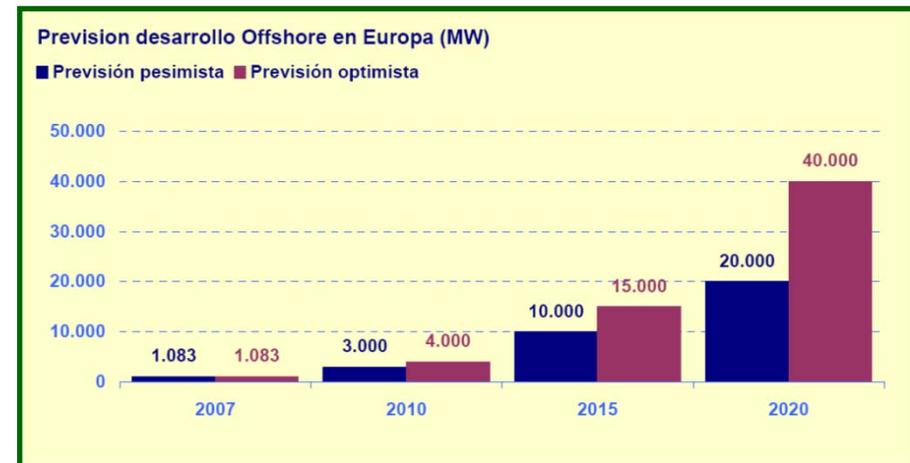
OVERVIEW

In 2010, worldwide wind power capacity reached 194.390 MW.



In 2010, worldwide offshore wind power capacity reached 2.946 MW

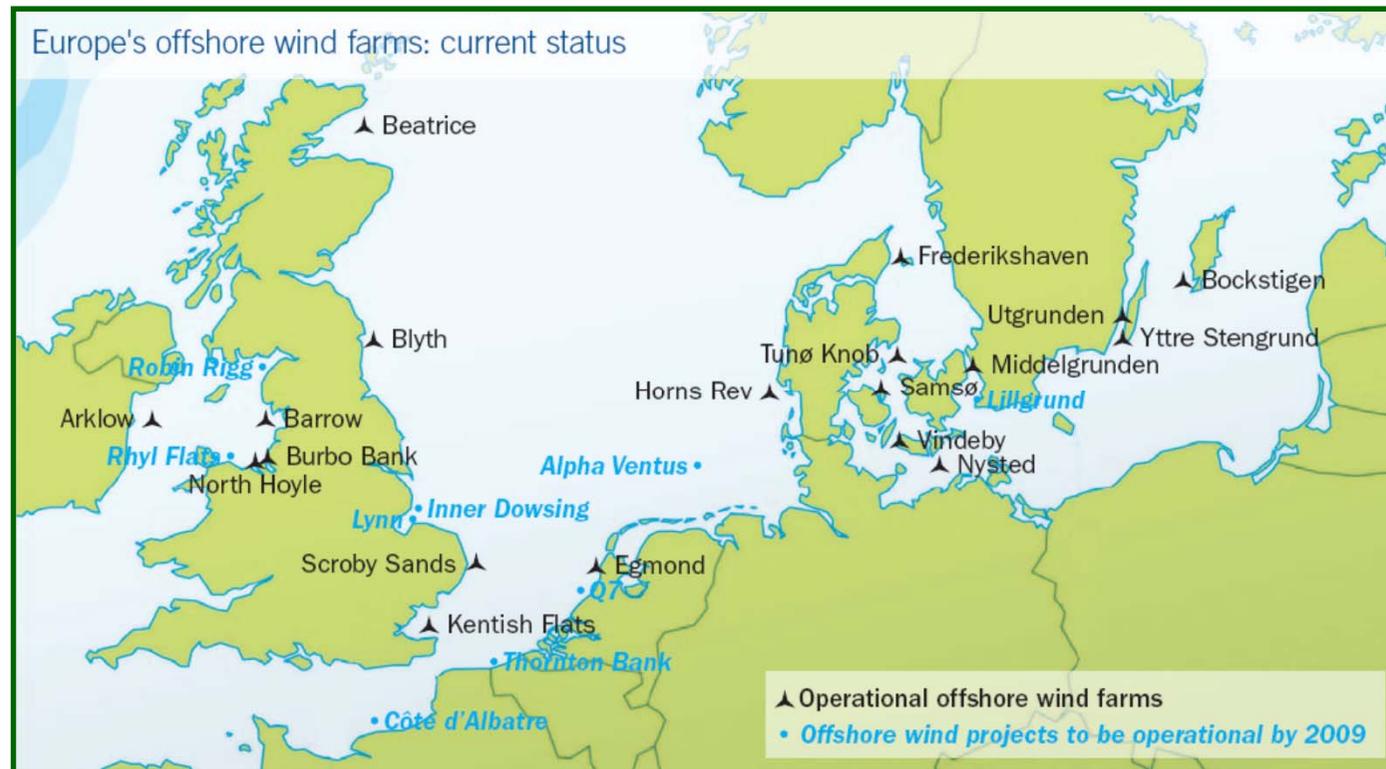
The EWEA estimates that 40,000 MW of offshore wind power capacity will be installed by 2020.



OFFSHORE WIND WORLDWIDE

OVERVIEW

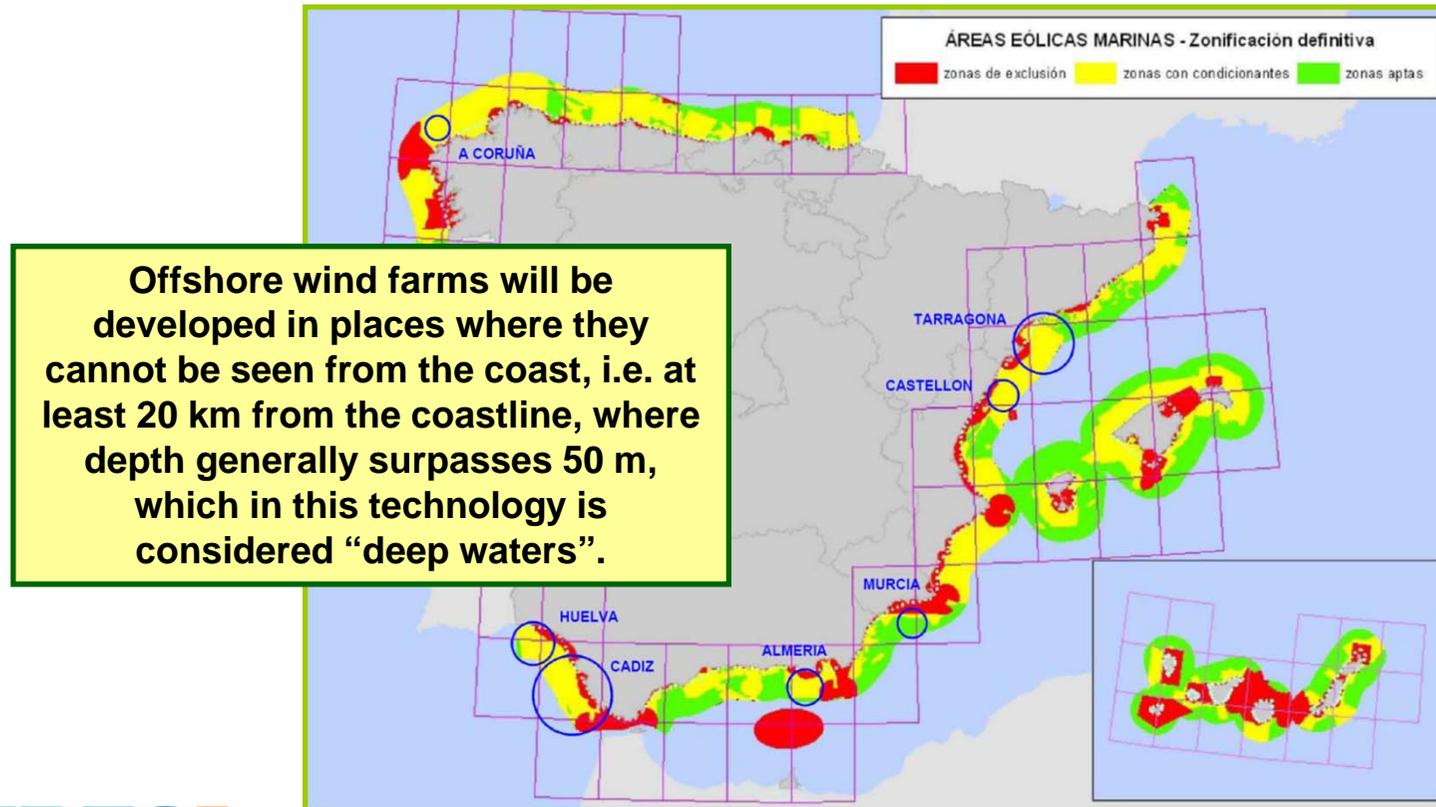
Offshore wind farms currently exist off the coasts of Denmark, the United Kingdom, the Netherlands, Sweden and Ireland, though none of them in deep waters (>50m).



OFFSHORE WIND IN SPAIN

OVERVIEW

Current applications to install Offshore Wind Farms in Spain amount to a capacity of more than 7.000 MW



ZÈFIR TEST STATION

IREC'S PROPOSAL

ZÈFIR Test Station

Setting up an International Test Station for offshore wind turbines in deep waters



ZÈFIR TEST STATION

AIM OF THE PROPOSAL

The *objective* of ZÈFIR Test Station initiative is to contribute to:

- The progressive **reduction of costs** in offshore wind farm installation.
- The increase of the **technological credibility** of this kind of applications.
- The increase of the scientific knowledge and technological know-how of the Industry and the involved research centers.
- The creation of new **business opportunities** for the companies involved in the project.
- The setting up of a reference **international center**, with capacity to attract industrial investments.
- The creation of a favorable environment to develop university programs, as attraction pole in **R&D**.

The Project is an opportunity demanded by the Industry, that will contribute to consolidate Europe as the international reference in Offshore Wind Energy.

ZÈFIR TEST STATION

AIM OF THE PROPOSAL

The ZÈFIR Test Station **purpose** is to:

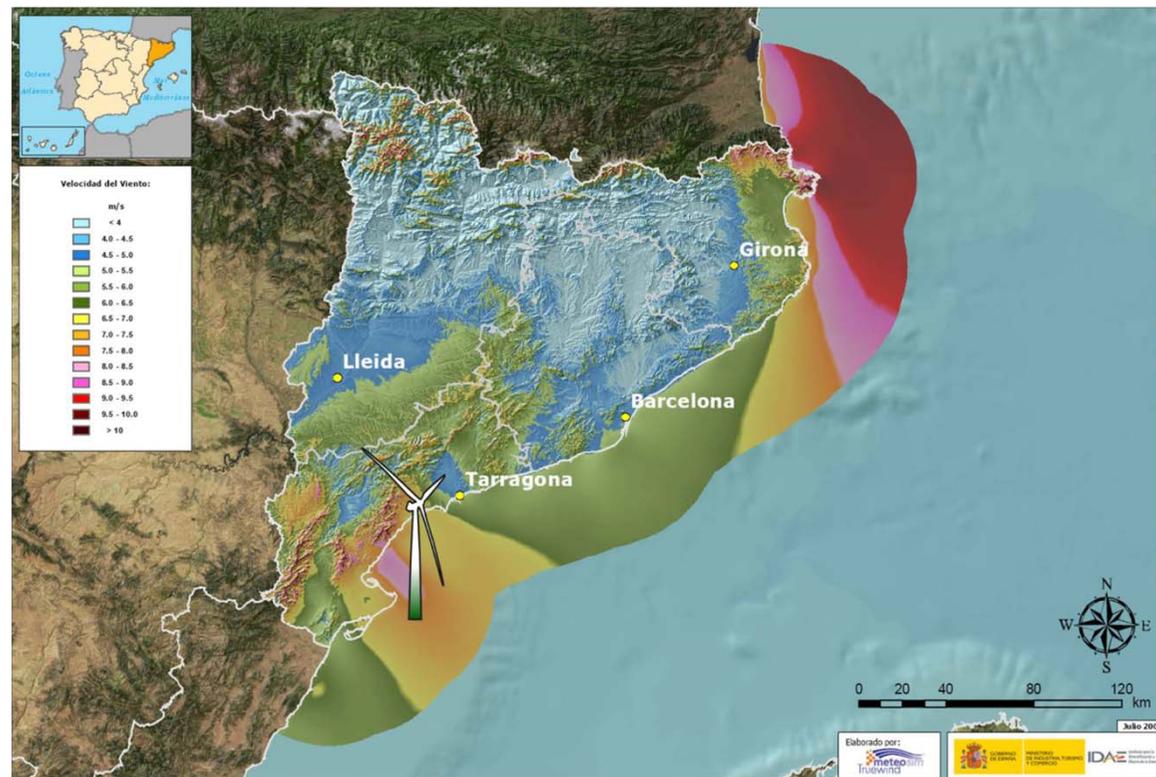
- Promote the entrance of new players in the offshore wind Market
- Foster the Development of deep-water floating offshore wind

| | PHASE 1 | PHASE 2 |
|----------------------------|--------------|----------|
| Water depth: | 42 m | 110 m |
| Distance to coast: | 3,5 km | 30 km |
| Number of turbines: | 4 | 8 |
| Power installed: | 20 MW | 50 MW |
| Foundation type: | Bottom-fixed | Floating |

ZÈFIR TEST STATION

LOCATION

- **Planned location:** off the coast of Tarragona.
- Availability of good wind resources, proximity to the port of Tarragona and electricity grid connections.



ZÈFIR TEST STATION

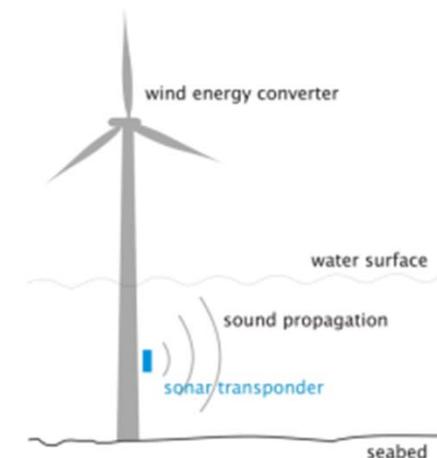
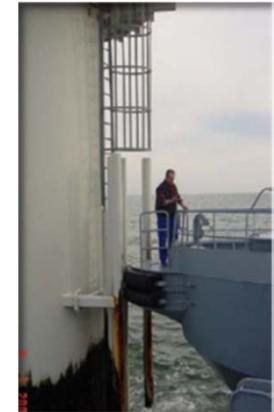
TECHNICAL AND ENVIRONMENTAL R&D ACTIVITIES

Technical research activities:

- Standards development for wind turbine and component certification, hydrodynamic and aerolastic calculation codes
- Wind Measurements for deep offshore
- Different kinds of foundation test
- Etc

ZÈFIR is an opportunity to do environmental research and study the real impact of offshore wind farms in the Mediterranean area:

- Sound waves and its impact on sea mammals and fish
- Impact of marine flora and fauna during construction and operation of the wind farm
- Seabed geology and sediments
- Etc



ZÈFIR TEST STATION

TRAINING ACTIVITIES

- **Training is critical** in offshore wind energy industry, for technological evolution, safety and environment respect.
- Training for suitable **profile technicians and workers**, in manufacturing, installation, operation and maintenance of offshore wind farms.
- Training for **university graduates** in different related fields (component design, wind turbine design, electrical and civil design, materials, atmosphere physics, etc.), in collaboration with the Universities.
- The Platform will be very valuable for the development of technologic research fields in the **Universities**, and for the development of a new academic specialization.



ZÈFIR TEST STATION

CALENDAR

The expected calendar for *ZÈFIR Test Station* is the following:

| Año | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|------|------|------|------|------|------|------|------|------|
| PHASE I 4 positions for shallow waters | | | | | | | | | |
| PHASE II 8 positions for deep waters | | | | | | | | | |

ZÈFIR TEST STATION

CONCLUSION



- Zèfir Test Station is a **lighthouse project** for IREC, with a high potential international impact, that covers an long-term requirement of the Industry in order to foster the development of a new and complex deep-water offshore wind energy technology.
- Deep offshore wind technologies require a great improvement in order to make feasible this new market, by means of **technological developments** and **costs reduction**. Solutions must be verified in order to make the projects bankable.
- To make feasible the deep-water offshore wind technology an ambitious **long term RD&D** program is required, involving manufacturers, developers, research centers, certification bodies and governments.
- IREC aims at contributing to this development by placing its deep-water **International Test Station** at the disposal of the Industry and the research centers.



Sponsors:



THANK YOU FOR YOUR ATTENTION

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