

# Press Release



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Successful research into rigid polyurethane foam with carbon dioxide

## Building with CO<sub>2</sub> technology becomes possible

- **Up to 20 percent CO<sub>2</sub> instead of oil in rigid polyurethane foam**
- **Innovative rigid foam for insulation boards**
- **Materials show enhanced sustainability in initial tests**

More sustainable, CO<sub>2</sub>-based materials for the construction sector - in the future, this could become reality. Since 2016, Covestro has been working with research and development partners as part of the "DreamResource" joint project (FKZ 033RC002) funded by the German Federal Ministry of Education and Research (BMBF) to research new, more environmentally friendly polyols with the potential to be used, for example, in the form of rigid polyurethane foam in insulation for the construction sector. An initial prototype of an insulation board has now been developed together with the project partner puren gmbh, which contains the novel polyols based on conventional ethylene oxides and CO<sub>2</sub>. This marks a decisive further development of Covestro's CO<sub>2</sub> technology for a particularly important part of the climate-relevant construction industry.

"Buildings are responsible for a large share of global energy consumption and greenhouse gas emissions. This makes it all the more important for us at Covestro to contribute to the Circular Economy and make insulation even more sustainable and efficient in the future. Our goal is to end the use of fossil fuels and make our production processes more sustainable," says Sucheta Govil, Chief Commercial Officer at Covestro.

Using innovative CO<sub>2</sub> technology, Covestro already produces the CO<sub>2</sub>-based precursor cardyon<sup>®</sup>, which is utilized in the manufacture of mattresses, sports flooring, textile fibers and components for vehicle interiors.



### **New, promising approach thanks to CO<sub>2</sub> technology**

Covestro has now succeeded in combining the petroleum derivative ethylene oxide with CO<sub>2</sub> in a chemical reaction to produce first polyols and finally rigid polyurethane foam. Up to 20 percent of petroleum-based raw materials are expected to be replaced by this process in the future. "With the development of these materials, we are endowing the greenhouse gas CO<sub>2</sub> with a new use with versatile applications," says Dr. Christoph Gürtler, Head of Catalysis and Technology at Covestro.

Together with Covestro's industrial partners puren gmbh, BYK-Chemie GmbH and PSS Polymer Standard Service GmbH, it proved possible not only to investigate a wide range of applications but also to develop new analytical methods for the CO<sub>2</sub>-based materials. With RWTH Aachen University and the Technical University of Berlin, the ecological and economic potential of this expanded CO<sub>2</sub> technology was investigated along with the in-depth characterization of the novel materials. "The results of DreamResource very clearly demonstrate the diverse opportunities that arise from the use of CO<sub>2</sub> as a basic building block for polyols to produce a wide variety of polyurethane types. The interaction between industry and science plays an essential role in this innovative field," says Dennis Krämer, project manager for national and international research projects for CO<sub>2</sub> utilization at DECHEMA e.V.

### **Versatile and sustainable insulation**

"This renewed expansion of the product range yields enormous leeway," continues Gürtler. Thanks to the promising combination of ethylene oxide and CO<sub>2</sub>, surface-active substances can also be produced through this new route in addition to CO<sub>2</sub>-based rigid polyurethane foam, which can be used in insulating boards for buildings, for example.

Lake Constance-based puren gmbh is one of the pioneers of rigid polyurethane foam technology and investigated the use of CO<sub>2</sub> polyols in the rigid foam segment in this research project.

Following more than three years of joint research in the collaborative project, over 400 kilogram of the CO<sub>2</sub>-based polyol was successfully delivered to puren for further processing. "These initial rigid foam insulation boards made with a CO<sub>2</sub>-based rigid foam polyol conform to standards and are already comparable with the market standard in terms of their key technical specifications. During further cooperation, we plan to manufacture additional prototypes and to enhance the properties with the aim of taking a giant step closer to the use of CO<sub>2</sub> as an alternative raw material in rigid foam insulation boards and ensuring rapid final development to market readiness," says puren Managing Director Dr.



Andreas Huther. Thanks to this successful collaboration, CO<sub>2</sub> can now be used as an alternative raw material in the rigid foam sector. This will make building insulations even more sustainable and will further reduce the dependence on fossil raw materials.

**About puren gmbh:**

Since the company was founded more than 50 years ago (1968) making it one of the pioneers of rigid polyurethane foam technology, puren gmbh, with its headquarters in Überlingen and several production and sales locations nationwide, a subsidiary in the Czech Republic and a joint venture in China, has been one of the leading companies in the rigid polyurethane foam industry. Today, puren Group generates sales of over 90 million euros with around 300 employees, while also making an enormous contribution to environmental protection with its numerous energy-saving products and a unique sustainability concept.

**About Covestro:**

With sales of EUR 12.4 billion in 2019, Covestro is among the world's largest polymer companies. Business activities are focused on the manufacture of high-tech polymer materials and the development of innovative solutions for products used in many areas of daily life. The main industries served are the automotive, construction, wood processing and furniture, and electrical and electronics industries. Other sectors include sports and leisure, cosmetics, healthcare and the chemical industry itself. Covestro has 30 production sites worldwide and employs approximately 17,200 people (calculated as full-time equivalents) as of the end of 2019.

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