

Establishing a multi-purpose biorefinery for the recycling of the organic content of Absorbent Hygiene Products waste in a circular economy domain

60
months

7
countries
involved

€ 10,500,000 EU funding
€ 17,200,000 total cost

13
consortium
partners

**10,000 tons/year of Absorbent Hygiene Products
(baby diapers, fem care, adult incontinence)
waste that will be upcycled into valuable materials**

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Horizon 2020
European Union Funding
for Research & Innovation

EMBRACED

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INNOVATIVE PROJECT SCOPE

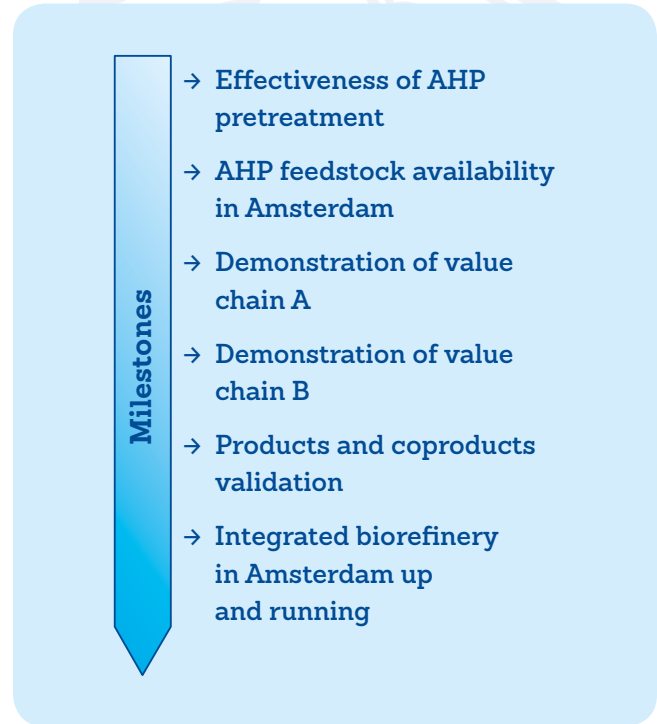
The **EMBRACED** project intends to demonstrate in a relevant industrial environment a circular model of integrated biorefinery based on the valorisation of the cellulosic fraction of post-consumer Absorbent Hygiene Products (AHP) waste towards the production of biobased building blocks, polymers, and fertilizers

PROJECT APPROACH

- **CASCADING APPROACH:** all fractions from the process will be valorized to obtain marketable end-products fully competitive with the respective fossil-based counterparts or other benchmark biobased products, in terms of cost, quality and sustainability
- **CIRCULAR ECONOMY APPROACH:** the cycle of raw materials will be closed and the use of primary resources will be minimized through the establishment of virtuous models of cooperation among the stakeholders involved along the whole value chain

PROJECT BACKGROUND

- **AHP** waste, which is currently considered a non-recyclable fraction, represents between **2-4% of the total Municipal Solid Waste**
- **Fater** in the last years has **developed and patented an innovative recycling solution** for post-consumer AHP waste, already demonstrated at 1,500 t/year in Lovadina di Spresiano (TV – Italy) in cooperation with the waste operator **Contarina**



MAIN PROJECT OBJECTIVES

Feedstock

- Recovery of 3 high purity fractions: **cellulose**, **plastic fraction** and **Super Absorbent Polymer (SAP)**
- Enhanced quality of cellulose by reducing the SAP content from 50% to 5%

Conversion of AHP waste cellulose into building blocks and polymers

- Demonstration of an innovative pretreatment technology for the obtaining of fermentable sugars from **AHP waste cellulose to be converted through first of its kind biotech process into biobased building blocks of industrial interest**
- Demonstration of **conversion of syngas from AHP waste into biodegradable Polyhydroxybutyrate (PHB)**
- **Demonstration of biobased and biodegradable polyesters formulation suitable for packaging applications**

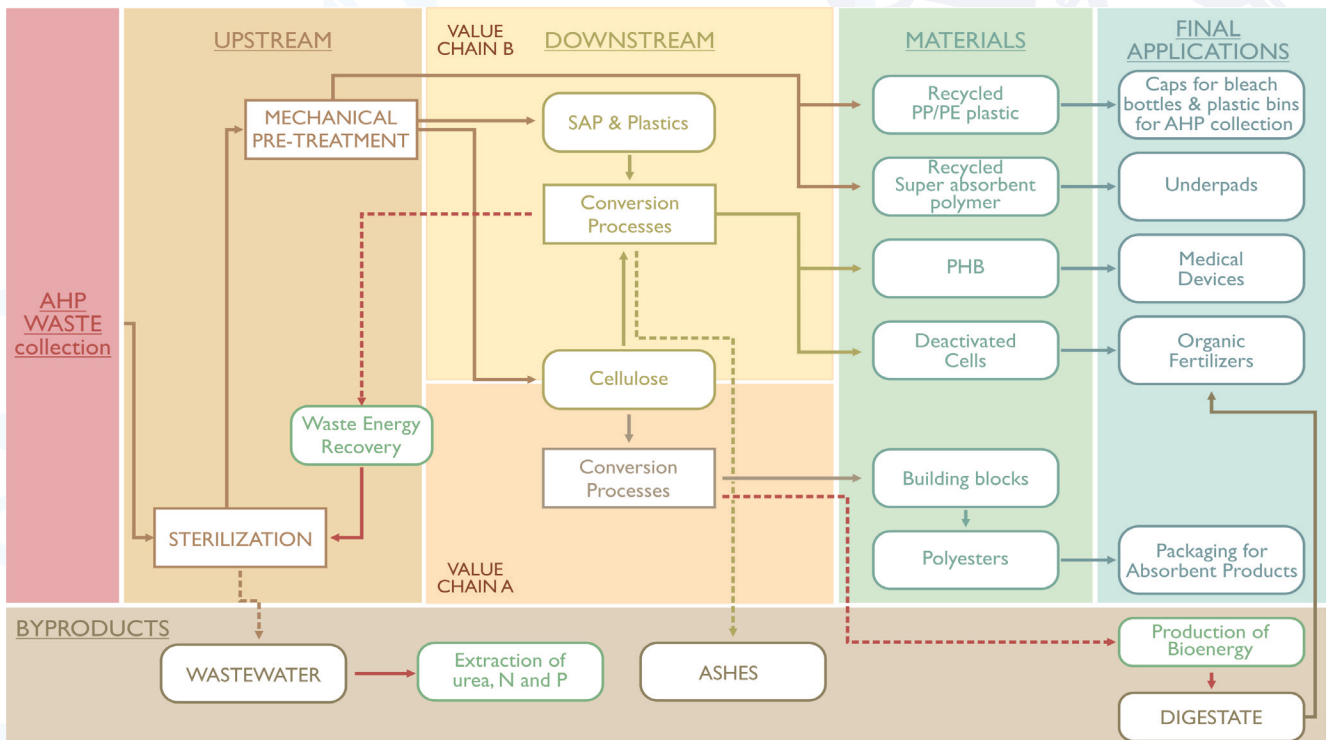
Validation into final products:

- Recycled plastic fraction into **plastic bins and caps**, deactivated cells from PHB fermentation into **organic fertilizers**, PHB into **medical devices**, biobased polyesters into **films for non-food packaging applications**, recycled SAP into innovative **absorbent underpads**

Recovery of high value molecules & production of bio-energy:

- Design of a system for **recovery of phosphate, ammonium, potassium and urea contained in wastewater** from AHP pretreatment process
- **Valorisation of by-products from fermentation into bio-energy production**

Realization of a demonstration plant of the integrated biorefinery in Amsterdam at 10,000 t/year capacity



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