

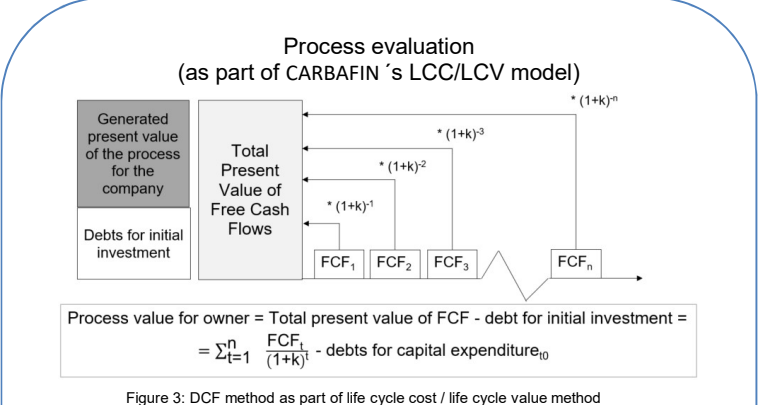
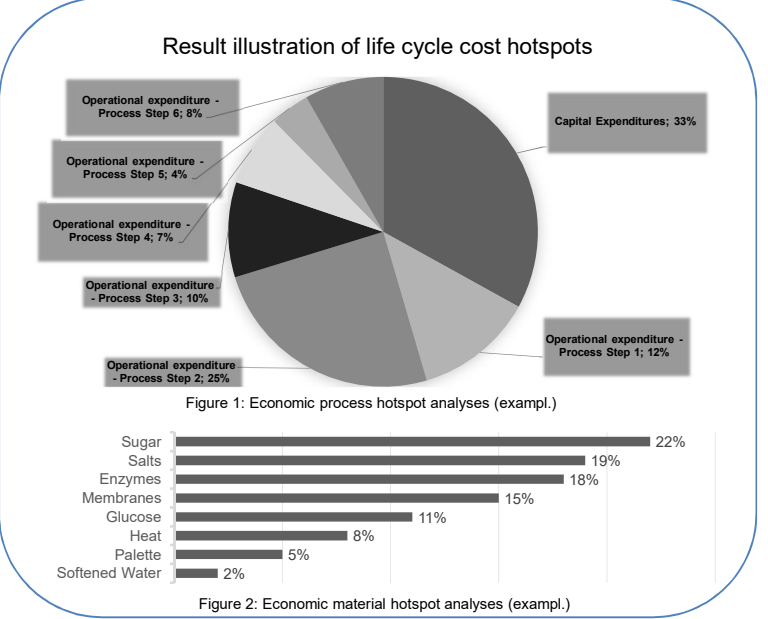
# EU – CARBAFIN Carbohydrate-based fine chemicals

## Initial situation and project objectives

CARBAFIN is a collaborative research project, which started in January 2018 and will last until December 2021. It is co-financed by the European Union with a funding of 5.3 million EUR. The EU-consortium consists of eight members coming from five different countries. A phosphorylase-based platform for the sustainable production of functional glucosides from sucrose is being developed. The aim is to generate a new value chain for the use of surplus sugar beet biomass in the EU by the separate conversion of glucose and fructose into value-adding products on an industrial scale.

## WP 6 – Process and product evaluation

The Working Group Sustainable Construction and the Institute of Business Administration and Industrial Sociology at Graz University of Technology are responsible for the investigation of economic feasibility and evaluation of the developed biochemical processes within CARBAFIN. Next to economic evaluation work package 6 contains the environmental process evaluation (LCA) which build the bases for techno-economic and techno-environmental improvement strategies. Live cycle costing and life cycle assessment therefore is considered in each phase of development and route selection, and generally embedded in strategic process decisions within the CARBAFIN research project.



Based on life cycle costing, free cash flows are planned for each period. This is based on a life cycle in which it is estimated that the product can be sold. The free cash flows of the individual years are discounted to t=0. The interest rate is derived from capital market data. The debt incurred at t=0 is deducted from the present value of the free cash flows. The result represents the added value of this process for the company.

## Results and contribution to the EU project (economic part)

Life cycle cost (LCC) are presented in order to identify future optimization potentials. Cost of each sub-process are analyzed and examined for optimization in order to demonstrate the advantages of the process itself quantitatively (Fig 1). In addition, hotspot analyses for used materials are structured by cost types over the entire process (Fig 2). Furthermore, the economic evaluation of the process cost saving potentials and optimization potentials for process improvements are pointed out (Fig 3). Evaluation results serve - next to LCA results - as a basis for further technical improvement steps. Finally, a combined evaluation of the optimized processes as best practice example for bio-based chemical production will be performed. Expected main results within the economic part of the research project are

1. Development of a LCC/LCV model for the evaluation of processes
2. Hotspot analysis and development of an improvement plan with recommendations for process optimization
3. Economic evaluation of biochemical processes

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Figure 4: Project partners within CARBAFIN research project

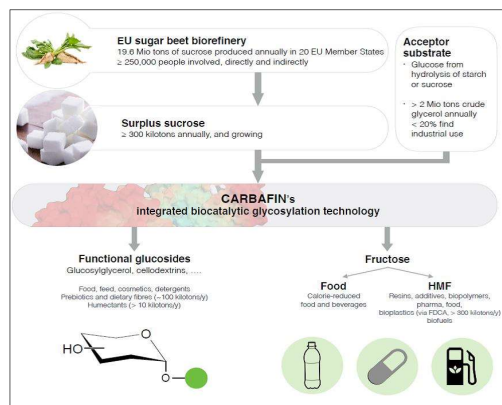


Figure 5: CARBAFIN's proposed biorefinery for functional glucoside and fructose/HMF production

## Funding

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 761030. The presented content reflects only the author's view, the Commission is not responsible for any use that may be made of the information it contains.

