CONTACT US

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DURATION

1 December 2020 - 30 November 2024

PROJECT BUDGET

€ 7,9 MEUR

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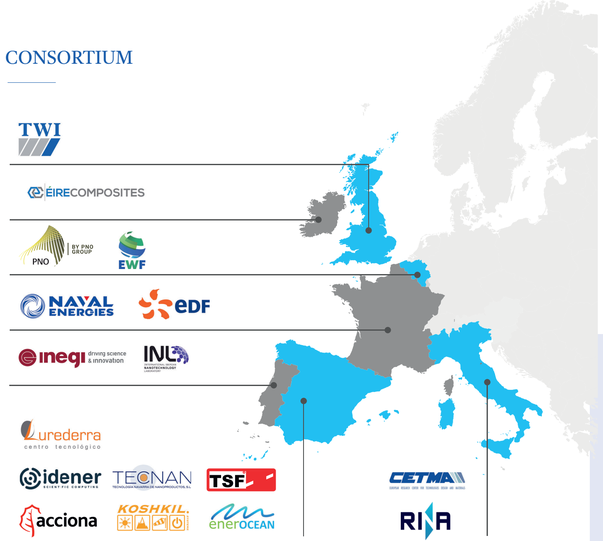
WEBSITE

https://www.marewind.eu/

CONSORTIUM



This project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 952960.

THE MAREWIND PROJECT

Wind structures are constantly exposed to environmental factors that cause severe damage. In the offshore wind sector, these challenges are even more pronounced. Corrosion and fatigue, driven by harsh conditions, are significantly shortening the lifespan of these offshore installations.

In this context, the MAREWIND project has explored new materials, gathered experimental data, and created predictive models to enhance durability, reduce maintenance, and achieve lower environmental impact.

Novel materials and coatings

- Anti-corrosion coating
- Antifouling coating
- Durable & Sustainable concrete
- Recyclable composite technology

Novel SHM tools

- Non-destructive monitoring by UAVs
- Smart integrated materials
- On-site monitoring by fiber optic sensors

IMPACT

- Enhance durability of materials
- Reduced Offshore Energy Production Costs
- Reduce life cycle costs
- Reduce environmental impact by 35%
- Save 3.5 ktoe in the short-term
- Bring wind energy systems below 10 ct€/kWh
- Decrease CO_2 emissions
- Save 13,6 ktoe in the mid-long-term

MARE WIND

MAterials solutions for cost **R**eduction and **E**xtended service life on **WIND** off-shore facilities

MAREWIND NOVEL SOLUTIONS

ANTICORROSION COATING

W2Power Floating structure

1. Surface Preparation
2. Anti-Corrosion Application
3. Monitoring

Spray gun application

Monitoring

Anticorrosion solution in real fastening elements

Benefits:

- Materials exposed to the marine atmosphere have shown no signs of corrosion
- Fully compatible with the yellow paint required by offshore visibility regulations
- Proven effectiveness of the solution for future applications

Critical turbine components

1. Painting Rotor hub in maintenance area
2. Treating vulnerable areas in-situ
3. Monitoring exposed areas

Spray gun application

After several months exposure

Benefits:

- One-layer coating applied by direct spray
- No need for special surface preparation or thermal curing
- Easy application demonstrated in real-world conditions on various windmill sections

COMPOSITE TECHNOLOGY

Circular use of blade materials

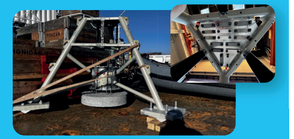
Successfully manufactured a 13-meter blade utilising **new composite technology**.

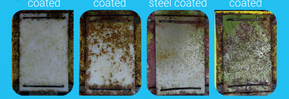
- Innovative recyclable resin utilised in the blade's construction
- Designed with a focus on circular sustainability
- Validated through rigorous mechanical testing

ANTIFOULING COATING

Material performance submerged in the sea

- Low- thickness product
- Superior adhesion when compared to commercial alternatives
- Versatile solution compatible with other layers





These experiments have been performed in the facilities of Consorcio Plataforma Oceánica de Canarias (PLOCAN)

Uncoated

Antiadherent effect in coated samples

Antifouling solution successfully tested in real exposure immersed in the sea

CONCRETE

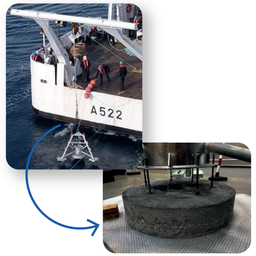
Ultra-High-Performance Concrete

- Increased durability (extremely high chloride penetration resistance) in harsh offshore conditions.
- Improved mechanical properties enabling slender floating structures
- Cost-effective nature to reduce maintenance and repair costs
- Optimised design enables efficient, strong structures

Ultra-High-Performance Concrete prototypes at Gijón Harbour

Alkali-Activated Materials concrete

- Increased durability, ensuring long-lasting performance under various conditions
- Suitable performance with a sustainable chemical nature
- Good capacity to flow in the molds
- Strong resistance to freeze-thaw cycles



Alkali Activated Material concrete ballast specimen

Analysis after 6 months exposure in the GBS submerged in Sines (Portugal)

STRUCTURAL HEALTH MONITORING

Integration of **Fiber Reinforced Polymer** bars in novel concrete formulations

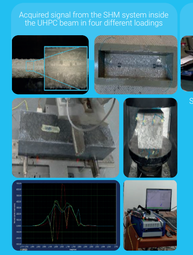
Bending tests for dynamic answer

Integration of **Fibre Optic Sensors** in blades, GBS structure and novel concrete formulations

In concrete, wave motion essay for thermal and structural monitoring (deformation)

Drones (UAVs) employed for external advanced blade inspections

Digital Image Correlation and thermographic analysis for full-field measuring techniques



Benefits:

- Reduce costs by detecting errors or materials defects early.
- Enhance employee safety by identifying potential risks and reducing on-site inspections.
- Improves resources management through early edge detection.
- Helps minimising risk of major damage and structural collapse.