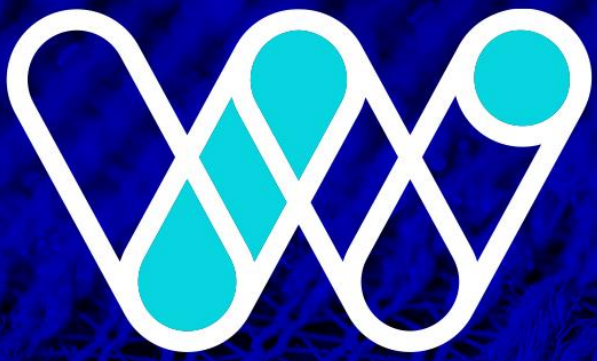

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Abstract WhiteCycle

PET is widely used in plastics and textiles leading to over 20 Mt/y of complex waste worldwide for which no closed loop recycling is viable today. Most complex waste is landfilled or incinerated. There is an urgent need to develop a circular solution to convert complex PET wastes from plastics and textiles back into high-added value products.

WHITECYCLE unites 3 brand-owners, 1 PET converter, 2 waste managers, 1 digital deeptech for smart sorting, the world leading enzymatic recycling SME, 1 LCA company, 3 UNIs/RTOs, 1 cluster and 1 management firm. They aim to demonstrate two new processes combining strong scientific and industrial know-how: (i) innovative identification, sorting and separation technologies that will dramatically increase the PET content of complex waste streams to 80%, and (ii) a disruptive enzymatic recycling process that is expected to yield pure PET monomers sustainably even for impure waste streams. PET monomers obtained will be repolymerised and recycled. Thus, 2 t of waste will be used to demonstrate 3 highly technical PET-containing pilot series: 100 tyres, 1,500 m of lay-flat hoses and 400m2 of multicomponent fabric that will be coated and used to manufacture 4 lines of technical garments. Process design kits, LCA and production cost estimates will be provided to PET manufacturers and waste management companies for rapid deployment and assure social acceptance. First projections show that WHITECYCLE's recycled PET will be competitive with virgin PET.

The project will conduct a full circle loop from real complex waste feedstock to representative product of the 3 use cases at TRL 5. Then, a strong upscale study will allow the process steps to reach TRL 6 to 8. By 2030, WHITECYCLE will enable the annual recycling of more than 2 Mt of PET, which corresponds to the amount of additional recycled PET needed to meet the EU's 2030 targets. This will reduce emissions by around 2.06 Mt CO2eq and avoid the landfilling of more than 1.8 Mt of PET.

The WhiteCycle project is an ambitious endeavor, and to achieve its objectives, key steps were actively undertaken during the first 18 months of the project: Macro-sorting identification and fiber/matrix separation in WP1, Amorphization in WP2, Enzymatic depolymerization and purification in WP3, and polymerization in WP4.

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