

# Press Release



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EU research project Carbon4PUR successfully completed

Covestro AG  
Communications  
51365 Leverkusen,  
Germany

Contact  
Petra Schäfer  
Telephone  
+49 214 6009 6332  
E-mail  
petra.schaefer  
@covestro.com

Contact  
Patrick Herrmann  
Telephone  
+49 173 30 57 800  
E-mail  
patrick.herrmann  
@covestro.com

## Valued materials from the chimney

- **Blast furnace gas from steel production as a carbon source for plastics**
- **Novel polyols produced**
- **Possible use in insulation boards and wood coatings demonstrated**

How can gas mixtures from industrial production be put to good use to produce valuable materials and save crude oil at the same time? The research consortium of the project Carbon4PUR has found answers to this question and has presented the final results after three and a half years of research work.

In the cross-sectoral project funded by the European Union (grant agreement no. 768919 ), 14 industrial and academic partners from seven countries investigated new technologies that allow converting gas streams from steel mills into polyurethane products. The consortium led by materials manufacturer Covestro investigated how carbon monoxide (CO) and -dioxide (CO<sub>2</sub>) containing blast furnace gas from steel production can be used as a carbon source for polyols. Polyols are intermediates and key components of polyurethane-based insulation materials and coatings, and are typically derived from crude oil.

The conclusion: Ecologically as well as economically, the new technology was evaluated as beneficial. "Supposed waste gas can be efficiently used once again as a valuable material and fed back into the cycle: The results of the research project have the potential to revolutionize production processes. This is a great discovery and a significant milestone on the road to a circular economy. Alternative raw materials become a reality," says Dr. Markus Steilemann, CEO of Covestro.



### **New polyol can be produced from gas mixture**

A key achievement of Carbon4PUR is the identification of novel catalysts that enable the production of new polyols. With the help of these catalysts, the research partners succeeded in producing polyols using carbon monoxide (CO) from gas mixtures at a laboratory scale. In the new intermediate, 27 percent CO could be bound.

Insights gained from Carbon4PUR could also have implications for the CO<sub>2</sub> technology developed by Covestro. The sustainable polyol cardyon® developed on this basis contains up to 20 percent carbon dioxide instead of crude oil and is used, for example, in the production of flexible polyurethane foam in mattresses, binders for sports flooring or elastic fibers. With the new knowledge the technology could possibly be extended to the use of CO<sub>2</sub>-containing gas mixtures such as blast furnace gas from steel production.

### **Findings as groundwork for future research & development**

As part of the research project, Carbon4PUR technology was successfully upscaled to a semi-industrial scale. First examples of applications have already been demonstrated by the Insulation business line of the Recticel Group (Belgium) and the chemical manufacturer Megara Resins (Greece), who have further advanced their product development on the basis of the research results. "We demonstrated that polyols based on the new Carbon4PUR technology can be successfully incorporated into rigid foams to make insulation boards with technical specifications comparable to the market reference," said Dr. Geert Snellings, Innovation Manager at Recticel. Megara Resins has succeeded in incorporating the new polyols into waterborne polyurethane dispersions for wood coatings.

In addition, as part of Carbon4PUR, RWTH Aachen University has investigated the acceptance of carbon capture and utilization (CCU) using the example of insulation boards in a scientific study. The term stands for the capture of carbon dioxide and its use for further chemical processes. "We found that the public still knows far too little about CCU technology. However, when end users receive adequate information, a generally positive attitude emerges," explains Prof. Dr. Martina Ziefle, Chair of Communications Science at RWTH Aachen University. "Nevertheless, there is still a remaining need to increase awareness of CCU to strengthen the technology's and product's acceptance."



### **Research alliance can create jobs**

Carbon4PUR is a unique example of cooperation between partners from the entire value chain. As such, the novel collaboration between the steel and chemical industry was evaluated at the Marseille-Fos site in France. There, an ArcelorMittal steel mill and a Covestro production plant are located in immediate proximity. "The cross-sectoral project has once again strengthened the idea of alliance in European industry," said Dr. Alexis Bazzanella from DECHEMA. "At the same time, projects like Carbon4PUR show that European commitment to climate protection and resource efficiency can create and secure jobs."

### **About Covestro:**

With sales of €10.7 billion in 2020, Covestro is one of the world's leading polymer companies. Business activities are focused on the manufacture of high-tech polymer materials and the development of innovative, sustainable solutions for products used in many areas of everyday life. In doing so, Covestro is fully aligning itself to the circular economy. Its main customers are the automotive and transport industries, the construction industry, the furniture and wood processing industries, and the electrical, electronics, and household appliance industries. Other sectors include sports and leisure, cosmetics, healthcare and the chemical industry itself. As of the end of 2020, Covestro produces at 33 sites worldwide and employs around 16,500 people (converted to full-time positions).

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