

The purpose of the Valor Plus project is to generate knowledge, new biotechnologies and new products

Interview to **Mr. Mick Parmar** (Project Manager and Coordinator for Valor Plus)



Dr. Kangala Chipasa (Technical Manager of Valor Plus)

The UK Health and Environment Research Institute Ltd

New consortium Valor Plus, made up of the UK Health and Environment Research Institute (HERI), is helping second generation biorefineries deliver an innovative and commercially viable new solution. The aim is to create biomass with zero waste, improved process efficiency, increased commercial competitiveness and profitability, and a more diverse and sustainable biomass resource. Mick Parmar and Kangala Chipasa explain us the most important keys to this project



What is the Valor Plus project?

The ValorPlus is a project to design, develop and integrate new processes to form closed loop systems making the best use of biorefinery by-products to deliver new high value products with improved economic and environmental performance

What is the purpose of this project?

The purpose of the project is to generate knowledge, new biotechnologies and new products that support the release, refinement and transformation of lignocellulosic biomass, lipids and low-volume functional chemicals to produce multiple bulk and high-value product streams.

Who is working in the Valor Plus project? Which Spanish companies collaborate with ValorPlus project?

With funding from the EU FP7 programme, the Valor Plus project consists of a strong consortium of 14 partners; The UK Health & Environment Research Institute Limited (UK) (Coordinator), BRUNEL University (UK), ABENGOA RESEARCH SL (ES), POLITECNICO DI MILANO (IT), BIOBASIC ENVIRONNEMENT SARL (FR), Wissenschaftliche Gerätebau Dr. Ing. Herbert Knauer GmbH (DE), ASA SPEZIALENZYME GMBH (DE), VOGELBUSCH Biocommodities GmbH (AT), INSTITUTO TECNOLÓGICO DEL EMBALAJE, TRANSPORTE Y LOGÍSTICA (ES), IFAM (DE), Asociación Española de Bioempresas (ES), FUNDACIÓN CARTIF (ES), BETA RENEWABLE GROUP SL (ES) and TECHNISCHE UNIVERSITÄT MÜNCHEN (DE)

What are the similarities between a bio-refinery and a crude (petroleum) refinery?

Similarities are that they can produce products that have similar applications and commercial value. Both processes involve pre-treatment, isolation, separation and purification phases and they both can yield finished products as well as materials that can be further used to produce value added products. The main difference is that bio-refineries use raw materials that are sustainable and have less negative environmental impact as compared to fossil based refineries used for the latter.

Why a bio-refinery can be called of “2nd generation”?

They are called second generation mainly because they use sustainable lignocellulosic biomass feed-stocks for the production of multiple product streams and this 2nd generation bio-refinery does not compete with food based biomass processes for input raw materials. For example in 1st generation bio-refineries the biomass used to produce various products (e.g., biodiesel) is also used to produce food products.

How sustainable are the 1st generation bio-refineries?

In our view the 1st generation bio-refineries are not

sustainable mainly because they compete with food production, taking into account that the world population is increasing and the demand for food is consequently also high and increasing. In contrast for 2nd generation bio-refineries this competition does not occur therefore making it more sustainable as compared to the 1st generation bio-refineries.

“We estimate that within three years after the project completion, we could have a large scale commercial process”

Which quotation has the project? Which profitability do you expect?

We estimate that if we were to have the closed loop processes then we could generate revenue of €720 per tonne of biomass, in contrast to current processes that generate a revenue of €323 per tonne of biomass giving an increased profitability of bio-refinery from 8% to 26%

How many bio-refineries have large scale production nowadays over the world? And in Europe?

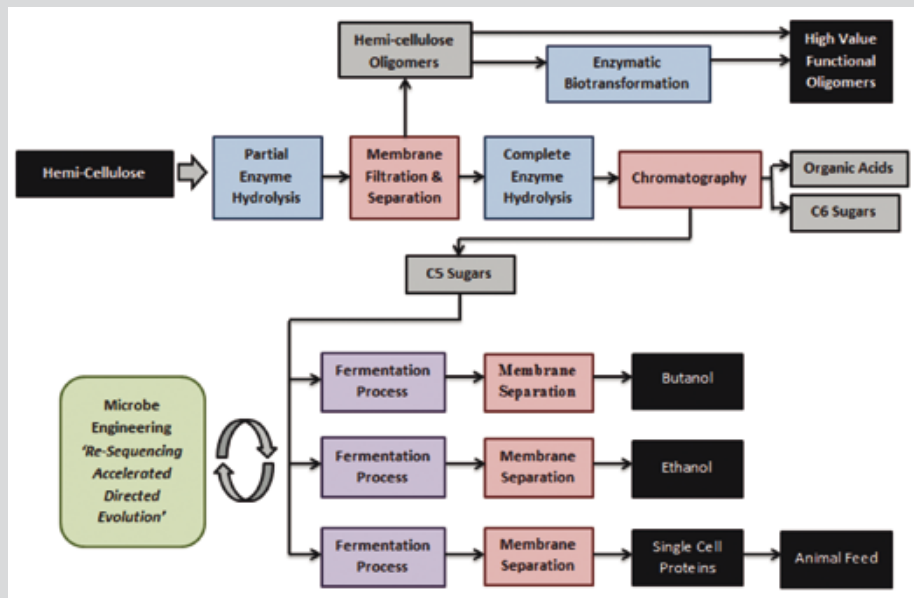
Opportunities for the development of bio-refineries for use of renewable materials as a commodity have been studied by many companies and institutes worldwide and the majority of these studies are still ongoing. Globally there are 20 large scale (over 60,000 tonnes/annum) bio-refineries using 2nd generation biomass; 40% of these companies are based in Europe. Furthermore there are about 30 companies that have produced large scale demonstrators and pilot plants, and the number of these companies is increasing each year.

Which is the innovation of this project in the face of other bio-refineries?

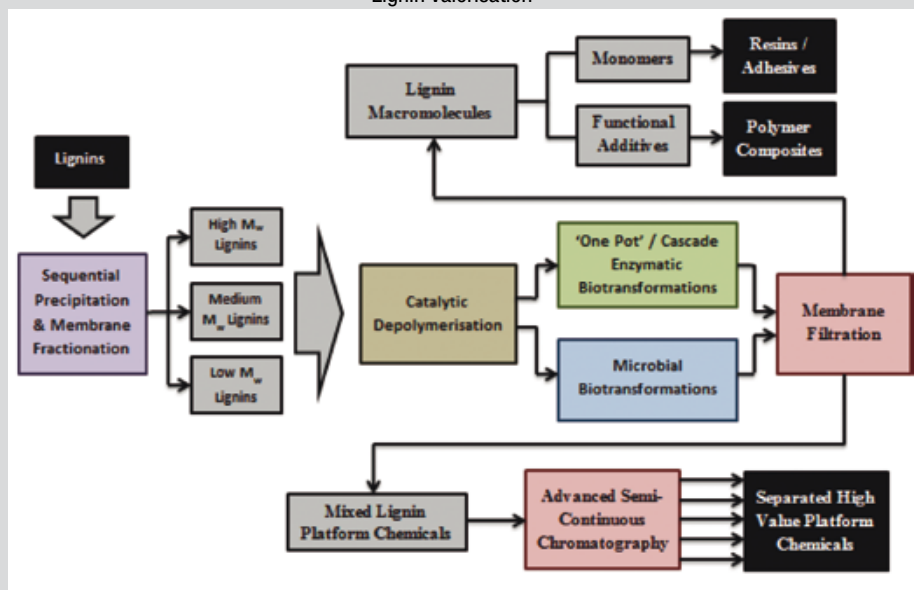
The key innovations of our Valor-Plus project are: Complete valorisation of key bio-refinery by-products leading to ‘closed loop’ integrated bio-refineries; development of a novel methodology for the controlled breakdown, release and fractionation of the lignocellulosic biomass; engineering of new enzymes and microorganisms for the controlled hydrolysis and transformation of hemicellulose to high value oligomers and bulk fermentation product streams; utilisation of combined chemo-enzymatic and chemo-microbial processes for the controlled depolymerisation and transformation of standardised lignin feedstocks to value product streams; engineering of new microorganisms suitable for the fermentation of crude glycerol to higher value product streams.

DIAGRAM OF THE GLOBAL PROCESS

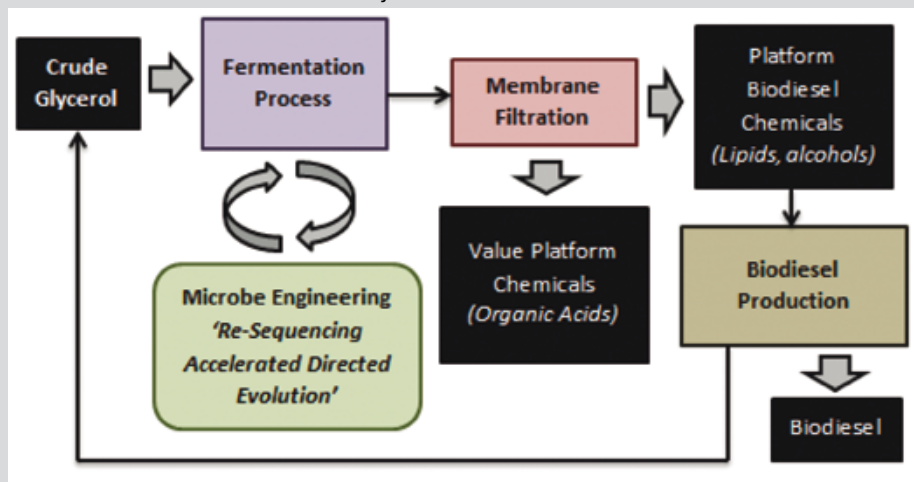
Hemicellulose Valorisation



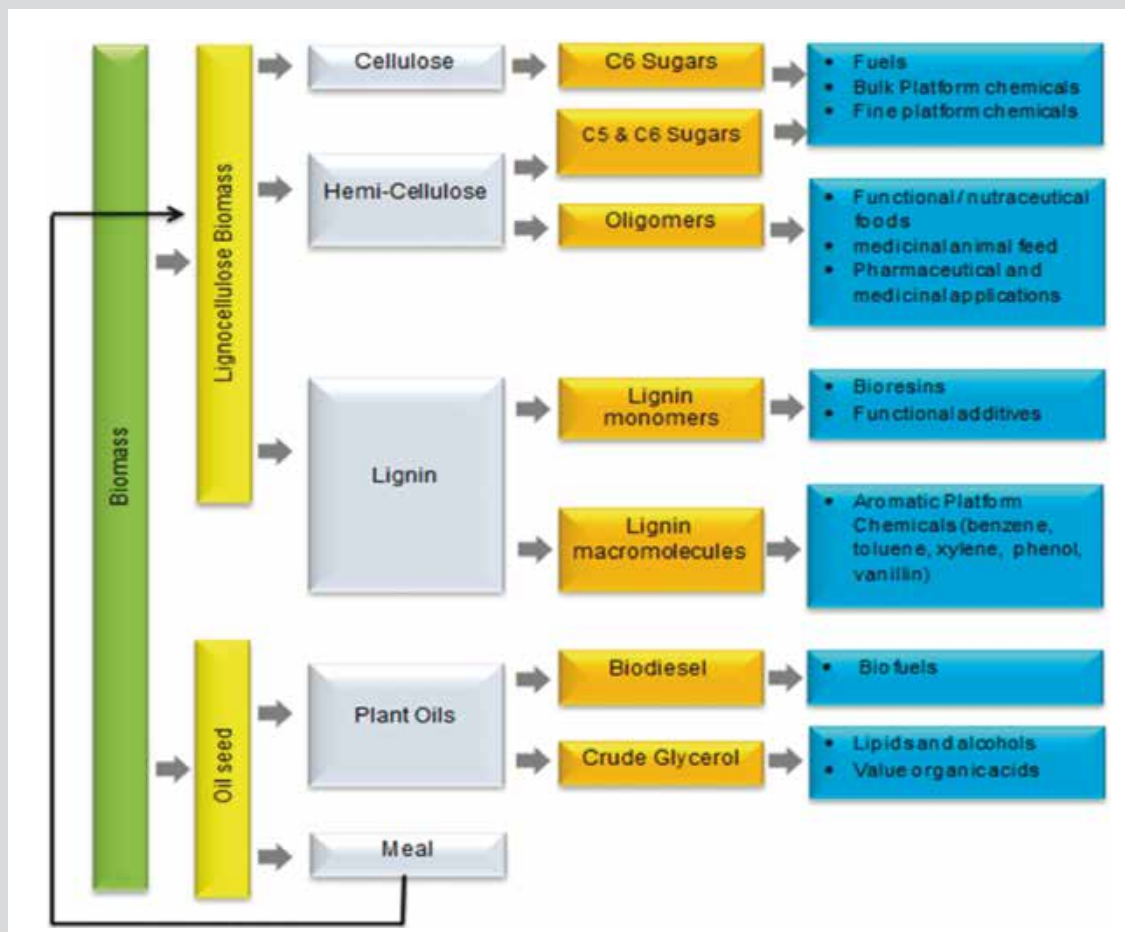
Lignin Valorisation



Glycerol Valorisation



MAIN RAW MATERIALS USED



“We believe that Impact of Spain in biotechnology will be significant in terms of take up of the developed technologies”

What applications do these products have?

Raw materials and the resulting products are given in the figure above (Main in raw materials used).

What annual production could a biorefinery based on your statements have?

Commonly only 20% of a plant is utilized, whereas our processes will enable utilization of over 60% of the biomass leading to increase in product yield of over 180,000 tonnes/annum worldwide compared to a typical large scale biorefinery with a yield of 60,000 tonnes/annum.

After the research, in how many years do you imagine would it be possible to have a large scale production?

We estimate that within three years after the project completion, we could have a large scale commercial process.

What do you think about the impact of Spain in biotechnology nowadays?

We believe that Impact of Spain in biotechnology will be significant in terms of take up of the developed technologies. These impacts for Spain can be summarized as follows: Be less dependent on petroleum and fossil based products; create jobs and new businesses; adopt more sustainable and economical low input farming practices; improve bio-diversity through growing a range of lignocellulosic biomass for bio-refineries; develop small scale rural bio-refineries; tailor made solutions to stimulate industries that can produce new bio based products; etimulate other industries due to the interrelationship amongst businesses. 