# MAterials solutions for cost Reduction and Extended service life on WIND off-shore facilities

## OFFSHORE WIND SECTOR IN EUROPE

Over the past 15 years, the wind energy sector has experienced a remarkable growth in Europe, positioning the continent as a leader in the market. In 2020, the wind capacity accounts for 220 GW, which met 16% of the electricity demand across Europe. Projections indicate that 105 GW will be installed over the next five years.

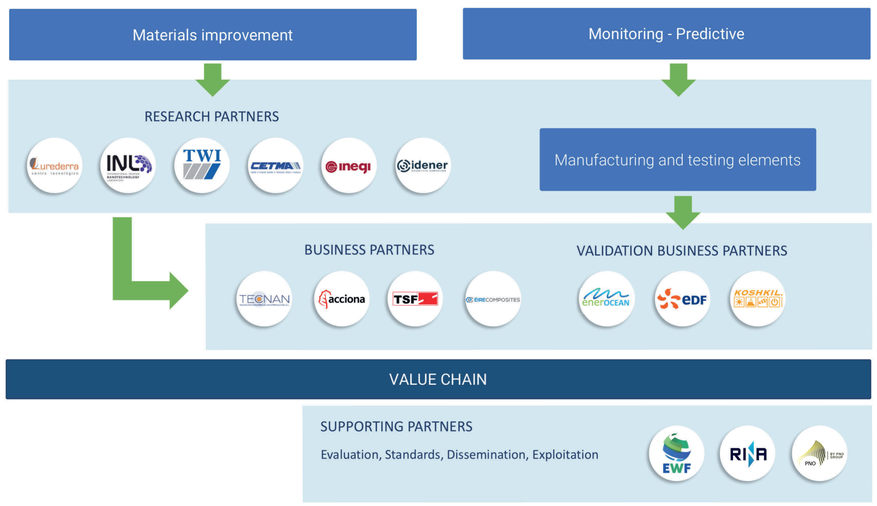
Despite this scenario, only 11% of the power capacity belongs to offshore structures contributing in 3% to Europe's electricity demand. Moreover, components of offshore wind turbines are exposed to damage mechanisms on both materials and coatings due to harsh marine environments, wetness, UV-radiation, abrasion and erosion, to name a few. Main consequences are the possible 4-20% reduction in energy production, the rise of Operation and Maintenance (O&M) costs up to 25% of the total expenditures, and the reduction of the 25-30 year lifetime. Finally, the need for recycling the increasing amount of end-of-life turbines is crucial.

## MAREWIND SOLUTIONS

The MAREWIND project provides vital solutions to help building a next generation of large offshore wind energy turbines. Its novel technologies will help solving the current challenges related to materials, coatings and architectural performance in the industry.

By enhancing the durability and recyclability of the materials, and by improving the monitoring and reducing the maintenance in offshore structures, the project will contribute to a more economic and sustainable model of the offshore wind sector. Finally, the outcomes of the project will also contribute to other sectors, such as marine renewable energies, marine and non-marine industries.

The project is funded by the European Union's Horizon 2020 Research and Innovation program and received €6,7 million EU-budget contribution. Sixteen organisations will develop the project according to the following strategy.




## OBJECTIVES

MAREWIND targets the main aspects related to materials durability and maintenance in offshore wind energy structures. Such issues imply failures, misfunctioning, loss of efficiency in energy generation as well as a major repercussion on CAPEX and O&M costs. The combined forces of key-players in the current value chain of wind energy; and offshore structures will cover a set of ambitious specific objectives.

- Increasing durability and anticorrosion protection of metallic materials exposed to harsh environments.
- Increasing durability of concrete for structural components.
- Long-term durability of antifouling coatings without biocides.
- Increasing stiffness and strength white reducing the weight of wind turbine blades.
- Improving Leading-edge protection systems with increased erosion resistance.
- Developing Structural Health Monitoring techniques for offshore wind turbines.
- Developing predictive corrosion models for offshore infrastructures considering changing climatic conditions.
- Developing recyclable-by-design materials for wind turbine blades.
- Demonstrating scalable manufacturing technologies for the innovations in wind turbine blades, concrete and coatings.
- Applying existing and upcoming standards in terms of performance of materials, safety and environmental impacts.
- Assessing the economic viability, environmental and societal impact of the proposed innovations.

## IMPACT

MAREWIND is expected to highly impact the EU wind energy industry, which is projected to have the largest contribution to the renewable energy targets for 2030. The project will strengthen the European leadership position in the industry as well as optimize the sector. Moreover, the MAREWIND innovations will help reduce Europe's energy dependance and significant macroeconomic benefits will be generated.

The MAREWIND results will have industrial, economic, ecological, energy and social benefits:

- maintaining/improving performance;
- improved durability of materials at optimized costs:
  - improved durability of corrosion protective coatings (> 25 years);
  - improved durability of reinforced structural concrete (> 50% durability increase);
  - improved durability of antifouling coatings (> 5 years);
  - improved durability of antierosion blade paints (>10 years);
- significant reduction of life cycle costs;
- cost reduction for offshore energy production of about 40% of the levelized cost of energy, with cost values produced by wind energy systems below 10 ct€/kWh;
- reduction of environmental impact by 35%;
- reducing $CO_2$ emissions and fuel dependency: 3,5 ktoe in short term and 13,6 ktoe at mid/long term; and
- creating growth and jobs in Europe by strengthening the European industrial technology base.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