Plastic, Packaging

Strategies to solve the problem of hardly recyclable Packaging Materials

Bio-Waste

Extracting valuable compounds from different Bio-waste streams

Water

Water Symbiosis Strategies in Industry, Agriculture, and Urban contexts

CIRCSYST Circular Systemic Solutions

PLASTIC • PACKAGING • BIO-WASTE • WATER

Demonstrator 6

Valorisation of brewer's spent grain

C. VALENCIANA & CASTILLA LA MANCHA, SPAIN

CIRCSYST | Circular Cities & Regions Initiative

UK Research and Innovation

Funded by the European Union

Start 2024

36 mo

€ 10.24 M

32 partners

9 pilots /
8 regions

About CircSyst

Resource extraction is responsible for nearly half of global greenhouse gas emissions and the vast majority of biodiversity loss. With 90% of world economy still linear, plastics, water and bio waste are treated as single use commodities rather than valuable resources. The CircSyst project addresses this challenge by developing Circular Systemic Solutions (CSS) that drive sustainable, circular economic models.

Over 36 months, 32 partners led by AIJU will run nine large-scale pilot systems spread across eight European regions, targeting three priority value chains from the EU Circular Economy Action Plan: water management, bio-waste valorisation, and plastics & packaging. The pilots exchange by-products and know-how so that, for example, a plastic fraction recovered in Greece can feed a recycling line in Spain. In this way, CircSyst forms an industrial-symbiosis network that supports the EU's Circular Cities and Regions Initiative (CCRI) and provides replicable and scalable solutions.

Giving New Life to a Brewing Byproduct: The Valorisation of Spent Grain

Each year, millions of tons of **brewers' spent grain** are produced across Europe. This byproduct of the brewing process—mainly composed of grain husks and residues—accounts for 85% of a brewery's solid waste.

While traditionally used as animal feed or compost, spent grain is **rich in valuable bioactive compounds**, such as:

- **Proteins** – for use in food, supplements, and animal feed
- **Polyphenols** – with antioxidant properties, ideal for cosmetics and nutraceuticals
- **Fibres** – functional ingredients in food or reinforcements in plastic materials

Demonstrator 6, led by UPV, focuses on extracting these compounds and using them in high-value applications—supporting the **circular economy** and the creation of innovative, sustainable products.

Who is involved?

The development of **Demonstrator 6** is being carried out on two levels:

1. Laboratory scale at the UPV's **Alcoy Campus**, where the extraction conditions for the compounds of interest are being optimised by assembling a pilot plant, and optimal characterisation methods are being determined.
2. Semi-industrial scale in **Castilla-La Mancha**, at the facilities of **L. Pernía S.A.**, where the results obtained in the UPV laboratory will be applied to a pre-industrial environment.

This demonstrator also includes the formulation of plastic matrix composite materials with the resulting fibre, which will be used to manufacture marketable chairs and pallets. Several entities are collaborating, including **AIJU, ACTECO, RIPAY,** and **CABKA**, to close the recovery loop for this agri-food waste.

CIRCSYST

Circular Systemic Solutions

Circular solution from brewery waste

Circular valorisation based on BSG

Sustainable circular approach through BSG reuse

PARTNERS

Universitat Politècnica de València

L. Pernía

aiju Technological Institute for Children's Products & Leisure

ripay Mobiliario

acteco

Cabka

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