

## **REWIND PROJECT: ENZYMATIC RECYCLING OF WASTE COOKING OILS FOR THE PLASTIC INDUSTRY**

Antonino Biundo, Ph.D.,

*Greenoil s.r.l., Rewow s.r.l., Department of Biosciences, Biotechnology and Environment,  
University of Bari Aldo Moro*

**Abstract:** The development of synthetic plastics has changed our world and currently several types of plastics are found in different applications. Most of the plastics comes from fossil resources and they are non-biodegradable materials causing a serious threat for the environment. Bioplastics are mostly produced from food resources which are not sustainable. For these reasons, the solution can be the use of waste. REWIND aims at the valorization of waste products through their enzymatic transformation following a circular economy approach. The production of monomers and polymers was capitalized through the test of different recombinantly produced enzymes. The enzymatic transformations was tested using single enzymes or a cocktail of biocatalysts to identify the potential of the biocatalytic cascade. The use of enzymes, and their further engineering, can reduce the utilization of harsh reaction conditions and chemicals, such as organic solvents and metal catalysts. The produced bio-based polymers was tested in terms of thermal and mechanical properties. In order to identify the steps that could be improved to reduce the impact sustainability assessment of the process and the products' life was carried out based on Green Chemistry principles and metrics. Different polymers were produced and tested to identify specific applications.