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Innovative, low cost, low weight and safe floating wind technology optimized for deep water wind sites

PROJECT ACRONYM: FLOTANT

PROJECT TITLE: Innovative, low cost, low weight and safe floating wind technology optimized for deep water wind sites

FUNDING: EU-H2020-LC-SC3-RES-11-2018, grant agreement 815289

EU Financial contribution: 4.9 million Euros

START DATE: April 1, 2019

DURATION: 36 months

PARTNERS: 17 partners from 8 countries

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OBJECTIVES

The main objective of FLOTANT project is to develop the conceptual and basic engineering, including performance tests of the mooring and anchoring systems and the dynamic cable to improve cost-efficiency, increased flexibility and robustness to a hybrid concrete-plastic floating structure implemented for DWWF. Innovative solutions will be designed to be deployed in water depths from 100m to 600m, optimizing the LCOE of the floating solution (85-95 €/MWh by 2030).

CHALLENGES & SCOPE SOLUTIONS PROPOSED BY FLOTANT

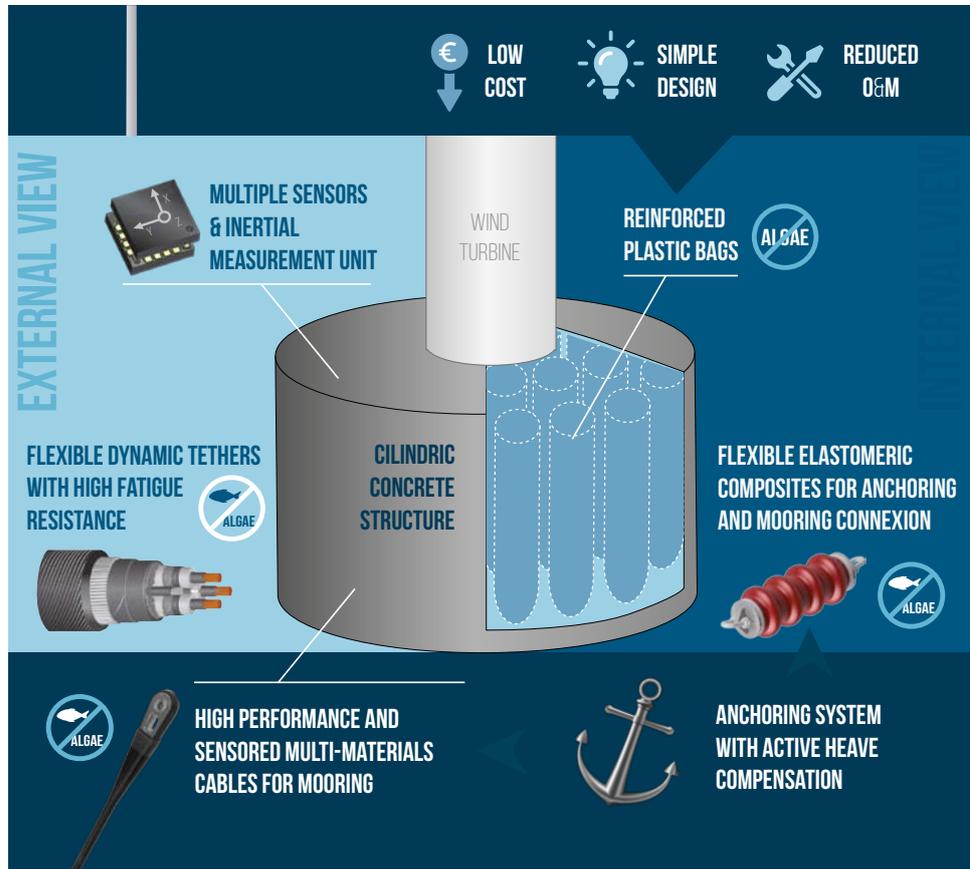
- Cost reductions remain a crucial necessity for existing or new technologies** → FLOTANT will develop a cost competitive integrated wind energy system with a LCOE lower than 120€/MWh by 2025 and 85-95€/MWh by 2030, achieved through new innovative technology in hybrid plastic/concrete substructure, mooring and anchoring, and dynamic cable systems which can all be used in deeper waters.
- Technology development including reliable, sustainable and cost-efficient anchoring and mooring system** → FLOTANT will develop lightweight reliable, sustainable and cost-efficient mooring solutions. The technology challenge will be to integrate the various innovative component behaviours into the nonlinear global mode prediction software to allow for the development of innovative mooring systems.
- Power evacuation optimization and cost reduction** → The technology challenge is to design cables that alleviate the severe and repeated loads, whilst maintaining a reliable and sustainable power connection. This will be addressed by identifying suitable design solutions for power cables in highly dynamic operating conditions, including connectors, conductor configuration and cable flexible and high torsion resistance sheathing options, to ensure safe, reliable, sustainable and cost effective electrical connections for FOW.
- Installation techniques** → Improved construction and installation techniques will be developed, reducing logistics costs, installation and commissioning. The technology developed will enable easy transport of the full unit to and from low depth harbours using full-blown bags and tugboats.
- O&M concepts** → Predictive O&M algorithms will be developed to minimize the corrective O&M costs. Use of non-corrosive materials, anti-fouling additives, non-complex and prefabricated structures and non-mechanical system to maintain the structure floating will contribute to minimize O&M operations as well.
- Proposals with technologies from TRL 3-4 to TRL 4-5** → FLOTANT project technologies starting from TRL 3-4 will achieve at the end of the project TRL 4-5 based on testings and demonstrations in in relevant environment, including real sea conditions.
- Lower environmental impacts** → Reduction of the materials employed in the FOW components. Recycling and reusing techniques will be investigated to minimize footprint. Anti-fouling and anti-bite additives will be developed to ensure that materials do not harm wildlife and flora. Easy structure design to allow an easy and quickly decommissioning of the components.
- Social acceptance or resistance to new energy technology, socioeconomic issues** → Main issues to be addressed by FLOTANT will carefully consider: i) Sharing the use of the sea with others: fishermen, commercial or recreational navigation, military constraints, ii) Issues related with proximity to airports or radars; iii) Landscape, when site is close to the coast, and iv) Landing of evacuation lines: maximum recycling at time of decommissioning.

CONCEPT AND METHODOLOGY

FLOTANT proposes to develop an innovative, integrated FOW solution, optimized to sustain a typical 10+MW WTG in deep waters (100-600m). It will be composed by: a novel anchoring and mooring systems, a floater & mast, and a power export system (including a design for a deep-water substation).

A holistic approach will be taken and realistic designs will be tested in relevant environments. The design of a new concept of mooring system based on the use of high performance and lightweight fibres and elastomers will be developed. Mooring will be complemented by a polymer spring component, and an anchoring system with active heave compensation. The fatigue performance of new plastic materials will be improved and additives to improve state-of-art dynamic cables. Anti-bite and anti-fouling properties to the FOW components will be provided. In addition, the suitable floating bags for a new concept of low cost floating platform will be developed. The floating bags will be designed based on the technology developed in the framework REFRESH project, where a large bag was designed to transport water between islands over the seawater. The bag will be made with a strong but flexible plastic-coated reinforced fabric. These coated fabrics are widely used in several applications due to low cost and optimal performance with a good combination of flexibility, toughness, extensibility and high ratio of strength to weight. Software tools for cost-benefit of transmission alternatives and layouts optimisation including emergency breakaways

will be developed and cable hang-off devices will oversee required simulations to evaluate the performance of the individual components and full FOW. The system will be fully sensing and monitored. The developed FLOTANT integral system will be validated in a controlled basin and some of the components in a relevant environment with a real



seawater conditions. Design basis of certain components and innovations will be certificated, meanwhile tailored O&M & installation strategies will be defined. The overall cost reduction as well as environmental, social and economic impacts will be assessed.

COORDINATOR

PLOCAN PLATAFORMA OCEÁNICA DE CANARIAS
 CONSORCIO GOBIERNO DE ESPAÑA GOBIERNO DE CANARIAS

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