

Closing the beer production loop with sustainable biorefining

Project leader: Prof. Dr. techn. Heike Frühwirth

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Partners: Frenvi UG, Mannheim

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Project

description:

The concept aims to redirect the side stream beer by-products within production for further utilization as food additives. The mineral components of beer by-products are extracted in a first step of the proposed biorefinery concept. The extracts are used as nutrients in a subsequent biotechnological process step to produce *Cyanobacteria* (*Spirulina sp.*). These are rich in high-quality proteins and thus a high-priced vegan dietary supplement in high demand. Annual growth rates of 10% to 2026 are predicted.

The starch, fiber, and sugar fraction remaining after extraction is processed into edible product solutions, such as human-consumable dish solutions, using a process that represents a development of the company FRENVI UG's patented Continuous Thermo Compression 3D Forming (CTC3DF) process. These products can then be re-introduced to the beer sector and its clients (B2B & B2C) as part of the circular economy.

The efficiency of the biorefinery concept and the quality of the additional generated products are ensured with digital support. The determination of raw material and operating data creates the basis for optimized resource planning and predictive process control.



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