

“Techno-economic analysis and business plan”



“Axel, the University of Applied Sciences Bremerhaven is one of 17 partners. And your WP “Techno-economic analysis and business plan” is one of 12. Can you please tell us what the main task of your work package is?”

“Our main task is to perform feasibility assessments for the combined aquaponic fish farming, halophyte farming, and biorefinery concept of AQUACOMBINE. The whole process needs to be designed in such a way that it can be implemented and adapted conveniently to different European application scenarios. To achieve the goal, process modelling, simulation, and integration at future business scale is the way forward and lay the foundation for techno-economic evaluation, and environmental life cycle impact assessment. Based on the findings regarding the overall performances, finally a business plan will be developed to pave the way for the exploitation of the project results.”

“What added value do you expect from the project?”

“I expect that the multidisciplinary approach of AQUACOMBINE enables us to demonstrate feasible future ways of cultivation of healthy food and animal feed on saline soil. In addition to that, value is added by following an innovative circular economy approach which combines the halophyte plant farming with aquaponic fish farming and a dedicated biorefinery. In this way, it enables to valorise the whole biomass by a sustainable co-production of feed, food, active components for pharmaceuticals and cosmetics as well as bio-energy to avoid any biowastes.”





“More than two years have passed since the project started in 2019, Axel, can you tell us your most surprising project result so far?”

“As a chemical engineer, I was most surprised by the finding of the biologists in the consortium that there are at least two halophyte species that look the same and the difference can just be seen in their gene sequence.”

“AQUACOMBINE is looking for answers on how to deal with the most important challenges of the 21st century, to meet the world’s demand for sustainably produced biomass for food and the growing bioproducts sector. Why is this topic important?”

“There are multiple aspects, why the project is important:

#1 The global population is growing. Demand for food and water will increase, while the area of agricultural land and available fresh water will decrease.

#2 Climate change provokes rising sea levels. Unfortunately, this leads to the loss of the land and/or will further increase the salinisation of agricultural land in coastal areas. As Bremerhaven is located directly at the North Sea, the agricultural cultivation in our region has a high risk to be affected by higher salt contents in the soil, in future.

#3 Saline soil is not (really) suited for farming today. Finding and demonstrating a way how saline soil could be used for future food production will help to prevent food shortages.

#4 Agriculture is the largest user of freshwater, which is essential for food production. Establishing a combination of aquaponic fish farming with hydroponic halophyte farming and water reuse will contribute to reduce the usage of freshwater in the agriculture.

#5 The development of rural areas, here those having saline soil, helps to avoid rural migration/exodus, today or in the future. Moreover, the valorisation of biomass to value products helps in rural development and encourages farmers to adapt innovative technology.

#6 We have a strong background in the technical design of concepts of whole integrated production processes, including biorefineries. Our approach is driven by the technical, economic, and environmental feasibility – holistic thinking towards a sustainable future.”

“Thanks, Axel for your answers. One last question: If you could wish for something for the project, what would it be and why?”



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"My wish for the project is that we do not find any real stumbling block that prevents us from putting our results into practice. By getting AQUACOMBINE into the real life, many of the above-mentioned problems mankind is facing can be tackled, by a sustainable development."



Prof. Dr.-Ing. Axel Gottschalk studied chemical and process engineering at the Technische Universität Dortmund (Germany) and the Institut National des Sciences Appliquées de Rouen (France). For his research in the fields of computer-aided process engineering (CAPE), artificial intelligence, and conceptual process design of chemical production processes, he received his academic degree Doktor-Ingenieur.

For 15 years he has been working as an expert in the development of whole integrated technical processes in various fields, e.g. energy efficiency, CO₂ capture, chemicals including bio-based raw materials, their conversion, and products. He is an expert on the conceptual design of whole sustainable processes in terms of economy and environment as well as related CAPE and LCA tools.

Prof. Dr.-Ing. Axel Gottschalk is the head of the Institute of Process Engineering, being part of the faculty of Technology at Bremerhaven University of Applied Sciences, Germany.

The Bremerhaven University of Applied Sciences was founded in 1975, but can be traced back for more than a hundred years ago. Being located at the German seaside, multiple study programmes of the 'university by the sea' have a link to marine and climate related engineering aspects.

In the AQUACOMBINE project, he is leading the work package WP10. He is also involved in WP1, WP3, WP4, WP5, WP9 and WP12.

Pictures

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