Carbo4Power

New generation of offshore turbine blades with intelligent architectures of hybrid, nano-enabled multi-materials via advanced manufacturing

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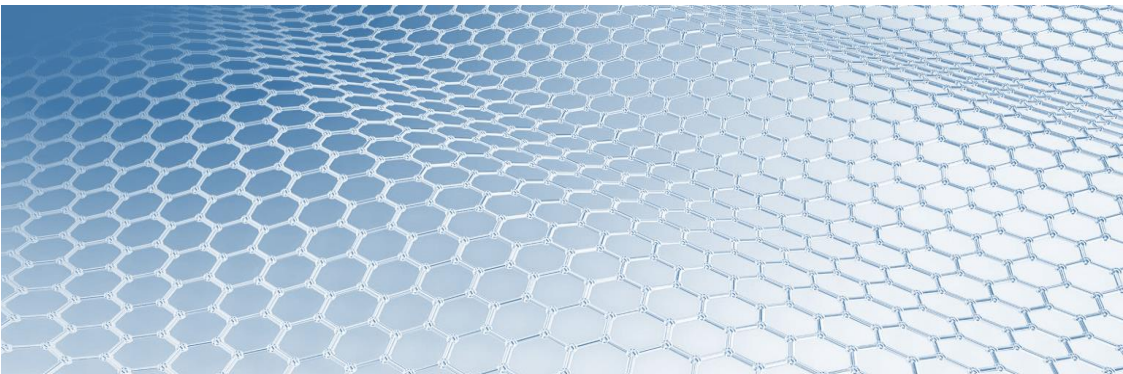
Carbo4Power will develop a new generation of lightweight, high strength, multifunctional, digitalized multi-materials for offshore wind and tidal turbine rotor blades that will increase their operational performance and durability while reducing the cost of energy production (bellow 10 ct€/ kWh for wind turbines and 15ct€/kWh for tidal), maintenance and their environmental impact. The innovative concept is based on nano-engineered hybrid (multi)materials and their intelligent architectures which breaks down as follows:

i) Nanocomposites based on dynamic thermosets with inherent recyclability and repairability and tailored nano-reinforcements to enhance mechanical properties.
ii) Multifunctional nano-enabled coatings to improve turbine protection (e.g., against lightning and biofouling (e.g. 50% fouling release).
iii) Blade segments will be designed and fabricated by advanced net-shape automated multi-material composite technologies that will allow ca. 20% scrap reduction.
iv) The approach for WTB is to deliver innovative design of modular rotor blade, while the approach for TTB is aimed towards an optimal design for 'one-shot' manufacture.
v) Recycling of blade materials will be increased up to 95% due to the advanced functionalities of 3R resins and adhesives with debonding on demand properties.

The strategic goal is to provide the frame which will create new pathways for manufacturing of FRPs for multiple processing life cycles, and explore the emerging valorisation opportunities in offshore energy sector.



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