UFZ Planetary solutions
KNOWLEDGE THAT DELIVERS.

Profile

Green Chemistry from Biowaste



The challenge

Many everyday products are still made from fossil-based raw materials or imported vegetable oils. This usually follows a linear principle: extracting raw materials, manufacturing products, using them, and disposing of them. Crude oil harms the climate and the environment, while palm and coconut oil involve long transport distances and problematic land use.

To achieve a more sustainable chemical industry, we need new raw materials and circular systems. Biowaste and regional residual materials offer considerable potential as alternative resources.

Our planetary solution

What ends up as waste today could be a raw material for the chemical industry tomorrow. In collaboration with the German Biomass Research Centre (DBFZ), the UFZ has developed the Capraferm® process. In the absence of oxygen, natural, robust bacterial communities convert biowaste and regional biomass into medium-chain carboxylic acids such as caproic and caprylic acid. These can then be used in lubricants and cleaning agents or processed into other chemicals. The remaining biomass can still be used to produce biogas and fertiliser. In this way, existing biogas plants can be developed into biorefineries that produce both energy and valuable chemical feedstocks. In another line of research, we control the microbiomes so that they use CO_2 and CO in addition to biomass. The aim is to develop a regional, resource-efficient chemical industry that uses waste and can replace fossil or imported raw materials. Capraferm® demonstrates one way in which this transformation can be achieved.

Our partners

This requires close cooperation between research and industry. The DBFZ is the key research partner for the scaling-up process. To put this into practice, we also collaborate with the food industry, biogas plant operators, and the chemical industry.

Relevant knowledge and technologies

Microbiome-based fermentation (Capraferm®): Natural bacterial communities convert biowaste and regional biomass into medium-chain carboxylic acids. The process can be combined with biogas production, thereby enabling the biomass to be used as both a raw material and a source of energy.

Scaling from pilot scale to commercial application: The process is being further developed on a pilot scale. The next step is a demonstration facility at an existing biogas plant to assess the technical and economic viability of the technology at a larger scale and pave the way for commercial application.



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Additional links:
Website: Working Group “Microbiology of Anaerobic Systems”
Podcast & transcript: How biowaste can make the chemical industry green (in German)

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