

## UPSCALING DEEP CONVERSION ROUTES FOR HARD-TO-RECYCLE BIOGENIC WASTE

<https://www.upcycle-project.eu/>

As prevention strategies are struggling with respect to some waste categories, biogenic hard-to-recycle streams represent a critical issue, hindering circular bioeconomy and resulting in severe environmental pollution phenomena. The Waste Framework Directive and the EU Green Deal indicate the need for developing pioneering value chains to address the challenge in compliance with sustainability targets. A set of promising thermochemical processes emerged, both in dry (pyrolysis, gasification) and wet aqueous (hydrothermal carbonisation, hydrothermal liquefaction) phases, with their application still limited by technical and non-technical barriers.

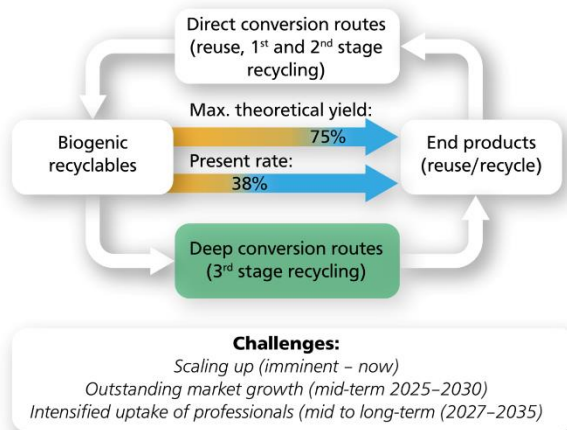
### Rationale

#### Waste feedstock from industry and agriculture:



#### 80% of chemical recycling:

**Aqueous** (hydrothermal liquefaction/carbonisation)  
**Oxidising/inert** (gasification, pyrolysis)



The **UPCYCLE project is a Marie Skłodowska-Curie (MSCA) Doctoral Network** that will train the next generation of professionals in the upscaling of such deep conversion technologies for hard-to-recycle biogenic waste and will provide innovative tools for the design of feasible waste upcycle solutions to high-value secondary materials.

Such ambition will be achieved by developing an integrated methodology combining cutting-edge experimental and modelling techniques at various scales (molecular, reactor and process) and by covering the entire value chain in continuity with relevant stakeholders.

Several priority waste streams will be targeted, namely highly contaminated and poorly reactive sewage sludge and derived products from municipal and industrial wastewater treatment as well as highly contaminated lignocellulosic materials.

The UPCYCLE partners will work synergistically to generate a cohort of well-trained young researchers with a unique multi-disciplinary set of skills, not limited to technical ones, with the goal of making them the future research leaders or entrepreneurs capable of bringing forward a paradigm shift. At once, the project will pave the way for large-scale deployment of sustainable technologies on which a new generation of biorefineries could rely.

**Applications are invited for [15 Ph.D. positions](#)** (DC1-DC15) available in **6 European Universities** (Politecnico di Milano - IT, University of Ljubljana - SLO, KU Leuven - BE, University Rey Juan Carlos - ES, "La Sapienza" Università di Roma - IT, TU Darmstadt - DE) leading to the award of a Ph.D. degree.

The recruited researchers will be trained for 3 years and will receive the Ph.D. degree from the hosting institution. Two secondment periods are foreseen for each candidate: one 6 month secondment in another hosting academic institution and a second 3 months period hosted by one of the **Associated Industry Partners** (CarboREM Srl - IT, Cap Holding S.p.A - IT, Sulzer Chemtech Ltd - CH, IOS, Vyncke N.V. - BE, Indaver N.V.- BE, Ingelia S.L.-ES, NextChem S.p.A - IT).

**[Two DC positions](#)** in the area of chemical kinetics and reactor modelling are available **at the [CRECK Modeling Laboratory of Politecnico di Milano](#)**. Details are provided at the links below.

[DC3 – Development of detailed chemistry models for HTC/HTL of hard-to-recycle biogenic waste streams](#)

[DC4 – Development of detailed chemistry models for pyrolysis/gasification of hard-to-recycle biogenic waste streams](#)

Apply [here](#) by the 31<sup>st</sup> of March 2025.

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