

Driving on bark, building with nutshells – Towards the enhanced valorisation of European lignocellulosic biomass for a bio-based economy

Over the next four years the European UNRAVEL project will demonstrate a sustainable and economically feasible biorefinery for the conversion of second generation biomass into fuels, chemicals and building materials. In their efforts the partnership that comprises research organisations, SMEs and large industry from six European countries are supported by the Bio Based Industries Joint Undertaking (BBI JU) which funds the UNRAVEL project with 3.6 million Euros.

The Bio-based Industries Consortium (BIC) and the European Union's 'Horizon 2020' Research and Innovation Framework Programme, both co-funding bodies of the BBI JU, have developed strategic agendas to realise the European transition towards a post-petroleum society while decoupling economic growth from resource depletion and negative environmental impacts. A key task is the creation of novel bio-based value chains by developing new biorefinery technologies and optimising the use of sustainable feedstock for innovative added-value products that respond to market needs. The project will also contribute to the development of new building blocks for different bio-based products from biomass of European origin.

One of the major challenges in creating long-term benefits is to find sustainable and industrially viable biomass that does not compete with land-use for food production or that could pose the risk of natural habitat loss. One promising solution lies in using biomass residues that originate from forestry and/or agriculture such as bark, wheat straw or nutshells. The potential availability of these residues is substantial with estimates of around 180 Mton per year within the EU. Agricultural residues and wheat straw represent approximately half of the total available amount. Components within these residues that are of major economic interest are sugars and lignin, a substance with which bio-based materials and biochemicals can be developed. The UNRAVEL project will target sugar as compound for advanced liquid biofuels for transport and lignin for building blocks for bio-based materials, such as bio-polymers, insulation foams (polyurethane) and bitumen.

To be able to use all valuable components that are present in a certain feedstock an efficient integrated biorefinery process is required. Currently, the inefficient fractionation of lignocellulosic biomass into its main constituents seriously hinders the use of plant-based residues for economic purposes.

In UNRAVEL the mild biomass fractionation process FABIOLA™ is applied, further matured and upscaled. This process has been patented by consortium partner ECN (part of TNO) and has a large potential for improving the cost-effective pre-treatment of biomass. The fractionation of pre-extracted agricultural, forestry and food-processing residues will result in high yields of components. Another breakthrough that will be achieved in UNRAVEL is the increased homogeneity of the feedstock composition by pre-extraction of biomass and the purity of resulting biorefinery products.

With its breakthroughs UNRAVEL will make a strong contribution towards the EU goal of a bio-based economy that supports the transition towards a post-petroleum society while decoupling economic growth from resource depletion and negative environmental impacts. The project holds potential for a significant reduction of operating cost and energy demand, which will equally benefit the economy and the environment. Individual processing and conversion steps of biomass and compounds and their technical and economic feasibility will be demonstrated at industrial pilot scale. A full techno-economic and sustainability assessment of the entire value chain, including environmental as well as social aspects, will be completed during the UNRAVEL project. These



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assessments ensure that all measures are taken to maximise the project's impact towards a more sustainable society.

Project key facts:

UNRAVEL started on the 1st June 2018 and will run for four years. The project is coordinated by Fraunhofer Gesellschaft and ECN (part of TNO). The consortium comprises ten partners from seven European countries.



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