Fatty Acid Biorefinery for Upcycling Low-value Organic Urban Substrates

Publieke samenvatting / Public summary

Aanleiding

The Netherlands strive for a circular society in 2050 in which all wastestreams should be efficiently upcycled. A major municipal waste stream is fruit, vegetable and garden waste, commonly referred to as the Organic Fraction of Municipal Solid Waste (OFMSW). In large parts of the Netherlands OFMSW is collected separately. In urban areas this is not always the case, but in metropolitan regions there is a growing interest in separate OFMSW collection. Separate OFMSW collection facilitates the proper upcycling to high-value products. The current practice of OFMSW treatment is based on anaerobic digestion and/or aerobic composting. Both processes yield relatively low-value end-products, e.g. methane-containing biogas and compost. It is possible to produce higher value compounds from OFMSW such as liquid biofuels, bioplastics, long chain fatty acids, and other specific compounds. To implement these emerging resource recovery technologies from a complex heterogeneous feedstock like OFMSW, the first conversion to Volatile Fatty Acids (VFA) viahydrolysisand fermentation processes is required.

Doelstelling

The Fatty Acid Biorefinery for Upcycling Low-value Urban Substrate (FABULOUS) project is a collaborative effort of Orgaworld, Paques, TU Delft, HVC and AMS. The main objective of the project is to enable the conversion of OFMSW streams into marketable end-products with the highest possible value, through development of the VFA

Projectinformatie / Project information

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Publicaties en materialen / Publications and attachments

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productionprocess in a VFA based biorefinery. In the Orgaworld Lelystad pilot facility, long-term experiments will be used to increase and demonstrate the robustness of VFA production from OFMSW. In the pilot plant, VFA production results into the production of PHA (bioplastic). However, VFA will also be tested in order to function as raw material for the production of Medium Chain Fatty Acids (MCFA), ketones and aromatics. The project increases the economic and environmental status of OFMSW treatment plants and subsequently contributes to the Dutch 2050 circular society objective. Furthermore, the project will contribute to both sustainable energy management and the reduction of fossil fuel dependency.

Korte omschrijving

This project consists of the following activities: - Development of the VFA production process - Validate the long-term process performance under realistic conditions - Technical development and economic assessment of the VFA-based biorefinery To increase the performance and validate the long-term stability of the VFA-based biorefinery, the existing pilot plant at the Orgaworld facility for VFA production from OFMSWand subsequent conversion of VFA to bioplastics-will be upgraded. Development of the pilot plant operation will be supported by laboratory experiments. VFA rich streams generated in the pilot plant will be used to test different VFA recovery processes, besides the bioplastic production process implemented at the pilot plant. Based on the experimental results a process model will be made, describing the VFA production performance and the quality of the residual compost as a function of the operational variables. The process model will be integrated into a full-scale design describing all steps from waste to product in order to conduct a societal, economic, environmental and technical analysis. A business plan will be elaborated for industrial implementation.

Resultaat

The resultsof the FABULOUS project will be: - An improved and validated VFA production process

design - Integrated VFA production process in OFMSW treatment scheme Upon the finalization of the project, the developed OFMSW treatment scheme is ready for scale-up and integration/demonstration into existing OFMSW treatment facilities. Orgaworld and HVC will use the results to fasten the transition towards a resource generating facility with a full-scale implementation of the VFA-based biorefinery. Paques will strengthen its position as developer and provider of process installations that recover valuable resources from waste(water) streams. They will improve existing and develop new technologies based on the results. TU Delft and AMS incorporate the results in their research agenda and prepare future research projects aimed at future biotechnological conversion routes.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.
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