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# ProGeo-UP – product stewardship through closed-loop geosynthetics

## Resource-efficient Circular Economy – Plastic Recycling Technologies (KuRT)

**The research team behind the "ProGeo-UP" project wants to pave the way for a complete cycle for geosynthetics. These high-quality materials for earthworks, hydraulic engineering, transport routes and landfill sites are currently mainly disposed of in waste incineration plants after demolition.**

**The project is part of the funding initiative "Resource-efficient Circular Economy – Plastic Recycling Technologies (KuRT)". "KuRT" is part of the BMBF research concept " Resource-efficient Circular Economy" and is aimed at high-quality recycling of plastics.**

### Geosynthetics gain in importance

In addition to mineral building materials, plastics have been increasingly used in construction worldwide since the 1960s. One relevant segment is geosynthetics (GEOK), which are mainly used in hydraulic engineering, earthworks, and foundations, as well as in landfill and tunnel construction and groundwater protection – in various functions such as filtration, sealing or stabilization.

They account for less than five percent of the total mass of a structure and have a high sustainability potential. For example, leaner construction methods can replace large quantities of mineral fractions, concrete and steel, and use locally available building materials of inferior quality. For example, $CO_2$ emissions can be reduced by up to 90 percent. Construction time is also reduced. As GEOK mineral mixes are currently still disposed of in incinerators after deconstruction, there is a great need for recycling.

### Closing the loop completely

The project "ProGeo-UP" aims to create the conditions for full recycling within five years. In addition to the re-use of selected products, the aim is to achieve recycling at the highest quality level. This means that new GEOK products will be made from recycled materials.

To this end, dismantling techniques for recovering the installed GEOK are being developed and tested based on three large-scale trials. In addition, the logistics systems, and processes to enable the material recycling of GEOK will be developed. The cycle will be set up in a robust manner to ensure a high, homogeneous, and standardized quality level of GEOK from secondary

Deconstruction of a geosynthetic.

materials in the long term. To this end, the necessary administrative and regulatory framework, such as standardization, will be developed. Based on a standardized knowledge on the life cycle of the products, quality assurance mechanisms will be established to enable the comprehensive recycling and use of high quality secondary materials from GEOK. Economic and environmental indicators developed during the project will be used to establish sustainable business models for this product group.

### Wide range of applications for the solutions

The "ProGeo-UP" researchers work in the following division of labour: The Resources working group of IWARU coordinates the overall project and deals with the processing technology and the analysis of the material flows generated at the various stages of the value chain. The infrastructure working group of IWARU will look at the dismantling process and analyze the environmental and economic indicators over the life cycle

to develop a business model. The RUB is responsible for setting up structures to collect relevant data on the value creation stages (material passport) and linking them to the relevant stakeholders. Two of Europe's leading manufacturers of GEOK, NAUE and HUESKER, are participating in the joint project.

IBH provides access to specific construction projects, including design details. TIBATEK specializes in attachments for the installation and removal of geosynthetics. TAILORLUX GmbH develops marking materials and sensor technology for quality and process assurance of plastics, and LINDNER & USG, two renowned manufacturers of processing units, complete the joint project. Other associated partners, such as the Institute for Materials Applications at the TH Köln, are also providing support.

The concept developed in "ProGeo-UP" is intended to be universally applicable for plastic products in contact with the ground in the construction sector, for example also for green roofs and artificial turf pitches, as these have similar framework conditions.

Geogrid reinforcement in a bridge construction.

**Funding initiative**
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**Contact**
Sabine Flamme
FH Münster | Institute for Infrastructure • Water • Resources • Environment (IWARU)
Corrensstraße 25 | 48149 Münster, Germany
Phone: +49 251 8365264
E-mail: flamme@fh-muenster.de

**Project partner**
Ruhr Universität Bochum, Lehrstuhl für Informatik im Bauwesen; Herold & Partner Ingenieure mbH; TAILORLUX GmbH; TIBATEK GmbH; HUESKER Synthetic GmbH; NAUE GmbH & Co. KG; assoziierte Beteiligte: TH Köln, Institut für Werkstoffanwendungen; STRABAG AG; BAUVERBÄNDE NRW e. V.; Hubert EING Kunststoffverwertung GmbH; RCS Rohstoffverwertung GmbH; Bundesanstalt für Gewässerkunde; LINDNER Recyclingtech GmbH; USG Umweltservice GmbH & CO. KG

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