

# NEW GENERATION OF OFFSHORE TURBINE BLADES WITH INTELLIGENT ARCHITECTURES OF HYBRID, NANO-ENABLED MULTIMATERIALS VIA ADVANCED MANUFACTURING

## CARBO4POWER PROJECT

Carbo4Power will develop a new generation of materials for offshore wind and tidal turbine rotor blades that will increase their operational performance, reduce the cost of energy production and their environmental impact. The innovative concept is based on nano-engineered hybrid materials and on innovative processes. The 1st one is to automate the preforming process and the 2nd one is a liquid one shot process to manufacture a complete blade.

### TECHNICAL AND ECONOMIC IMPACTS

- 20% scrap reduction
- Recycling of blade materials will be increased up to 95%
- 20% manufacturing time reduction

### BUDGET

7 898K€

### KEYWORDS

Automated complex preform manufacturing, Process step reduction, RTM one shot process

### RESEARCH THEMES AND EXPERTISES

Innovation processes  
Composite processes

### EQUIPMENTS

MADRAS Line  
RTM Injection Machine  
Multi axial test bench

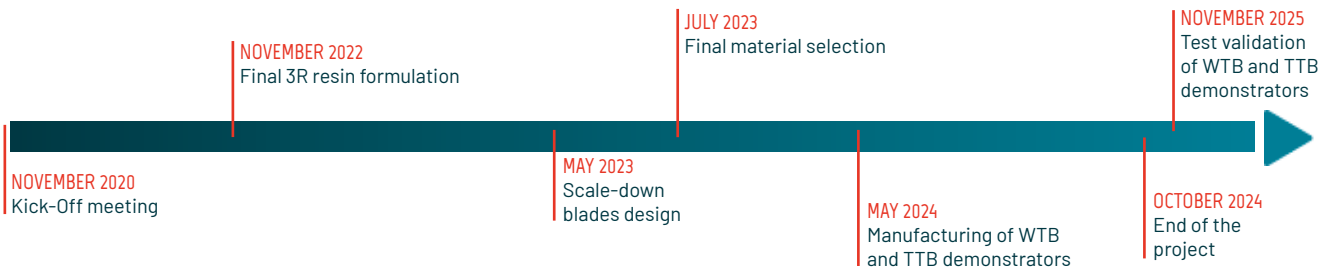
### PARTNERS

Coordinator : NTUA (EL)

Industrials : AiDEAS (EE), BIONIC SURFACE TECHN. (AT), BIOG3D (EL), CNAT (UK), HAYDALE COMPOSITE SOLUTIONS LIMITED (UK), IRES (BE), SABELLA (FR), SENSE IN (FR)

Academics : UNIV BIRMINGHAM (UK), UNIV STRATHCLYDE (UK)

RTO : AIMEN (ES), CIDETEC (ES), FRAUNHOFER IFAM (DE), INEGI (PT), IRT JULES VERNE (FR), ITA INNOVA (ES), ORE CATAPULT (UK)



## INDUSTRIAL CONTEXT

This project is part of the implementation context of large-scale and more efficient offshore grid to help reducing greenhouse gas emissions and increasing the offshore wind energy capacity.

This requires increasing reliability of the turbines, reducing the labour costs and the unnecessary maintenance and eliminating the unexpected failures.

## INNOVATIVE FEATURES

- Manufacture-to-design approach enabling high deposition rate and reducing scrap and investments.
- Improved performances and increased reliability and durability through nano-engineered materials.
- Digitalization of blades empowered through integration of smart functionalities.
- Increased recyclability thanks to innovative materials and joining technologies.

## INDUSTRIAL APPLICATIONS

The project should allow the design of lighter and more resistant turbine blades which manufacture will be facilitated by advanced processes.

The design, based on a modular concept, will reduce the production cost and enable recyclability/reuse.

The integration of an in-situ sensor system will ensure the proper functioning and integrity of structures in real time, which will allow maintenance operations to be adapted.



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