



The sewage plant of the future is a biorefinery

Pilot project RoKKA uses wastewater to produce fertiliser and raw materials

Stuttgart/Ulm. The Ministry for the Environment, Climate Protection and the Energy Sector is funding the new research project RoKKA which is used to prove the viability of recovering raw materials from wastewater. This adds a crucial function to the scope of a conventional sewage treatment plant. Together with the operators of the sewage treatment plants in Erbach and Neu-Ulm, the project partners demonstrate the positive contribution towards climate protection and a secure feedstock supply, as the manufactured products can replace fossil materials and energy-intensive processes.

"Until now the task of a wastewater treatment plant was mainly to clean wastewater," says Dr.-Ing. Marius Mohr, Project manager at Fraunhofer IGB (Institute for Interfacial Engineering and Biotechnology). "Now we are also looking at the raw materials contained in the wastewater." Scientists from Fraunhofer IGB, the University of Stuttgart, the University of Kassel and the Technical University of Kaiserslautern are working on the sustainable biorefinery together with the companies SolarSpring GmbH, Deukum GmbH, Nanoscience for life GmbH, Umwelttechnik BW GmbH, the city of Erbach and the Steinhäule Treatment Plant Administrative Union.

Securing raw materials using microalgae and electrosynthesis

The scientists are testing methods for extracting phosphorus and nitrogen compounds for fertilisers from wastewater. The microalgae are also used to produce plant fortifiers and agricultural soil conditioners. Even the CO₂ that is produced during the production of biogas is separated and reprocessed into a raw material for the chemical industry. "That way, principles of bioeconomy are applied and sewage treatment plants can become a sustainable source of raw materials. The recovery of phosphorus and nitrogen as fertiliser closes the nutrient cycle and has a positive effect on the climate," says Dr.-Ing. Anette Zimmermann, Head of Environmental Technology and Bioeconomy at Umwelttechnik BW.

The ePhos process enables the recovery of phosphorus. With the help of a sacrificial anode made of magnesium, the phosphorus is electrochemically precipitated as struvite. Two pilot plants separate the ammonium nitrogen from the sludge water. One plant follows the principle of membrane gas absorption with membrane contactors, the other works on the principle of membrane distillation.

The RoKKA pilot project assesses the impact of nitrogen recovery with a view to the climate balance of wastewater treatment plants. The conventional degradation of nitrogen compounds at sewage treatment plants produces a considerable amount of the greenhouse gas nitrous oxide (N₂O), also known as laughing gas. The extent to which the nutrients contained in the wastewater serve as food for microalgae is also being tested. In addition to light, algae require CO₂ for photosynthesis. It comes from the biogas digestion process and is separated with the help of an amino acid solution. At the same time, another way of utilising CO₂ is being tested. Part of the CO₂ is converted into formate by an electrosynthesis plant. Formate is a basic chemical used in the chemical industry. The project thus demonstrates the possibility of recycling CO₂.

Biorefinery at the Erbach and Neu-Ulm wastewater treatment plants

The pilot plants in the towns of Erbach and Neu-Ulm will be integrated into existing sewage treatment plants and tested with real wastewater. "We are pleased to be a research partner making this project possible," says Thomas Schniertshauer from the Erbach building authorities. "Already in 2016, we took the first step towards a bioeconomy with the construction of a



high-load digestion process at our wastewater treatment plant. Now we are proud to expand our wastewater treatment plant into a sustainable biorefinery."

The project is funded by the Baden-Württemberg Ministry of the Environment, Climate Protection and the Energy Sector as part of the ERDF (European Research and Development Fund) programme "Bioeconomy - Biorefineries for the recovery of raw materials from waste and wastewater". ERDF is a structural fund that supports economic, territorial and social cohesion within the EU. Project coordination and public relations are being managed by Umwelttechnik BW, the state agency for environmental technology and resource efficiency in Baden-Württemberg.

About Umwelttechnik Baden-Württemberg (UTBW)

Umwelttechnik Baden-Württemberg is the state agency for environmental technology and resource efficiency in Baden-Württemberg. UTBW works at the interface between politics, business and science. With core competencies in the classic environmental technology fields (waste, wastewater, exhaust air) and activities in the field of bioeconomy, UTBW supports companies on their way to a more sustainable future.

Given dwindling resources and fluctuating prices, the aim is to raise awareness for the potential of bioeconomy and efficiency strategies and to support companies with the implementation of sustainability measures. With a wide range of information services, training courses, events and the implementation of funding programmes, UTBW has been active in the federal state of Baden-Württemberg since 2012.

The state agency is state-owned but operates independently as a private limited company. The supervisory board of the state agency, which is composed of representatives of the Ministry of State, the Ministry of the Environment, Climate Protection and the Energy Sector, the Ministry of Economics, Labour and Housing and the Ministry of Science and the Arts, controls the strategic orientation and finances of the state agency.

Contact

Press relations

Antje Sacher

Friedrichstraße 45

70174 Stuttgart

+49 711 252841-67

antje.sacher@umwelttechnik-bw.de

Project manager:

Jürgen Schmidtke

Friedrichstraße 45

70174 Stuttgart

+49 711 252841-27

juergen.schmidtke@umwelttechnik-bw.de