GreenSolRes

Deliverable 4.2

Interim report on LCA

Demonstration of solvent and resin production from lignocellulosic biomass via the platform chemical levulinic acid

The project leading to this application has received funding from the Bio Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 720695

BBI JU
Bio-based Industries Consortium
Horizon 2020 European Union Funding for Research & Innovation

About GreenSolRes

The need to establish economic and sustainable large-scale operations for the conversion of renewable resources to chemical building blocks is becoming increasingly urgent in the context of climate change and depleting fossil fuel reservoirs. Pathways for the manufacturing of bio-based fuels and chemicals have been developed, but most of them rely on sugar and starch crops for feedstock. GreenSolRes aims at a sustainable and competitive industrial production of the platform chemical levulinic acid (LVA) from non-food lignocellulosic biomass. Further, the conversion of LVA and LVA esters into industry-relevant building blocks γ-valerolactone (GVL), 1-methyl-1,4-butanediol (MeBDO) and 2-methyltetrahydrofuran (2-MTHF) will take place by new catalytic methods developed during the course of this project. Finally, these chemicals will be upgraded to solvents and resin monomers for the production of high added value adhesives and consumer products. This project was started in September 2016 and has a duration of five years.

Project Coordinator

RWTH AACHEN UNIVERSITY

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Catalysis LIKAT Leibniz-Institut für Katalyse e.V.

SYNCOM

Hybrid Catalysis Custom Synthesis & Screening

vito

BASF We create chemistry

Lenzing Innovative by nature

About this document

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Publishable Summary

In order to evaluate the environmental performance of the GreenSolRes bio-based value chain, a comparative LCA is conducted. In this intermediate report, the modeling approach and preliminary results of the LCA study are presented. During the first year of the LCA study, a model for the life cycle of the bio-based production of GVL via LVA from woodchips has been established. During the production of levulinic acid from woodchips, large amounts of biochar are co-produced. Results of the life-cycle model indicate that the environmental impact of the bio-based value chain is highly sensitive towards different scenarios of biochar utilization.

Furthermore, the life-cycle assessment for the three fossil-based intermediate reference products THF, BDO, and GBL is completed. The global warming impact of these three chemicals was assesed considering two different production routes. Depending on route and chemical, the cradle-to-gate global warming impact is between 4.1-7.8 kg CO_2 eq./kg. Suitable fossil-based reference polymers and solvents have been identified that could be substituted by bio-based polymers and solvents based on GVL, Me-BDO, and 2-MTHF. The life-cycle modelling for the fossil-based reference polymers has been completed, while data acquisition is in progress for the fossil-based reference solvents.