

Press Release

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Creating value from waste: EU Project Circular Flooring turns post-consumer PVC flooring into plasticiser-free recyclates

Freising, Germany – Following five years of intense research, the Circular Flooring consortium has proven that it is possible to produce plasticiser-free PVC recyclates from end-of-life flexible floor coverings. The solvent-based recycling process, which is operated with CreaSolv® formulations¹ jointly developed by Fraunhofer IVV and CreaCycle, can efficiently remove critical legacy plasticisers from waste PVC flooring. The recovered PVC complies with EU REACH legislation and can therefore be used to produce new PVC flooring. The project thus supports the EU objective of establishing a European circular economy. In addition, the consortium has demonstrated the technical feasibility of the process on a pilot scale, paving the way for scaling up to commercial dimensions. The Fraunhofer Institute for Processing Engineering and Packaging IVV in Freising, Germany, carried out the project together with ten companies and research facilities from five European countries. The European Union provided Circular Flooring with funding of around €5.4 million from its Horizon 2020 programme.

Polyvinyl chloride (PVC) is a very robust plastic that, thanks to its durability, is suited for use in many long-term applications, including floor coverings for residential, commercial and industrial use. However, old post-consumer PVC flooring can contain problematic plasticisers such as DEHP, which, under the terms of the EU REACH Regulation², are no longer used in new PVC floor coverings. Until now, the only method for removing these substances was thermal recovery, resulting in the wastage of valuable materials.

Successful neutralisation of critical plasticisers

In its research, the Circular Flooring consortium successfully demonstrated that recycled material from post-consumer PVC flooring could be fed back into the product cycle. The researchers developed a solvent-based recycling process for PVC floor coverings that separates the PVC from undesired plasticisers and recovers it.

¹ CreaSolv® is a registered trademark of the CreaCycle GmbH, Grevenbroich.

² Website: EUR-Lex – Access to European Union law: [EUR-Lex - 02006R1907-20231201 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/)

The PVC recyclate can be used to make new flooring products. In order to facilitate this recycling, new tailored additives and stabilizers were developed in the frame of the project.

Due to product requirements for specific colour quality, which were not covered by the project, the recyclate is not used in the top layer of PVC flooring but can replace up to 100% of virgin PVC in non-visible layers, even in the type of luxury vinyl tiles that are currently experiencing increasing popularity. Furthermore, the critical legacy plasticisers that are removed during the process can be converted into uncritical REACH-compliant substances.

“The quality of the PVC recyclate produced on a pilot scale is very good, conforming to EU standards and permitting reuse in new PVC products”, explained Fraunhofer IVV’s Dr Martin Schlummer, who coordinated the project. “Transforming the separated plasticisers into REACH-compliant products proved more chemically complex than we had at first imagined. Nevertheless, we were ultimately successful.”

New large-scale pilot plant opened in Freising

At the end of 2023, following the successful preliminary development in the laboratory, and a construction process lasting several years, Fraunhofer IVV opened a large-scale pilot plant at its premises in Freising. This was used in the Circular Flooring project to produce pure PVC recyclates. The pilot plant is also available to other sectors such as the automotive, packaging or construction industries seeking to test recyclates from solvent-based recycling and to produce them for industrial application tests. The large-scale pilot plant was funded by the Bavarian State Ministry of Economic Affairs, Regional Development and Energy, Fraunhofer IVV and the EU in the scope of Circular Flooring.

Increasing demand for recycled PVC

The Circular Flooring consortium also conducted a market survey that shows consumers and manufacturers are heavily influenced by sustainability and that demand for PVC recyclates is increasing. In addition, Europe has sufficient sources of PVC waste for recycling. “Currently there is a need to activate, join up and reinforce the collecting and processing infrastructure, especially for post-consumer floor coverings”, explained Martin Schlummer.

The partners in the project also formulated and investigated a number of quality standards relating to economic feasibility, describing realistic business cases for the production of new PVC flooring from recycled material. The project is also preparing a life cycle assessment to analyse the environmental impact of the process.

Helping to strengthen the European PVC industry

The research conducted in Circular Flooring now offers a new option for increasing the level of recycled PVC as a proportion of European plastic production. Alongside the environmental benefits, the newly developed process also offers economic advantages: it strengthens the European PVC industry and helps to create new jobs in the recycling sector.

About the EU Project Circular Flooring

[Circular Flooring](#) is a project funded by the European Commission that launched in June 2019, receiving €5.4 million in funding until August 2024 from Horizon 2020, the EU Framework Programme for Research and Innovation. The objective of the project was to recycle post-consumer PVC floor coverings by separating and removing the critical additives in order to recover PVC that complies with EU legislation for use in new flooring products. The project involved 11 companies and research institutes from Germany, Belgium, France, Greece and Austria. Circular Flooring is coordinated by the Fraunhofer Institute for Process Engineering and Packaging IVV in Freising, Germany. Additional German project partners include Bavarian Research Alliance (BayFOR), Sphera Solutions GmbH, Westlake Vinnolit GmbH & Co. KG, Lober GmbH & Co. Abfallentsorgungs-KG and AgPR Arbeitsgemeinschaft PVC-Bodenbelag Recycling GbR.

About the Bavarian Research Alliance (BayFOR)

BayFOR successfully supported the Circular Flooring consortium in preparing its application for EU funding. As a project partner, it also provided the consortium with guidance on project management and communication activities. The [Bavarian Research Alliance](#), which is funded by the Bavarian Ministry of Science and the Arts, supports and advises Bavarian scientists and stakeholders from the private sector in securing European funding for research, development and innovation. The focus is on the current Framework Programme for Research and Innovation [Horizon Europe](#). BayFOR is a partner in the [Enterprise Europe Network](#) and a partner institution in the [Bavarian Research and Innovation Agency](#).

Circular Flooring profile:

Project name: Circular Flooring (grant agreement no. 821366) - New products from waste PVC flooring and safe end-of-life treatment of plasticisers)

Duration: 06/2019-08/2024

Project partner:

- [Fraunhofer Institute for Process Engineering and Packaging IVV](#) in Freising, Germany
- [Akdeniz Chemson Additives AG](#), Austria
- [Arbeitsgemeinschaft PVC-Bodenbelag Recycling GbR](#), Germany
- [Bavarian Research Alliance](#), Germany
- [European Resilient Flooring Manufacturers' Institute](#), Belgium
- [Institut National de l'Environnement Industriel et des Risques](#), France
- [Katholieke Universiteit Leuven](#), Belgium
- [Lober GmbH & Co. Abfallentsorgungs-KG](#), Germany
- [National Technical University of Athens](#), Greece
- [Sphera Solutions GmbH](#), Germany
- [Westlake Vinnolit GmbH & Co. KG](#), Germany

Project lead: Dr. Martin Schlummer, Fraunhofer IVV

Programme: Horizon 2020

Total project sum: 5.4 million euros

Funding: European Union

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