PROJECT AIM

To demonstrate the process and commercial benefits of the **BioSonic Technology** for the efficient fractionation of surplus and/or waste woody biomass into cellulose, hemicellulose in the form of sugars, and lignin.

PROJECT OBJECTIVES

To develop a novel separation process that does not require high temperature or pressure, and is capable of producing high purity wood fractions faster, more efficiently and economically than traditional digestion processes.

To ensure the technology is scalable for use by small, medium and large hard and soft wood forest enterprises, and adaptable for the processing of other lignocellulosic biomasses such as wheat straw, grasses, sugar cane bagasse and palm waste.

PROJECT SUMMARY

Since January 2013, the BioSonic project has developed an innovative organic chemical process to extract a variety of valuable products from woody and other lignocellulosic biomass, for use in the food, pharmaceutical, cosmetic, textile and energy industries. This low temperature, low pressure and energy efficient process has the potential to permit the economic production of large quantities of high value chemicals. The technology can also be adapted to operate close the source of renewable raw materials, simultaneously decreasing transport distances and resulting pollution.

SOCIAL IMPACT AND CARBON REDUCTION

Production development for the processing of surplus and/or waste biomass across the EU and the rest of the world will lead to employment opportunities, wealth generation and improved standards of living.

Every cubic metre of wood absorbs 1 tonne of CO_2 every year which equates to 10% of the EU's annual CO_2 emissions; more wood more carbon benefit. The **BioSonic Technology**, which demands less energy and recovers solvents, will result in significant CO_2 reduction.

www.biosonic-fp7.eu

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BioSonic – Lignocellulosic BioRefinery

Novel Mobile Sonication Process for Local Valorisation of Lignocellulosic Forest Materials to Produce Valuable Chemicals

The concept of the Lignocellulosic Biorefinery (LCBR) is gaining ground in the EU, as a way to increase the value obtained from wood waste such as sawdust and chippings, from €50/tonne to potentially as much as €500/tonne. To do this, the LCBR would cleanly fractionate the three components: cellulose, hemicellulose and lignin without degrading them. Generally the paper and bioethanol industries create high quality cellulose, yet fail to capitalise on the value of the other two components. The BioSonic project aims to exploit all the components of lignocellulosic biomass.

This project is in receipt of funding from the European Union's Seventh Framework Programme for research, technological development and demonstration.

Grant Agreement No. 315550

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FEEDSTOCKS

40% of the EU's land area is forested and 60% of its annual wood growth is harvested, producing over 20 billion cubic metres of usable wood. The remainder is surplus. Overall the EU forest land area has increased by 4 million hectares in the last 15 years and it is one of the world's largest producers of sawn wood.

60% of EU forests are privately owned by around 16 million forest owners and in the EU there are over 300,000 forest-reliant businesses employing over 3 million people. These organisations produce forest-derived products worth €500 billion.

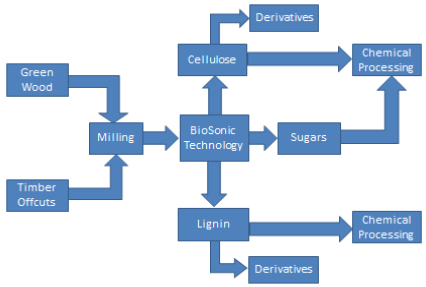
European Opportunities ….

The 250 million cubic metres of sawn wood products produce thousands of tonnes of offcuts and sawdust waste which, if chemically processed using the **BioSonic Technology**, could produce valuable high quality cellulose, hemicellulose in the form of sugars, and lignin for a multitude of industrial uses.

By contrast the 350 million cubic metres of pulp produced for paper is now in decline due to the increase in digital media and Far East competition. This serious situation demands new outlets for pulped wood such as wood composites and speciality chemicals, which could be easily addressed and be another golden opportunity for the technology.

In addition to hard and softwood feedstocks, the **Biosonic Technology** is well suited to other lignocellulosic biomasses, such as straws, miscanthus and rye grasses, sugar cane bagasse and palm fronds.

TECHNOLOGY



The **BioSonic Technology** provides several options to enter the value chain, which fall into two categories:

1. Standalone biorefining technology for the production of cellulose, hemicellulose in the form of sugars, and lignin.
2. Low energy hydrolysis process, which could be beneficially integrated into current biorefining processes for lignocellulosic feedstock.

Hard or soft wood is sourced in the traditional manner from forests and reduced to particulate size. Water, organic acid and solvents are added to produce a slurry which is then passed through an ultrasonic reactor where fractionation occurs. The separated hemicellulose, in the form of C5 and C6 sugars, and lignin are collected in the aqueous and organic liquid phases respectively leaving the cellulose in the solid phase. The organolsolv and acidic water are recovered from the liquid phases for regeneration and re-use. The separated products are collected for tranportation to the appropriate secondary processing facilities.

PRODUCTS

Wood is renewable and available and economic processing offers a route to a wide variety of speciality chemicals, industries and products markets, such as:

Pharmaceuticals, plastics, packaging, textiles, food and drink supplements, cosmetics, personal care, domestic products, veterinary and agricultural applications.






The market opportunity for bio-derived PET (polyethylene terephthalate), an important platform for synthetic materials derived from cellulose could be as high as: bottles 18M tonnes/year, fibres 42M tonnes/year and films 5M tonnes/year.