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

Informe

Información del proyecto

MAREWIND

Identificador del acuerdo de subvención: 952960

Sitio web del proyecto

DOI
10.3030/952960

Proyecto cerrado

Fecha de la firma de la CE
6 Noviembre 2020

Fecha de inicio
1 Diciembre 2020

Fecha de finalización
30 Noviembre 2024

Financiado con arreglo a
INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Advanced materials

Coste total
€ 7 953 783,75

Aportación de la UE
€ 6 706 969,38

Coordinado por
L'UREDERRA, FUNDACION PARA EL DESARROLLO TECNOLOGICO Y SOCIAL
Spain

Periodic Reporting for period 2 - MAREWIND (MAterials solutions for cost Reduction and Extended service life on WIND off-shore facilities)

Período documentado: 2022-06-01 hasta 2023-11-30

Resumen del contexto y de los objetivos generales del proyecto

The next generation of large offshore wind energy generators and tidal power generators needs improvements to solve challenges related to materials, coatings and multi-material architectures to increase operational performance and allow an appreciable reduction of the overall cost: capital expenditure, running and maintenance costs. Offshore energy functional and structural components are subjected to numerous damage mechanisms, which concern both materials and coatings. Corrosion and fatigue turned out to be the main mechanisms of deterioration in offshore structures where severe environmental factors affect such as extended periods of wetness, UV-radiation, abrasion and erosion which could eventually accelerate corrosion rates. Moreover, wind turbine blade leading-edge erosion is one of the key challenges in the offshore wind industry as it can reduce the annual energy production by 4% to 20%. This would equate to a loss in productivity worth between 152 and 760 million € a year across the whole European offshore wind sector. In addition to productivity loss due to repair operations, the maintenance is difficult and the cost is extremely high due to several factors, including the logistics of getting men and materials to the job site, but also due to the limited access to the structures due to offshore weather conditions. Operations and Maintenance account for approximately 25% of the costs of offshore wind farms. In this situation, durability of materials used to protect these types of infrastructures should be matched to their useful life which should optimally perform for 25-30 years. In addition, sustainable processes for dealing with wind turbines at the end of their service life is also needed considering the expected amount of waste blade material that will need to be recycled annually can increase up to 800,000 tonnes per year by 2050. MAREWIND project aims to address these challenging aspects increasing competitiveness and sustainability of the sector.

MAREWIND addresses the main aspects related to materials durability and maintenance in offshore structures which consequently imply failures, misfunctioning, loss of efficiency in energy generation and which have a major repercussion on O&M and CAPEX. With the combined forces of key-players in the current value chain of wind energy and offshore structures, MAREWIND covers a set of ambitious targets focused on: (a) increased durability of both functional and structural components, (b) smart materials and monitoring including predictive modelling (c) lightweight materials and (d) increase recyclability of materials and components. These five objectives will be developed considering three main pillars addressing all those aspects related to (1) Scalable manufacturing technologies and easy to repair solutions, (2) Safer-by-design materials avoiding environmental concerns and ocean impacts and (3) Standardisation aspects for effective European deployment of marketable and usable technologies.

The following specific objectives are set:

Objective 1: Increasing durability/anticorrosion of metallic materials for atmospheric and splash areas

Objective 2: Increasing durability of non-metallic materials for structural components

Objective 3: Long-term durability of antifouling coatings without biocides

Objective 4: Increasing stiffness and strength and reducing weight of larger blades

Objective 5: Leading-edge protection systems with increased erosion resistance

Objective 6: Monitoring and predicting structural health and corrosion for preventive maintenance

Objective 7: Implementing circular use of blade materials at prototype level

Objective 8: Demonstrating scalable manufacturing technologies

Objective 9: Standardisation and regulation

Objective 10: Assessing the economic viability, environmental and social impact of the proposed solutions

Trabajo realizado desde el comienzo del proyecto hasta el final del período abarcado por el informe y los principales resultados hasta la fecha

Current periodic report of MAREWIND (MAterials solutions for cost Reduction and Extended service life on WIND off-shore facilities) project is the period M18 to M36 (1st June 2022 to 30th November 2023).
MAREWIND is divided in eight WPs. During first 18 Month of the project WP1 Definition of requirements and WP2 Fabrication and testing elements individually have been completed and Milestone 2 (M2- Selected formulation passing relevant laboratory standards and characterisation) was reached. WP3 Structural Health Monitoring (SHM) tools and predictive modelling for preventive maintenance of wind energy has drawn on 85% at Month 36 and Milestone 1 (M1- Initial data from the models previous to validation) was reached on Month 12.
WP4 Techcnologies Validation and Manufacturing started on Month 16 and fisnished on Month 36 on which Milestones 3 and 4 have been reached with validation of technologies and construction of prototypes to be tested in WP5. WP5 "Technologies demonstration in relevant environment" started on Month 30 and the testing on sites selected as relevant environment has started.
On WP6 Technical Validation of results LCC, LCCA & SLCA first results have been obtained on execution of the workpackage. Work of all the partners has been of main importance on WP7 Dissemination, exploitation and Stakeholder Engagement, covering all the value chain. WP8 day to day and overall project management has been carried out during Month 19 to Month 36 of the project, including also Data Management Plan (DMP).

Avances que van más allá del estado de la técnica e impacto potencial esperado (incluida la repercusión socioeconómica y las implicaciones sociales más amplias del proyecto hasta la fecha)

Over the past 15 years, wind energy has experienced a remarkable growth in Europe. A key factor in the rapid development of the offshore wind industry is the substantial reduction in the Levelised Cost of Energy (LCOE) experienced in the past few years, which enhanced and stimulated investors' interest in the industry. In order to achieve and maintain the expected cost reductions and ensure the cost competitiveness of offshore wind in the energy sector, MAREWIND project will work on different technologies to optimise CAPEX and OPEX, including improvements on performance and decommission, which will lead to a LCOE reduction. Offshore wind farms are designed to resist the more challenging wind regime offshore, and require additional corrosion protection and other measures to resist the harsh marine environment.
MAREWIND project will work on different materials and technologies as costs associated with this are also important. The technology concepts of MAREWIND linked to previous research knowledge and activities within the consortium are based on: anticorrosion protection for metallic elements,

increasing durability and corrosion resistance of non-metallic materials for structural components, antifouling coatings in steel componenets and polymeric elements, increasing mechanical performane of larger blades, recyclable by-design materials, supporting monitoring and modelling and in situ repair technologies.

general

Última actualización: 8 Julio 2024

Permalink: https://cordis.europa.eu/project/id/952960/reporting/es