

PUReSmart PolyUrethane Recycling Towards a Smart Circular Economy

Newsletter - May 2020

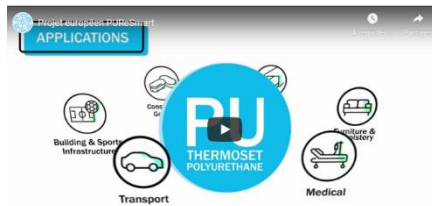


PUReSmart seeks ways of transitioning from the current linear lifecycle of polyurethane (PU) products to a circular economy model.

The PUReSmart consortium is an end-to-end collaboration spanning the entire polyurethane reprocessing value chain and gathering 9 partners from six different countries. PUReSmart is coordinated by the Belgian company Recticel and was launched on 1st January 2019 for a duration of four years. It is supported by EUR 6 million in funding from the European Union Horizon 2020 Research and Innovation Program.

PUReSmart at a glance

Click on the image to watch the video

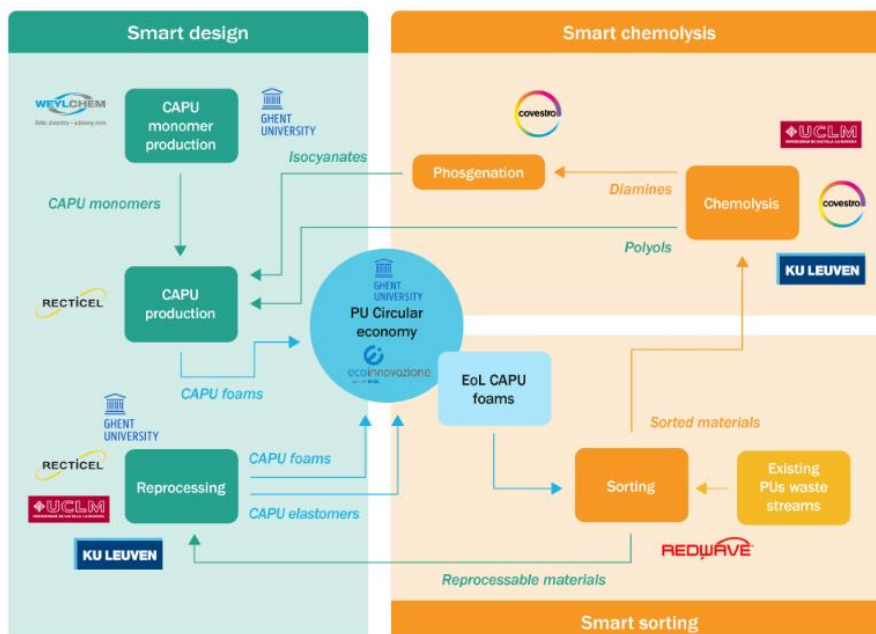


PUReSmart consortium will develop

- a chemical re-design that allows PU thermoset polymer to be recycled like a thermoplastic,
- a chemolysis technology that allows revalorisation of PU's building blocks, i.e. polyol and isocyanate.
- innovative sorting technologies to separate a diverse range of PU materials into dedicated feedstocks which will be broken down into their basic components as inputs for existing PU products and as raw materials for the newly designed polymer.

PUReSmart targets the recovery of over 90% of End-Of-Life PU with the goal of converting it into valuable inputs for new and known products. The ultimate goal is to merge the durability of thermosets with the circularity of thermoplastics.

Project organization



This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 814543.

The PUReSmart project results presented reflect only the author's view. The Commission is not responsible for any use that may be made of the information it contains.

PURSmart progress: breakthrough steps in 12 months

Thanks to the fluent and professional cooperation between all PURSmart partners, the progress obtained in one year is considerable.

The development of new chemistries in order to obtain Covalent Adaptable Polyurethanes (CAPU) is moving forward. From the several new Triazolone dione-based (TAD-based) molecules synthesized by **UGent**, two were selected and are being further investigated. The compatibilization of the TAD-based comonomers and their up-scalability are now taken into account directly during the design and synthesis of the comonomers as concerted work between **Covestro**, **Weylchem** and **UGent**. The first CAPU elastomers were obtained at **UGent**. First CAPU foams were obtained at **Recticel** using alternative non-TAD chemistries. **University of Castilla-La Mancha** performed reprocessing tests on the new polymers.

Under the leadership of **Redwave** supported by **Covestro** and **Recticel**, detection methods were found to distinguish different PU foam types. As a feedback from the "Smart Chemolysis" work package, the foam types are reorganized to enable an economical feasible but high quality chemolysis process. The water uptake, the fire retardancy present in the foams and the light weight of the material are among the challenges for the emphasized sorting technology that were tackled during the last months.

The chemical breakdown is mainly investigated by **KU Leuven**, **Covestro**, **Recticel** and the **University of Castilla-La Mancha**. Based on the screening of different chemolysing agents and separation approaches, the most industrially feasible method was selected and will be further evaluated at **Covestro**. This will give input for the process development, enabling lab-scale foaming trials with the recycled products.

Ecoinnovazione improved their data for the analysis of the sustainability characteristics of the project for the baseline scenario. The quantification of the environmental footprint of the 2030 PU-based mattresses value chain is progressing. The technological setting for the PU production, considering different feedstocks (including CO₂ and bio-based sources), has been defined. **Ecoinnovazione** is now starting the analysis of the social materiality of this value chain, and stakeholders will be invited to contribute.

Breakthrough steps in the smart chemolysis process have been reached, as shown by the two patent applications submitted by **Covestro** resp. **Recticel**, as well as by the earlier decision to build a pilot-plant for chemolysis.



Project consortium at the 12M General Assembly meeting at Covestro (Germany, January 2020)

The PURSmart project is working on a process with complete recovery of not only the polyol, but also of the isocyanate precursors (amines), which will hopefully lead to the first recycled isocyanate in the world.

The impact of PURSmart is extremely important in the treatment of End-of-Life (EoL) PU products. As today the recycling options are rather limited, the project will bring new solutions to recover valuable raw materials out of EoL materials to be re-used to make a new generation of CAPU foams. This will close the loop and create opportunities for a circular economy.

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