



EUROPEAN RECYCLING & CIRCULARITY  
IN LARGE COMPOSITE COMPONENTS

## Newsletter 04

November 2024



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Dear Reader,

Welcome to **Issue #4** of the EuReComp Newsletter!

In this edition, we're excited to showcase the remarkable progress made in Work Package 3 (WP3) and Work Package 6 (WP6), both of which play a vital role in promoting circular economy principles within the composite materials industry. WP3 focuses on the innovative repurposing and repair of end-of-life (EoL) components, successfully transforming EoL wind turbine blade segments into functional floats for small-scale photovoltaic (PV) systems while developing novel repair strategies to extend component life. Meanwhile, WP6 emphasizes safety and sustainability assessments, combining risk and safety evaluations with life cycle assessments and techno-economic analyses to identify best practices and environmental benefits. Together, these work packages are crucial in addressing the challenges of composite waste management, enhancing resource efficiency, and promoting sustainable practices across the project.

Enjoy exploring the progress and achievements within EuReComp, and stay connected with our project through our website and social media channels! ”

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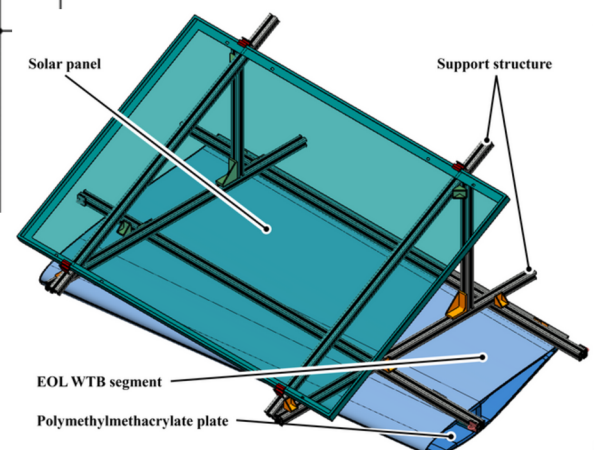
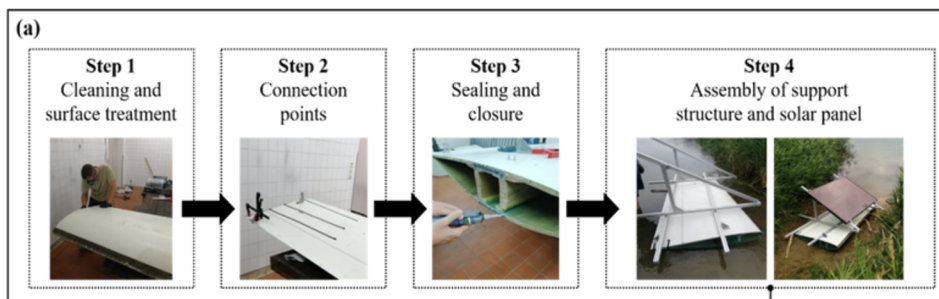


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## “ WP3: Circularity by repurposing and repair – design-assisted ”

“ WP3 focuses on promoting circular economy principles through the innovative reuse and repair of end-of-life (EoL) components, particularly wind turbine blades (WTBs). This work package has made significant strides in developing practical solutions for composite waste management, supporting the overall objectives of the EuReComp project.

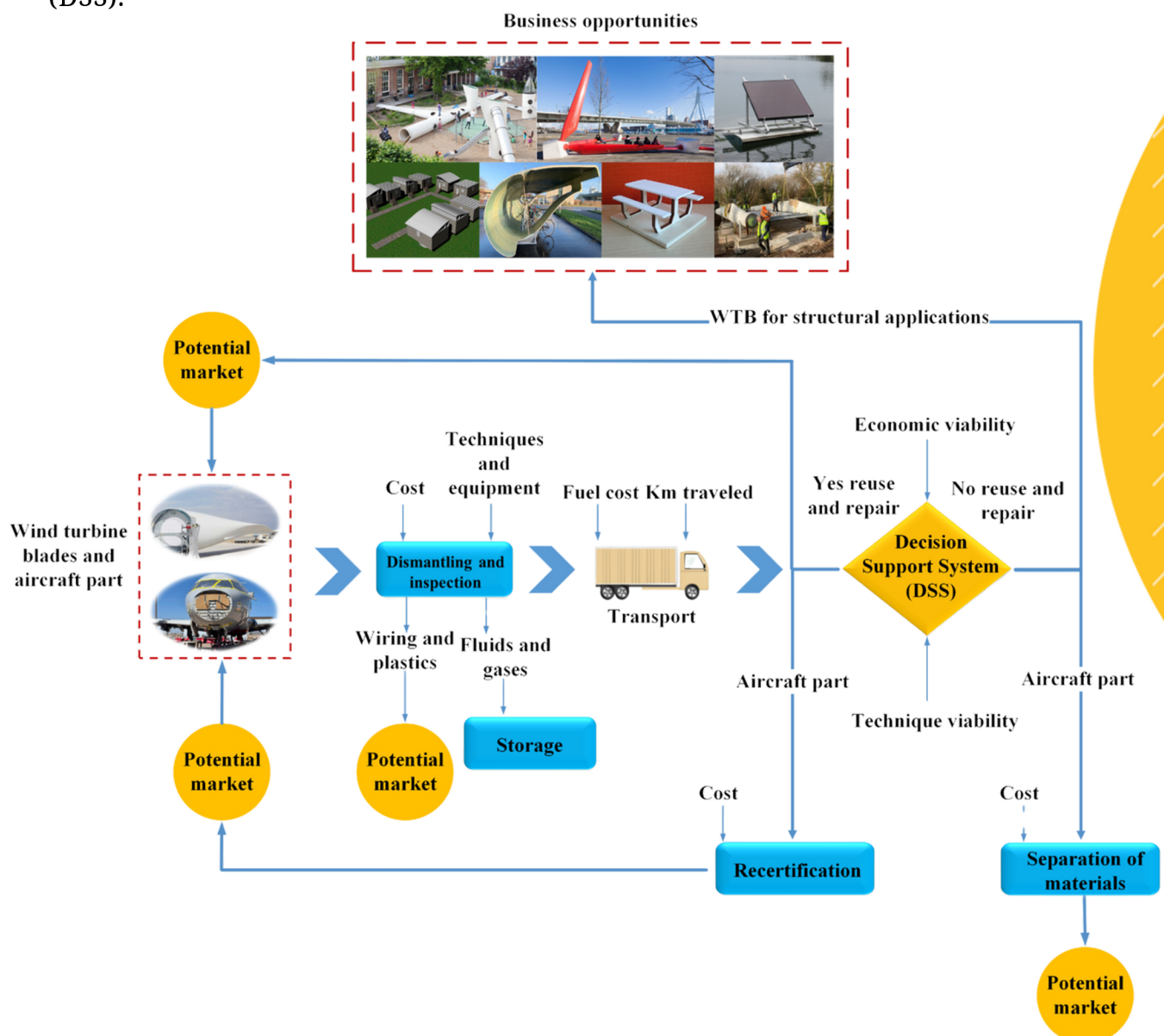
Key achievements, by partners from HTWK, include the successful repurposing of an EoL WTB segment into a functional float for a small-scale photovoltaic (PV) floating system. Contributions from project partners encompassed material selection, structural design, and testing of buoyancy and stability. Preliminary results from floatability tests have shown promise, indicating the viability of the system. Deliverables submitted include the initial design, testing reports, and a preliminary life cycle assessment (LCA) that highlights the environmental benefits of this approach.



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## “ WP3: Circularity by repurposing and repair – design-assisted ”

“ Additionally, a sustainable business guide was developed, by AIMEN, to evaluate business models from a sustainability perspective. This guide integrates the entire value chain and stakeholders through inspection and analysis activities, setting technical thresholds, disassembly, transportation, and a Decision Support System (DSS).



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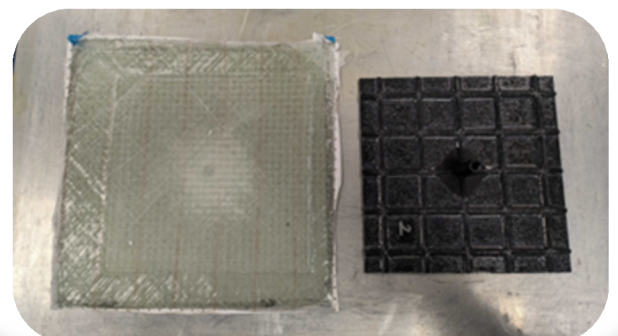
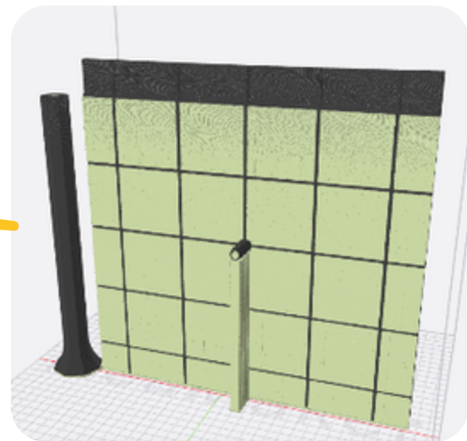
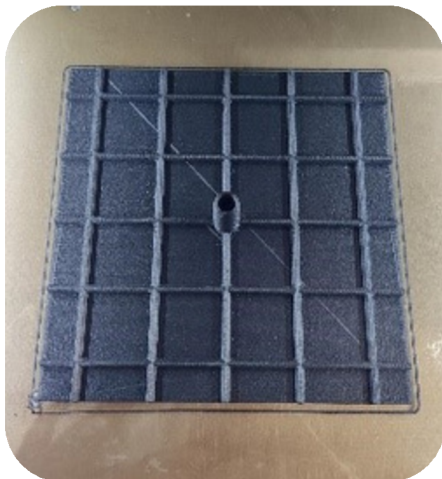
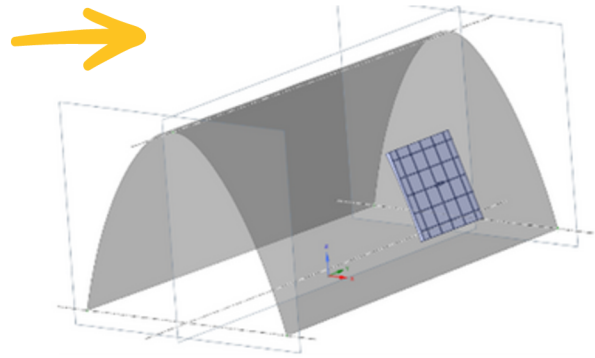
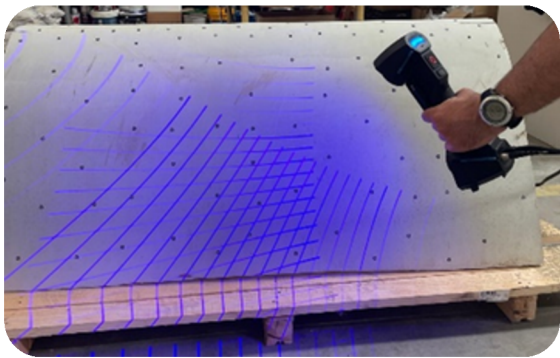
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## “ WP3: Circularity by repurposing and repair – design-assisted ”

“ In the realm of repair strategies, a novel approach using soft-patch infusion was introduced by partners ITA and BioG3D, employing rigid 3D-printed tools as an alternative to traditional flexible blankets. This innovative technology aims to improve the quality of repairs for WTB composites while utilizing custom, reusable tooling made from potentially recyclable materials. Activities included a comprehensive review of damage types, benchmarking materials, conducting infusion trials, and designing 3D CAD models for rigid caul plates. Initial infusion trials have been conducted to evaluate the application and optimize the repair process. ”



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“ WP3: Circularity by repurposing and repair – design-assisted ”

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- *What's Next for WP3*

Looking ahead, the next steps for WP3 involve scaling up the PV-floating system to support multiple solar panels and incorporating additional EoL WTB materials into the support structure. Future deliverables will include a testing report on material performance, an economic feasibility analysis for the floating PV system, and validation of the repair strategies developed. The objective is to ensure the successful market insertion of repurposed and repaired components, aligning with EuReComp's goals of promoting reuse and repair strategies for large composite components that currently lack effective solutions.

Through these efforts, WP3 significantly contributes to reducing environmental impact, increasing resource efficiency, and enhancing the lifecycle of composite parts before recycling or reuse.

- **Contribution to the EuReComp Scope:**

Promoting circular economy principles through the reuse of end-of-life (EoL) wind turbine blade (WTB) components addresses the critical challenge of composite waste management, especially for glass fiber-reinforced composites. This initiative aligns with EuReComp's goals of reducing environmental impact, increasing resource efficiency, and enhancing reuse strategies for large composite components.

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### “WP6: SEP Benchmarking: Safety-Environment- Performance”

“ WP6 focuses on safety, environmental, and performance assessments of the EuReComp project materials, R6 strategy processes, and demonstrators. This work package is dedicated to comprehensive evaluations that combine risk and safety assessments, environmental life cycle assessment (LCA), techno-economic analysis (TEA), life cycle costing (LCC), and socio-economic analysis. Work Package 6 (WP6), led by IRES alongside the University of Patras and SUT, is making significant strides in evaluating risk and safety aspects. Key achievements on IRES work include:

- **Risk and Safety Assessment:** The risk and safety aspects of the project's diverse work environments have been thoroughly evaluated. Risk awareness leaflets were distributed to partners, providing quick reference points for hazards and best practices for process operators. Additionally, computational fluid dynamics models were employed to trace airborne substances based on ventilation conditions in high-temperature work environments.
- **Environmental Evaluation:** The solvolysis process has yielded credits from recycled carbon fibers that replace virgin materials. Moreover, the project benefited from the absorption of NO<sub>x</sub> gases in a wet scrubber, with the scrubber liquid being reused as a pre-treatment medium. Hotspot analyses identified critical areas for improvement, allowing for sensitivity analyses that suggest alternatives to reduce environmental impacts.
- **Life Cycle Costing and Economic Analysis:** Data gathering and updates for solvolysis processes were completed, leading to the creation of a Life Cycle Inventory (LCI) for both chemical- and plasma-enhanced solvolysis processes, including a demo use case for infusion. Preliminary LCC analysis and a techno-economic literature review on solvolysis have identified cost hotspots.

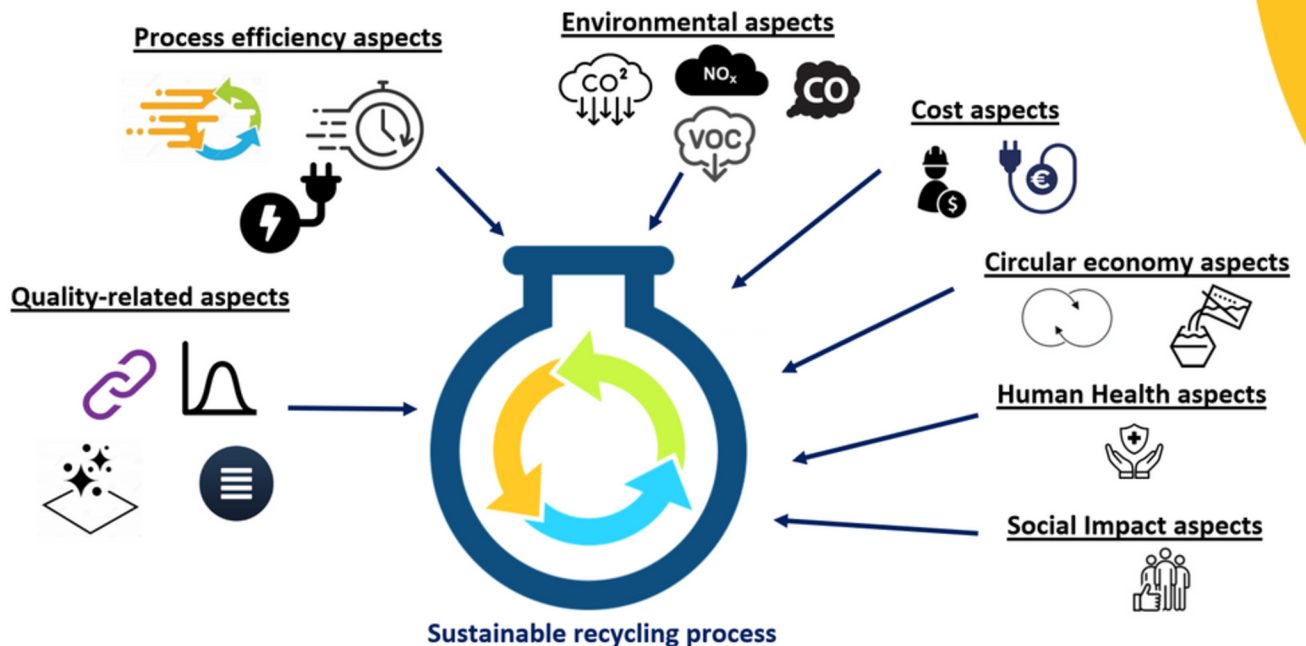
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### “WP6: SEP Benchmarking: Safety-Environment- Performance”

The University of Patras is also making strides in developing a comprehensive assessment tool for composites recycling processes, emphasizing sustainability considerations within the EuReComp project. This tool aims to aid decision-making by identifying the most sustainable recycling processes, supported by data analyses from project partners, including LCA, LCC, social LCA (sLCA), and health and safety factors.

The first version of the holistic assessment tool is now available for experimentation, with further development planned towards its second and final version by the project's conclusion. This user-friendly tool evaluates the holistic sustainability of composites recycling processes, incorporating aspects related to process efficiency, environmental and economic criteria, and social impact. It utilizes Multi-Criteria Decision-Making (MCDM) methodologies to ensure a comprehensive assessment of sustainability factors. The concept of holistic sustainability in a recycling process is illustrated below.



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### “WP6: SEP Benchmarking: Safety-Environment- Performance”

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- *What's Next for WP6*

Looking ahead, WP6 will evaluate occupational exposure to airborne particles during the manufacturing of the EuReComp demonstrator through on-site measurements. A comparative analysis between EuReComp composites and conventional composites will identify changes to the environment. Upcoming activities will also include LCC analysis across all processes and techno-economic analysis of pre-treatment methods, recycling processes, and demo use cases. The results will be utilized in a holistic Index Tool to aid in selecting optimal recycling processes, facilitate comparisons with conventional systems, and identify hotspots needing further attention across project value chains.

- **Contribution to the EuReComp Scope:**

The contributions from IRES and the University of Patras are crucial for the overall EuReComp project scope, enabling a comprehensive evaluation of the holistic sustainability of recycling processes for composites, particularly CFRP. This work will facilitate benchmarking against current techniques and future recycling methods, providing valuable insights to optimize and advance recycling practices in the field.

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### “ Events / Conferences / Exhibitions ”



*The EuReComp project team embarked on a journey to Leipzig, Germany for our **30-Month Progress Meeting**.*

*EuReComp team successfully participated in the **14th EASN International Conference***



***Open Survey:** Recycling and circularity in large thermoset composite components.*

**Take part here!**



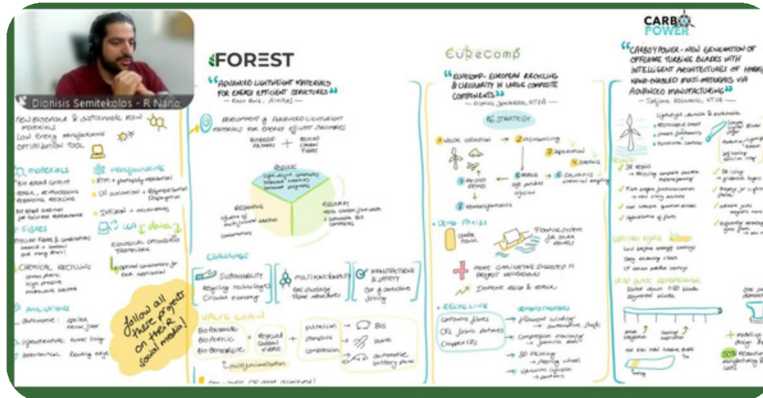
*The **EuReComp Webinar Series** of 2024 continues.*



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### Events / Conferences / Exhibitions



**EuReComp Shines at REPOXYBLE-Organized Workshop on Sustainable Recycling**

**EuReComp team successfully participated in ECCM21.**



**Taking part in the EuroScience Open Forum in Katowice, Poland**



**Team members participated in EU workshop on Sustainable Advanced Materials**



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## “ Our Team ”



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01.04.2022

48 months

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