



Deliverable 5.5

**Report on business case of new
adhesive products based on MeBDO**

**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. The JU receives support from the European Union's Horizon 2020 research and innovation programme and the Bio-based Industries Consortium.



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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 non-food lignocellulosic biomass. Further, the conversion of LVA and LVA esters into the 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.

Project Coordinator



Project Office



Consortium



About this document

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Publishable Summary

This report deals with the business case evaluation of bio-based MeBDO as raw material in adhesives. The application focus for this report is on polyurethane (PU) adhesives. Market assumptions and requirements for future bio-based MeBDO containing adhesives are based on Henkel internal technical experiments, interviews and market report data. Other market potentials beyond adhesives will not be discussed within this report.

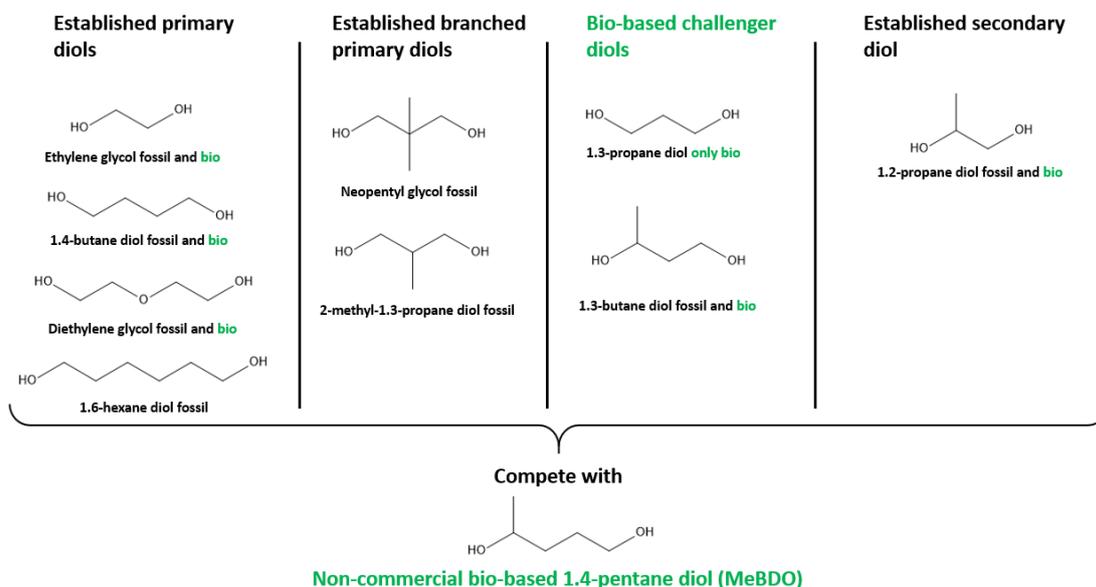


Figure 1: Overview of typical diols used in polyurethane adhesives. A first application for bio-based MeBDO adhesives could be a structural adhesive for electronic devices. Henkel Loctite HDD 3544F is a 60% bio-based adhesive reference for this scenario.

Henkel has proven that MeBDO can be beneficially utilized as building block for polyurethanes and specifically for reactive polyurethane hotmelt adhesives. First developments have demonstrated similar and partially even better performance compared to standard fossil-based alternatives. MeBDO itself is not a so-called drop-in chemical but will provide new properties to adhesives. Its unique selling point is a combination of properties, like renewable carbon content, chain length, OH group reactivity as well as hydrophobicity, due to its chemical structure. No other state of the art diol (see figure 1) can deliver this set of properties all in one. By analyzing the economics, Henkel concludes that a market start, naturally accompanied by estimated higher costs and lower volumes, is promising for reactive polyurethane hotmelt (PURHM) adhesives in high value adhesive markets, like electronics. Further growth and scale up enables MeBDO utilization for PU technology covering other market segments beyond electronics as well. Deeper market penetration and commercialization will be reached when MeBDO prices drop down into a price range similar for other state of the art diols (e.g. 2-6€/kg). When fully commercialized and registered, including toxicological assessment, MeBDO is seen as a very valuable building block to expand the material toolbox based on renewable carbon. Combined with other renewable carbon based raw materials, MeBDO can help adhesive manufacturers to gain additional market share and set the latest trends toward sustainability. Hence, MeBDO can contribute to reduce the carbon footprint in adhesive formulations.