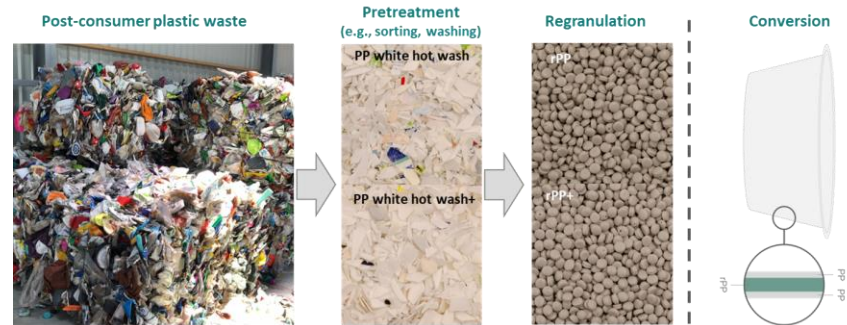


**CHASE****Chemical Systems Engineering**

Programm: COMET – Competence Centers for Excellent Technologies

Programme line: COMET-Zentrum (K1)

Type of Project: Circular Process Streams, multi-firm MFP3.1, 10/19 – 09/23



## FROM WASTE TO HIGH-VALUE APPLICATIONS: A STEP TOWARDS A CIRCULAR ECONOMY FOR PLASTICS

### A COMPREHENSIVE INDUSTRIAL STUDY ON TRANSFORMING POST-CONSUMER PP WASTE INTO HIGH-QUALITY YOGURT CUPS

With the swift advancements in waste management and sustainability, mechanical recycling has become a pivotal component in the shift towards a circular economy in the plastics sector. However, producing high-quality recyclates through mechanical recycling requires a synchronized collaboration among various stakeholders. These include consumers, waste collection systems, infrastructure, sorting facilities, and recycling companies, all working together towards the shared objective of creating high-quality recyclates.

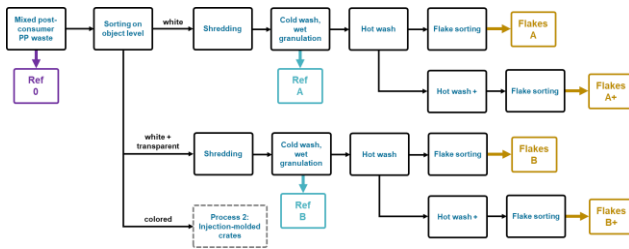
In an effort to apply the knowledge acquired during the first funding period, a collaborative industrial-scale study was conducted in partnership with the National Test Center for Circular Plastics (NTCP) in Heerenveen, Netherlands, along with LIT Factory, Greiner AG, and ENGEL Austria GmbH. The primary objective of the study was to execute a recycling process with focus on the quality attributes of the final product, ultimately generating high-quality recyclates suitable for high-value products. The input materials were primarily composed of polypropylene

(PP) sourced from household post-consumer waste in the Netherlands, while the goal was the production of white yogurt cups. The study aimed to:

- Investigate the impact of pretreatment setups on PP recyclate and related products.
- Showcase the utilization of PP waste stream as input material for high-quality products.
- Monitor changes in material properties throughout a comprehensive recycling process.
- Identify necessary modifications to meet the requirements of a predetermined pilot product.

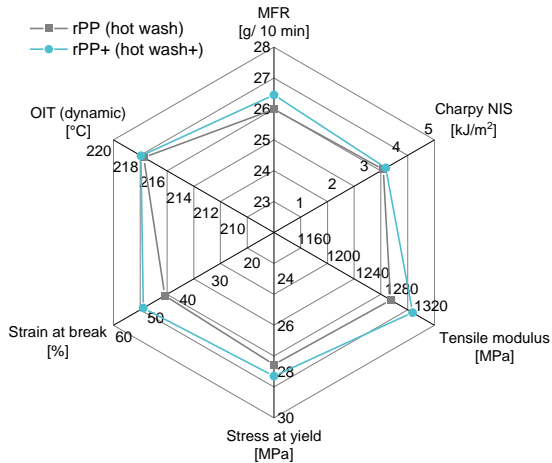
The study unfolded in three key stages: waste treatment, regranulation, and conversion. The initial phase occurred at facilities of NTCP, where the input stream underwent meticulous sorting to achieve a pure output of white PP. Subsequently, materials underwent washing with two distinct setups with the objective to assess the influence on enhancing the quality of the final product (Figure 1).

## SUCCESS STORY



**Figure 1:** Material flow in the waste treatment phase.

Following this, the materials were transported to Linz, Austria, for the regranulation stage at the LIT Factory facilities. The resulting recyclates were then sent to Greiner AG to produce thermoformed cups. Additionally, some materials were transported to ENGEL Austria to explore the potential of direct conversion using a two-stage injection molding machine.



**Figure 2:** Variations in the property profile of the resulting recyclates due to the different washing methods.

Furthermore, a thorough examination was undertaken to acquire a deeper understanding of the material properties across the various processing stages. Observable variations emerged as a result of employing distinct washing methods. Figure 2 illustrates a comparative analysis of the property profiles of materials treated with different washing techniques.

As the project is currently being finalized, the conclusive results are pending until the project objectives are fully realized. Figure 3 displays illustrative images of cups, made of the resulting recyclates, and produced with different technologies.



**Figure 3:** Images of the final cups, made of the recyclate after being subjected to different washing setups including hot washing (left) and hot washing+ (right). The cups were produced by thermoforming (top) and injection molding (bottom).

### Project Coordination

DI Hassan Akhras  
Research Scientist  
CHASE GmbH  
T +43 664 8568519  
hassan.akhras@chasecenter.at

### Competence Center CHASE GmbH

Hafenstraße 47-51  
4020 Linz, Austria  
T +43 664 9658923  
patrick.pammer@chasecenter.at  
www.chasecenter.at

### Project partner

- JKU Linz, Österreich
- NTCP, Netherlands
- Engel, Austria
- Greiner, Austria

This success story was provided by the centre management and by the mentioned project partners for the purpose of being published on the FFG website. CHASE is a COMET Centre within the COMET – Competence Centers for Excellent Technologies Program and funded by BMK, BMAW and the provinces Upper Austria and Vienna. The COMET Program is managed by FFG. Further information on COMET: [www.ffg.at/comet](http://www.ffg.at/comet)