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ReBlade – Extending the Life of Wind Turbines Through Re-blading

Abstract

The **ReBlade** project focused on the development and demonstration of an innovative solution aimed at extending the operational life of wind turbines. By leveraging advanced composite materials and design techniques, ÉireComposites aimed to increase the viable life span of wind turbines and reduce damage and degradation caused by environmental factors like UV radiation, erosion, and mechanical stress. The project provided a sustainable and cost-effective method for blade refurbishment, enabling wind farm operators to maximize the lifespan of their assets, reduce operational downtime, and lower maintenance costs. This policy brief outlines the main achievements of the ReBlade project and its potential impact on the wind energy sector.

Research Outcomes

The **ReBlade** project has achieved several noteworthy objectives including:

- Development of a methodology to retrofit existing wind turbines with highly efficient rotor blades
- Design and manufacture of a sustainable and recyclable full-scale wind turbine blade
- De-risked the performance of wind turbine blades through a series of structural tests

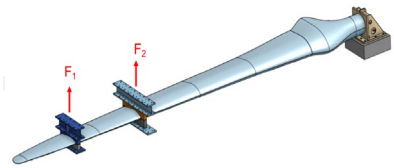

Figure 1 Structural Testing Demo

- Feasibility verification of using thermoplastic resin to manufacture large scale composite structures

Impacts on the Current Landscape

The commissioning of fully recyclable wind turbine blades should be considered as the only option in the near future.

The overall environmental benefit of commissioning a new wind farm that utilises fully recyclable turbines is significant; it is estimated that a new wind farm with intrinsic re-blading plans can operate for 30 years and be profitable after just 9 years.

Figure 2 Re-blading of a Wind Turbine

The project also showed that new blade designs can capture roughly 5% more energy than old designs from the 1990s, thus creating further environmental benefits.
The outcomes of the project will contribute to extending the life of existing wind farms and make future farms more sustainable. In the longer term, the project will contribute to a reduced levelized cost of energy for consumer.

Recommendations

Ireland has extensive offshore wind resources which have not yet been harnessed. The recyclable technologies developed in **ReBlade** can make the commercialisation of these resources more sustainable.
The findings of the project will also help operators of existing turbines extend the life of currently operational onshore wind farms.
The findings of the **ReBlade** project will help policy makers understand the benefits of both re-blading wind turbines and using sustainable materials. It is anticipated that this will lead to policies and supports that extend the life-expectancy of windfarms as well as the use of more sustainable materials for future wind projects.

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