



Deliverable 2.2

**Report on comparison of integrated  
vs. 2-step process LVA to 2-MTHF**

**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*

## 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 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 lignocellulosic wastes and residues originating from forestry and agricultural sector. Further, the conversion of LVA into industry relevant building blocks  $\gamma$ -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 four years.

### Project Coordinator



### Project Office



### Consortium



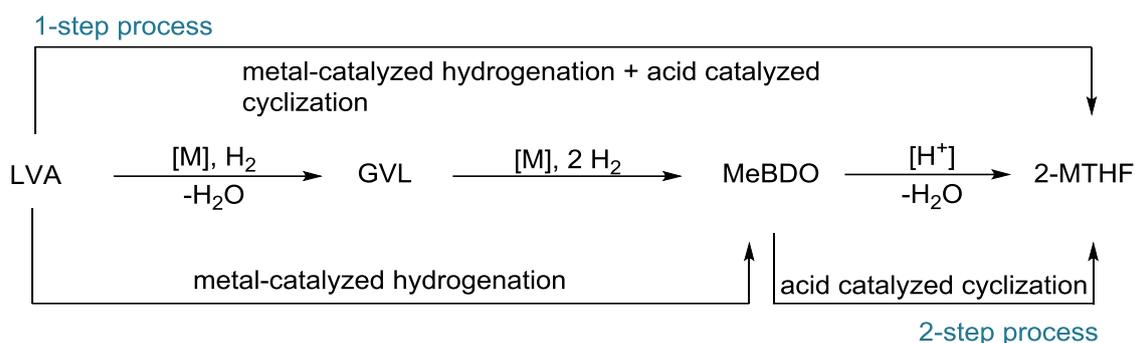
## About this document

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## Publishable Summary

The consecutive transformation of levulinic acid (LVA) to  $\gamma$ -valerolactone (GVL), 1-methyl-1,4-butanediol (MeBDO) and 2-methyltetrahydrofuran (2-MTHF) can be either conducted in an integrated 1-step process or a 2-step process. In the latter case, the metal-catalyzed hydrogenation to GVL and MeBDO is separated from the acid-catalyzed cyclization of MeBDO to 2-MTHF (Figure 1).



**Figure 1:** Compared process options for the conversion of LVA to GVL, MeBDO and 2-MTHF.

In an interdisciplinary approach, the two possible process options were initially experimentally tested in lab scale reactions with the recently established molecular ruthenium catalysts and then evaluated based on a preliminary process simulation. The comprehensive evaluation demonstrated favourable performance indicators for the 2-step process, paving the way to two independent and dedicated process units with optimum characteristics.