

Press Release

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How to use wastewater differently?

Essen/Zwingenberg. Emschergenossenschaft and BRAIN are researching potential uses of carbon streams in wastewater through biotechnological processes. This should increase the energy yield and allow special oils for use as high-performance additives in the lubricant industry to be obtained. The joint research program is funded by the German Federal Ministry of Education and Research (BMBF) as part of the strategic alliance ZeroCarbFP (ZeroCarbon Footprint). Alongside its research in the field of wastewater use with the biotechnology company BRAIN, Emschergenossenschaft is the coordinator of this nine-year ongoing alliance, worth 48 million Euros.

Wastewater treatment plants are the largest municipal electricity consumers. For wastewater treatment, an average of 50 kWh of electrical energy per capita is currently required. When converted to the average electricity consumption in the private sector, this corresponds to about 5%. In relative terms, this constitutes a power consumption of around 4.2 TWh/year for all water treatment plants in Germany. To reduce operating costs and conserve resources, wastewater treatment plants rely on techniques which either reduce energy consumption, or increase internal energy generation.

Within the strategic alliance ZeroCarbFP, the use of carbon-rich waste streams for the syn-

thesis of functional biomass is explored. The research program between Emschergenossenschaft and its technology partner BRAIN aims to use carbon-rich wastewater for growing specific oil-forming organisms. The biomass thus obtained can then be used for energy recovery or as a raw material for the production of, for instance, high-performance additives in the lubricant industry. In order to make use of this raw material, synergies within the strategic alliance are utilised, and FUCHS Europe Schmierstoffe GmbH, among others, features as a commercial partner.

The findings obtained to date are very promising. From the wastewater of a specially selected Emschergenossenschaft

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treatment plant, certain organisms could be isolated, which were then evaluated by the partners as suitable for further investigation based on their high lipid formation properties. An important criterion in the assessment stage is a lipid formation rate of more than 20% of the dry biomass. In addition to specific bacteria, a number of yeasts and fungi could also be identified as being potential energy and raw material suppliers.

"Sewage treatment plants already perform a very good wastewater treatment service. However, there appears to be a high recovery potential of unused carbon compounds, which we are trying to develop in the context of ZeroCarbFP. This would help to further reduce operation costs, as well as having a positive effect on the environment", explains Dr. Jochen Stemplewski, CEO of Emschergenossenschaft.

"Together with BRAIN, we are trying to take wastewater technology down a new path, as well as investigating the uses of wastewater in order to maximise the value of this substrate. The integration of biotechnology offers new opportunities for urban water management, where all the possible associated risks must be carefully considered and prevented." "We will therefore con-

duct extensive sustainability studies in which the path along the entire value chain will be assessed and evaluated," adds Dirk Bogaczyk, overall coordinator of the strategic alliance.

"Our BioArchive, which we refer to as 'nature's toolbox', contains approximately 30,000 well-characterised, highly diverse microorganisms. They have been successfully screened by us, leaving organisms which can produce a large quantity and wide variety of industrially relevant lipids. However, through the alliance we were able to complement these organisms with the isolated organisms from the wastewater treatment plants", says Dr. Guido Meurer, Unit Head of Strain Development at BRAIN, regarding the systematic approach within ZeroCarbFP. "In the next phase of the program, the method established so far, will be scaled for industrial application."

About the collaboration partners

Emschergenossenschaft (founded in 1899) manages the river basins of the Emscher and Lippe along with the Lippeverband (founded in 1926). These organisations together form the largest wastewater disposal unit in Ger-

many. They operate a total of 55 sewage treatment plants and maintain approximately 750 kilometers of water courses. As part of their water management responsibilities, the two organisations also deal extensively with issues such as energy efficiency, resource recovery and climate change impacts.

BRAIN AG is one of Europe's technology leaders in the field of industrial 'white' biotechnology. Within strategic alliances, BRAIN AG has identified and developed numerous innovative products and solutions for companies in the chemical, pharmaceutical, cosmetic and food industries by harnessing nature's untapped biodiversity. These active product components are identified by BRAIN AG and contained in the company's "BioArchive", one of the most comprehensive archives of its kind. Since its foundation in 1993, BRAIN has entered into over 99 strategic cooperations with nearly every prominent company in the chemical industry. Cooperation partners include BASF, Bayer Schering, Clariant, DSM, Emschergenossenschaft, Evonik Degussa, Fuchs, Henkel, Nutrinova, RWE, Sandoz, Südzucker and Symrise. The company currently employs 116 highly skilled personnel.