

Integrated Catalytic Recycling of Plastic Residues Into Added-Value Chemicals

This project has received European Union's Horizon 2020 research and innovation funding under grant agreement N° 820770.









Event Information

H2020-NMBP-SPIRE GA No. 820770





1. Challenge: Closing the Plastic Recycling Loop

• 27.1 Mt/year Plastic waste recovered in EU

• Only ca. 31% is efficiently recycled

- 70 % \cong 18.5 Mt/year NOT RECYCLED
 - ---→ 42% Incineration
 - ···→ 27% Landfill

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Plastic Recycling and Valorisation Added-Value Chemicals (alkyl-aromatics)

Energy efficiency Sustainability

iCAREPLAST addresses the **cost and energy-efficient recycling** of a large fraction of today's non-recyclable plastics and composites. The process combines **chemical routes** (catalytic and separation steps) to produce **valuable chemicals**.



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3. SPIRE Integrated Catalytic Recycling of Plastic Residues Into Added-Value Chemicals

Responding to Call: H2020-NMBP-SPIRE-2018

Plastic Recycling Process

EC contribution: 6.51 M€ Duration: Oct. 2018 – Oct. 2022

- → Improved energy and resource efficiency (LCA, LCC).
- → Integration with the relevant value chain.
- → Flexibility. Ensured supply of raw materials.
- ---- Quality/specifications of the yielded streams ensuring their usability .
- → Non-technological hurdles to enable the prompt deployment in industry of the developed concepts and economic indicators.



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4. Ambition

Plastic Recycling



Added-Value Chemicals

Energy efficiency
Sustainability

Demonstration of the whole technology for plastic waste valorisation in a pilot plant able to process >100 kg/h of plastic (TRL-7)

- ✓ Chemical recycling.
- Production of high valuable chemicals.
- Maximisation and complete exploitation of currently non-recyclable plastic waste.
- Improvement of process efficiency to reduce the carbon footprint and ensure the viability and sustainability.

Adaptable to other waste materials (e.g. biomass).

Involved technologies/developments can be exploited in many other industries.





6. Concept Added-Value Energy efficiency **Plastic Recycling** Chemicals Sustainability Liquified Alkyl **BTX** CO_2 aromatics TRL-7 Non-recycled FRACTIONATIO packaging waste --- Control and End-of-life composites **Optimisation** OXYCOMBUSTION → Artificial Intelligence **Dirty plastics** from MSW PYROLYSIS → Life Cycle Engineering ALKYLATION Carbon char H2020-NMBP-SPIRE **Event Information** REPLAST GA No. 820770 Sustainable Process Industry through Resource and Energy Efficiency 9



8. Expectations*

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Indicator	Q icareplast Impact
Pyrolysis Liquid Yield	个12%
Energy Required (MJ/kg plastic)	√45%
Residues Production	√95%
Economic Yield (€/kg plastic)	↑ 200%
Raw Material	Up-cycling of nowadays non-recycled plastics
Products	Virgin-like commodities
Plant Capacity	Over 140,000 ton of plastic waste in 5 years
Number of Installation	29 plants around Europe in 5 years
CO ₂ emissions	√40%

*Compared to benchmark recycling processes applying thermal conversions.

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CAREPLAST

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