

Optimising the European Bio-refinery processes

★ The use of biomass for fuel, chemicals, materials and a range of products will make it a major contributor to European sustainable development. But first Europe has to nurture an infrastructure of cooperation to create effective bio-refinery processes explains **Franck Dumeignil**

The development and implementation of bio-refinery processes is the prime goal of the Framework Programme Seven funded EuroBioRef project, as today's bio-refineries are reliant on a limited number of biomass sources, are not optimised for efficiency, and there is a disconnect between the many stakeholders involved in this young industry.

Biomass is a 'wonder-resource' if correctly refined with potential for not only fuels, but also a number of products such as chemicals, polymers and materials, to the point where it could be a driving force for a sustainable economy. Efficiency in the bio-refinery processes is key and by integrating the stakeholders involved at all levels – new synergies, cost efficiencies and improved methods can be achieved.

Today, most of the existing bio-refinery concepts use a limited number of raw materials and technologies, based around a single type of biomass – the focus is usually on producing biofuels (biodiesel or bioethanol). Only a fraction of the

biomass is converted into higher value chemical products.

A state-of-the-art bio-refinery is represented eg. by an integrated bio-ethanol production including fermentation of biomass, distillation of ethanol, treatment of by-products in a bio-gas unit as well as combined heat and power generation, covering the energy demand of the processes. Excess methane/ electricity is exported to the public grids.

The EuroBioRef project is illustrating what is possible in the next wave of bio-refinery design. In contrast to existing concepts, the EuroBioRef project will develop a highly integrated and diversified concept applying multiple feedstocks, multiple technologies and multiple bio-products. The approach means that various production platforms can be analysed in order to choose optimised economic solutions throughout locations in Europe.

Re-vamped for efficiency

The project has a specific aim to overcome

the fragmentation in the biomass industry. This will mean decisive actions will be taken to facilitate better networking, coordination and cooperation among a wide variety of actors.

There are 28 project partners involved in the EuroBioRef project from 14 different countries, comprising of large and small chemical and biochemical industries, as well as academics and researchers from the whole biomass value chain, and also relevant European organisations.

Specifically, the new concept will adopt a flexible and a modular process design adapted to large-scale but also small-scale production units, which will be easier to install in various European areas.

The overall efficiency of this approach will be a vast improvement to the existing situation and will ensure the production of bio-jet fuels and multiple products in a flexible and optimised way and take advantage of the differences in biomass components and intermediates. It should also improve cost efficiency by as much as 30 per cent through



improved reaction and separation effectiveness, reduced capital investments, improved plant and feedstock flexibility and reduction of production time and logistics. Further, it will reduce by 30 per cent the energy used and produce zero waste. Raw material management will also mean that a reduction of feedstock consumption will be possible to the tune of at least 10 per cent.

Large-scale research, testing, optimisation and demonstrations of processes in the production of a range of products will be necessary.

In contrast, the EuroBioRef concept achieves integration across the whole system, from feedstock to product diversification and adapts to regional conditions, integrating into existing infrastructure, minimising risks to investors. The flexible approach means widening bio-refinery implementation to the full geographical range of Europe and offers opportunities for export of bio-refinery technology packages to more local markets and feedstock hotspots in developing countries – for instance in

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Reducing risk to investors

For a bio-based economy to become possible it was realised that a new Europe-spanning integrated approach was needed at the refinement stage. For instance, currently, the standard bio-refinery concept relies on massive economies of scale at one-dedicated site to achieve higher performance. It implies risks for investors, as logistical requirements drastically increase with the size of a single plant, and market dynamics may cause simplistic product output optimisation to fall short.

Eastern Europe there is high potential based on feedstock availability but as yet there are no existing bio-refineries. Bio-refineries are presently confined to the North and West of Europe.

The EuroBioRef project is ultimately looking to bridge the gap between the Agriculture industry and Chemical industry by integrating the whole biomass chain. It has the potential to re-energise bio-mass production, grow the industry and achieve the original dream of biomass sustainability across the whole of Europe. ★

At a glance

Full Project Title

EUROpean multilevel integrated BIOREfinery design for sustainable biomass processing (EuroBioRef)

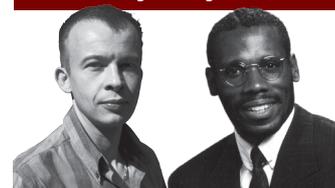
Project Partners

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Kent Washington is currently completing his PhD in Project Management at the SKEMA business school.

