VERTIWIND

Vertical axis floating wind turbines

MARINE ENERGY

Context

The VERTIWIND project stems from an analysis of French coastal waters. Sea depths of over 30 metres are attained too close to the shore to allow development of anchored offshore wind energy as it has emerged in northern European countries. Conversely, floating wind turbines could allow France to attain its offshore wind energy objectives, notably by building wind farms in the Mediterranean.

Ocean wind turbines are almost always of horizontal axis design. The vertical axis technology proposed by VERTIWIND not only allows the turbine to be more steeply tilted, lowering the cost of the floating structure, it also reduces its visual impact. These turbines are simpler, more robust, and better suited to the marine environment.

Objectives

VERTIWIND aims to resolve some of the problems inherent to traditional horizontal axis floating turbines, for instance the need to control blade tilt at all times, as function of ocean swell. The simple and robust vertical axis technology enables optimal turbine function in turbulent flow, a characteristic of floating wind turbines installed on a moving support structure.

The project also aims to lower the cost of the floating structure and reduce visual impact.

Project stages

A first 1/10-scale demonstrator equipped with a hydraulic jack and a tilting mechanism was designed to test the performance of the turbine tilted on a floating structure when exposed to wind and waves, and was tested near Boulogne-sur-Mer. In late 2012 NENUPHAR started construction of a 2 MW vertical axis prototype that has been in testing at Fos-sur-Mer since May 2014. Later on a demonstrator will be floated at the the MISTRAL testing site off Port Saint Louis du Rhône, near Fos-sur-Mer.

This project is part of a broader initiative: a second demonstrator is planned in the framework of the European INFLOW project, and then a 13-unit floating wind turbine farm, a project selected under the NER300 programme.

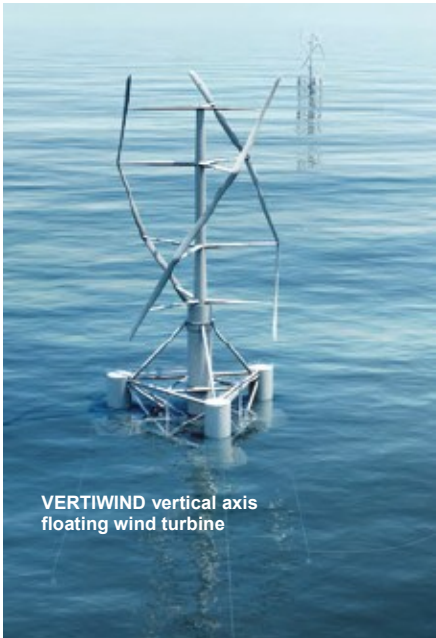
THIS PROJECT IS SUPPORTED BY ADEME UNDER **THE LOW CARBONE ENERGY PROGRAMME OF THE INVESTMENTS FOR THE FUTURE PROGRAMME (PIA)**

Duration: 4 years
Start-up: September 2011
Total investment: €16.8 M
PIA funding: €7.1 M
Form of PIA funding: subsidies and refundables grants
Location: France
Fos-sur-Mer (Provence Alpes Côte d'Azur)

Coordinator

NENUPHAR

Partners



Expected results

Innovation

The VERTIWIND turbine is a genuine technology breakthrough. It can float in areas where the sea depth is up to 200 metres, and requires only minimal draw for installation on the floating structure.

The turbine blades are curved for the best operational performance.

Economic and social impacts

Although their blades are of similar size to those of horizontal axis turbines, vertical axis wind turbines are more acceptable to residents on land because they are much less visible (and audible) from the coast.

VERTIWIND could at term create between 200 and 250 jobs .

Environment

One of the strong points of vertical axis floating turbines is their shorter height at blade tip, making them less visible from the shore. The noise usually associated with wind turbines is almost entirely absent, given the distance from land. The effects of noise and vibration on marine life will be measured during testing campaigns at sea.

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Applications and markets

Floating wind turbine technology is now a sector of technological innovation, and competition is severe, among European countries and on a global scale. A vast R&D programme on floating wind turbines has been launched in Japan, in the wake of the Fukushima disaster. Several research programmes have likewise been launched in the United States, because the sea floors of territorial waters are too deep for the development of anchored offshore wind energy. The VERTIWIND project targets the future market for offshore wind energy, today restricted to countries with wide continental shelves of shallow waters, less than 35 m deep (Denmark, Netherlands, Belgium, Germany and the United Kingdom). Mediterranean rim countries (Spain, Portugal, Italy, Greece, Turkey), the United States and Japan are all looking to develop offshore wind, and their deep territorial waters will require floating turbines in most instances.

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