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Development of efficient biomass conversion routes for biofuel production and utilisation (CONVER-B)

Lignocellulosic biomasses such as agricultural and forest residues, dedicated energy crops, industrial and municipal wastes are the most abundant feedstocks, and hold tremendous potential for large-scale biofuels production. However, effective utilization of these resources is not always practical due to the recalcitrance of lignocellulose to hydrolysis. The digestibility of lignocellulosic biomass is directly determined by the structure and content of lignin and hemicelluloses, type of lignin-carbohydrate complexation, cellulose crystallinity and degree of polymerization, pore volume, and specific area of cellulose. Therefore, efficient biomass conversion routes are needed to utilize the complete carbon content of lignocellulose for the large-scale biofuel production.

The overall aim of this project is to find efficient processes to transform selected agricultural residues and other lignocellulosic biomasses, based on their availability in the three participating countries into clean biofuels. Practically, this present project is intended to tackle the challenges related to conversion of lignocellulosic biomass to liquid biofuels, e.g. ethanol, butanol and higher alcohols, medium-chain fatty acids as precursors and gaseous biofuels such as biomethane. Project objectives are divided to the work packages concentrating on (i) identifying efficient processes for biomass conversion to biofuels through sugar platform, (ii) investigating lignocellulosic biomass conversion through carboxylate platform, (iii) determining novel processes for biomass conversion to biofuels through syngas platform, (iv) modeling of biomass conversion technologies under study, (v) examining performance and modelling of biofuel engines and (vi) performing the analyses of economic and ecological sustainability of individual and integrated conversion processes.

Bioalcohols (butanol, ethanol and higher alcohols) and biogas to be produced from the overall process are well known biofuels. The advantages in the production of all these biofuels from the perspective of reduction of GHG emissions and energy efficiency are highly appreciated by the global scientific communities. So, enhanced sustainable commercial scale production of these biofuels is the prime future goal of the CONVER-B project. This will be obtained by performing the process simulation and modelling studies of all the reactor schemes and techniques used facilitating its way towards commercialization. The project will also take part in facing challenging issues currently existing in utilization of biofuels in engine prototypes.

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