





THE BIO-BASED INDUSTRIES JOINT UNDERTAKING (BBI JU)

The BBI JU initiative is a €3.7 billion public-private partnership between the European Union (EU) and the Bio-based Industries Consortium (BIC). It is an autonomous EU body operating under Horizon 2020 rules and procedures, dedicated to investing in research and innovation projects.

Bio-based industries and their value chains are faced with complex and substantial technology and innovation challenges. BBI JU was created to act as a catalyst to tackle these challenges by de-risking investments for private research and innovation, structuring the sector to allow it to reach critical mass in a focused and coherent way. This will enable long-term stability and predictability for the sector and will keep the investments in Europe, thus creating new jobs – most of them in rural areas – and value to our citizens, while leading the transition towards a post-petroleum society.

BBI JU is about connecting key sectors, creating new value chains and producing a range of innovative bio-based products to ultimately create a new bio-based community and economy.





MISSION

BBI JU's mission is to implement the Strategic Innovation and Research Agenda (SIRA) developed by the Bio-based Industry Consortium (BIC), using Horizon 2020 rules and procedures.

BBI JU organises yearly calls for proposals to support research, demonstration and deployment activities enabling the collaboration between stakeholders along entire value chains, covering primary production of biomass, processing industry and final use.

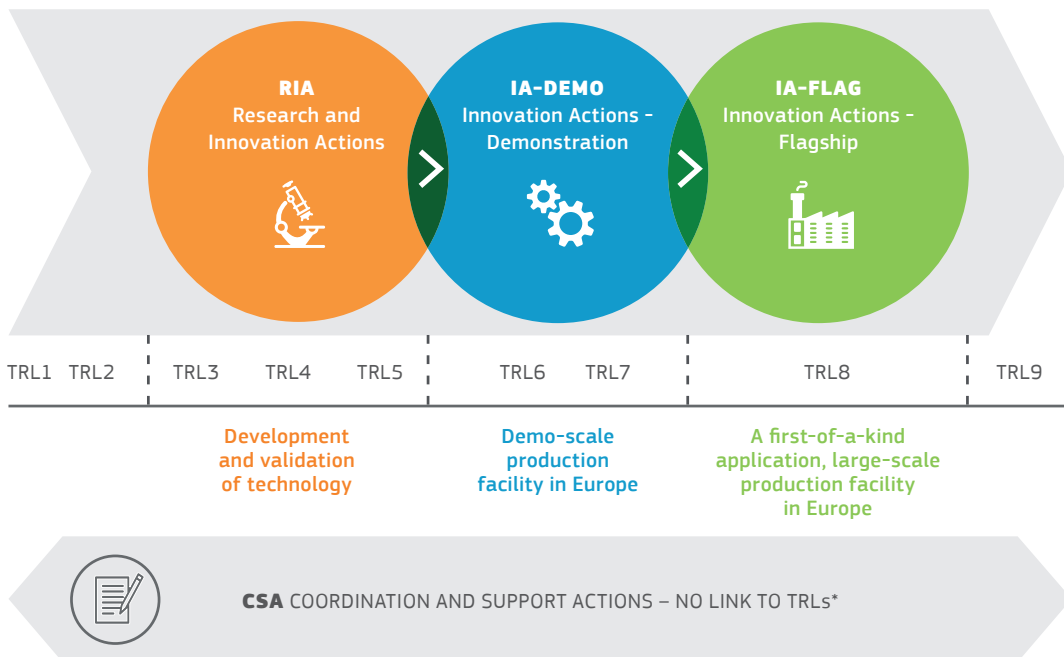
VISION

Our vision is a competitive, innovative and sustainable Europe leading the transition towards a post-petroleum society while decoupling economic growth from resource depletion and negative environmental impacts.

Together with pan-European and cross-sector industries/SMEs, research organisations, universities, regions, and countries, we will develop a bio-based economy for Europe.



BBI JU TYPES OF ACTIONS



***Technology Readiness Levels (TRLs)** are a method of measuring the maturity level of the technology development in a project. This method provides a common understanding of technology status and innovation.



RIAs Research and Innovation Actions

ABACUS

Algae for a biomass applied to the production of added value compounds

BIOMASS: ALGAE

DEVELOPING THE POTENTIAL OF ALGAE

Algae production is currently limited to a few small industries, mainly for the feed, nutrition and cosmetic sectors. This is ripe for expansion. However, creating an economically viable and sustainable method of growing large quantities of algae and converting them into commercial products that the markets accept remains a challenge.

ENHANCED INNOVATION CAPACITY

The commercialisation of high value compounds sourced from microalgae could grow the existing industry considerably, while product innovation based on new molecular targets and biorefinery schemes could open new markets. The ABACUS project has been designed to synthesise a range of new molecules, in terpenoids family, from microalgae that will help bring competitive products to the market.

FROM ALGAE TO FOOD, FRAGRANCES, FLAVOURS

Algae are a fertile source of potential new natural materials. ABACUS will make a major step in mastering the value chain for competitive, algae based-products. ABACUS is tackling the biological and bioprocess challenges of oriented algal production of terpenoids and carotenoids in both well-established and more innovative (but promising) market sectors. ABACUS will enhance innovation capacity by connecting algae-producing companies with larger enterprises in the flavour and perfume sectors, which seek new natural, bio-based sources.

Website

www.abacus-bbi.eu

Start date

01 May 2017

End date

30 April 2020

BBi JU contribution

€ 4 653 659

AFTERLIFE

**Advanced Filtration TEchnologies for the Recovery and Later
conversion of relevant Fractions from wastEwater**

BIOMASS: INDUSTRIAL WASTEWATER

HOLISTIC PROCESS DESIGN AT PILOT SCALE

The AFTERLIFE project proposes a flexible, cost- and resource-efficient process for recovering and valorising the relevant fractions from wastewater. It will represent an advance on existing approaches to wastewater treatment, which rely on physic-chemical and biological methods.

NEW BIO-BASED BIOPOLYMERS FROM INDUSTRIAL WASTE WATER

The AFTERLIFE process will separate out the different components of value using a series of membrane filtration units that will separate all the solids in the wastewater. These will then treated to obtain high-pure extracts and metabolites or, alternatively, to be converted into value-added biopolymers called polyhydroxyalkanoates(PHAs).

RETURNING PURIFIED WATER BACK TO THE ENVIRONMENT

In addition to the value extracted from the solids, the remaining outflow of the water will be ultrapure and ready for re-use. It will develop innovative approaches for separating the organic content of wastewater, transforming these into bio-based products and minimising waste produced. In addition it will show that the quality and purity of these intermediates is such that they can be converted to make the targeted end-products without further purification. AFTERLIFE will also demonstrate that the wastewater streams chosen for experimental validation are easily replicable in other sites in Europe.

Website

www.bbi-europe.eu/projects/afterlife

Start date

01 September 2017

End date

31 August 2021

BBI JU contribution

€ 3 890 593



BARBARA

Biopolymers with advanced functionalities for building and automotive parts processed through additive manufacturing

BIOMASS: AGRO-FOOD SIDE-STREAMS

NEW STARCH MOLECULES FROM AGRO-FOOD WASTE

The BARBARA project aims to convert the side-stream fractions and residues from agro-food production into novel polysaccharides and functional additives that can be valorised. These compounds will be selected to provide additional capabilities to polymers. These will be mixed with other compounds to create engineering bioplastics adapted for Fused Filament Fabrication (FFF) processes (3D printing).

ADDED VALUE FOR AUTOMOTIVE & BUILDING INDUSTRIES

Improving building and automotive materials performance BARBARA will develop novel bio-based engineering bio-plastic materials that will be validated using functional prototypes in the building and automotive sectors. This will ultimately allow development of improved mechanical, thermal and aesthetic properties of novel bio-based engineering polymers as well as demonstrators of final parts for the automotive sector and moulds and tools for hybrid manufacturing in advanced building applications.

BIO-BASED MATERIALS, CONSUMER PRODUCTS AND VALUE CHAINS

BARBARA will develop four new bio-based materials and three new validated consumer products. It will develop innovations in four Key Enabling Technologies - industrial biotech, nanotechnology, advanced materials and advance manufacturing technologies. In addition, it also establishes two new bio-based value chains and links European platforms by bringing together the BBI with the Vanguard initiative.

Website

www.barbaraproject.eu

Start date

01 May 2017

End date

30 April 2020

BBi JU contribution

€ 2 603 861



BioBarr

New bio-based food packaging materials with enhanced barrier properties – BioBarr

BIOMASS: WASTES AND AGRO-INDUSTRIAL CO-PRODUCTS

BIO-BASED FOR FOOD PACKAGING

BioBarr will develop new bio-based and biodegradable food packaging materials. These films will be produced using completely natural processes, using raw material derived from wastes and agro-industrial co-products. The project will study methods of polyhydroxyalkanoates (PHA) coating treatments without affecting the biodegradability. These have the potential to replace conventional polymers, possessing similar properties with higher biodegradability and better functional properties and mechanical strength.

IMPROVING THE SHELF LIFE

Currently, using PHAs for food packaging has some limitations, particularly in transmitting oxygen and water. This makes them less than ideal for dry products as bakeries, where loss of crispiness and oxidation of fats can be a problem. BioBarr aims to overcome this by improving vapour and gas barrier properties through material functionalisation. This involves compounding biodegradable materials in multi-layer structures specific for the food product category to be packed. It will also look at surface treatments as a further step.

NEW MARKETS FOR FOOD INDUSTRY

The BioBarr project should create a new bio-based value chain, from bio-plastic producer to food industry end-user. It is an opportunity for innovation and job creation as well as allowing Europe to reduce its dependency on imported oil. It will generate additional income and sustainable development to rural areas, create quality jobs and modernise the economy.

Website	www.biobarr.eu
Start date	01 June 2017
End date	31 May 2021
BBI JU contribution	€ 3 253 438



BIOrescue

Enhanced bioconversion of agricultural residues through cascading use

BIOMASS: MUSHROOM ORGANIC WASTE & OTHER LIGNOCELLULOSIC WASTE

EXPENSIVE WASTE

Europe's mushroom industry generates approximately five million tonnes of spent mushroom substrate (SMS). This is the extraneous substrate and mushroom mycelium that is left behind after harvesting the mushrooms. Storing and disposing of this SMS has become a significant economic and logistical problem, disposal costing up to €50/tonne, & a bill of up to €250 million for the mushroom industry each year. BIOrescue will turn this economic and logistical problem into biochemical materials that can be used as replacements to those derived from fossil resources.

CASCADING EFFECT

BIOrescue will demonstrate and develop the concept of an integrated bio-production process based on the cascading use of SMS supplemented with wheat straw (WS) and other underutilised lignocellulosic feedstocks like pruning residues, residual citrus peels and wastes. When applied within a conventional mushroom production farm, this will turn it into an efficient and sustainable bio-refinery. This concept will avoid disposal and allow for the production of some biodegradable bio-based products and bioactive compounds that will help to replace the existing ones based on fossil resources.

DEMONSTRATING ADDED VALUE

This system will ensure year round operation by using SMS as a major component and wheat straw which is a resource that is already stored at mushrooms farms. Biomass is processed into a bio-based final product which is used at least once more, either for materials or energy. It will upgrade the SMS feedstock into higher value derived bioproducts.

Website

www.bbi-europe.eu/projects/biorescue

Start date

01 September 2016

End date

31 August 2019

BBi JU contribution

€ 2 635 140



BIOSEA

Innovative cost-effective technology for maximizing aquatic biomass-based molecules for food, feed and cosmetic applications

BIOMASS: ALGAE

ABUNDANT HOME-GROWN EUROPEAN PROTEIN SOURCE

EU society needs new sustainable bio-based feedstocks to meet population growth and reduce dependence on fossil fuels for raw materials; around 70% of the EU's protein needs are imported. Aquatic feedstock offers a potential solution, however its total production volume and market size are still relatively small.

NEW SMART BIO-BASED INGREDIENTS FOR FOOD, FEED AND COSMETICS

In addition, the algae feedstock market still relies on immature technologies for production and technologies not specifically designed for the purpose. The BIOSEA project aims to validate and scale up an entire production process of ingredients from the lipid, protein, carbohydrates and minority compounds fractions of four algae, including upstream and downstream steps.

SCALING UP TO A SUSTAINABLE LOWER-COST ALTERNATIVE

The BIOSEA process will be effective and environmentally friendly and the compounds will be obtained at low cost, leading to the future industrialisation of the process. The BIOSEA project will develop a new bio-based value chain based on aquatic biomass and obtain at least six new compounds for use in formulating different food, feed and cosmetic/personal care products. It will also validate the bio-based compounds obtained in a variety of final consumer applications. This way, BIOSEA will contribute in reducing Europe's dependence on feedstock imports, diminishing the pressure of land resources and opening new markets and business opportunities.

Website

www.bbi-europe.eu/projects/biosea

Start date

01 June 2017

End date

31 May 2020

BBi JU contribution

€ 2 611 223

BIOSMART

Bio-based smart packaging for enhanced preservation of food quality

BIOMASS: BIOPEF, BIOPET AND PLA

NEW BIOBASED PACKAGING

BIOSMART will develop active and smart bio-based and compostable packages to meet the needs of both fresh and pre-treated food applications. It will demonstrate three new types of packages (flexible/rigid plastic and cardboard) with enhanced performance addressing consumer needs. All will be new concepts with an emphasis on consumer convenience and overall value chain value creation.

CONSUMER-FRIENDLY

In order to address future demands, packaging will need to enable 'lightweighting', reduced food residues, easier shelf life monitoring and longer shelf life, easier consumer waste handling, all without a price premium. BIOSMART will ensure that fresh food packages that should be biodegradable or compostable and processed food packages that should be recyclable are in line with the EU's objective of reducing the recyclable content in landfilled waste. An added benefit is the increase of shelf life of food products through improved preservation.

LINKING SECTORS

It will create a new cross-sectorial interconnection in bio-based economy clusters linking to the complete value chain, from bio-based raw material to end-users. BIOSMART will also introduce novel bio-based lipopeptide and peptide additives with anti-microbial, anti-fungal and/or anti-oxidant properties to increment food shelf life, new coatings with enhanced O_2 , CO_2 , water and UV barrier properties.

Website

www.biosmart-project.eu

Start date

01 May 2017

End date

30 April 2021

BBJ JU contribution

€ 3 610 866

CARBOSURF

New processes for the fermentative production of glycolipid biosurfactants and sialylated carbohydrates

BIOMASS: GLYCOLIPIDS

INCREASING AVAILABILITY

Glycolipid biosurfactants offer a vastly improved environmental compatibility compared to traditional surfactants, while specialty carbohydrates have applications in a very broad range of markets. Increasing the supply and availability of specialty carbohydrates from kilogrammes to hundreds of tonnes will massively widen the range of available applications.

ADDITIONALITY IN THE EXISTING MARKET

CARBOSURF is working to produce specific biochemicals called glycolipid biosurfactants and specialty carbohydrates, where market interest is already high. The project will significantly improve the flexibility, productivity and environmental performance of biosurfactants and specialty biochemicals industrial processes.

INNOVATIVE FERMENTATION PROCESSES

The project will develop innovative fermentation processes to produce glycolipid biosurfactants and specialty carbohydrates. It will test the market potential in a wide range of application fields, like nutraceutical, pharmaceutical and cosmetic industries to assess the technical, economic, environmental and social sustainability of these processes over the whole value chain, from biomass input to product application output. The project will contribute to the replacement of 5-10% fossil-based surfactants with biosurfactants, offering increased flexibility, productivity and environmental performance of the EU biochemical industries.

Website

www.carbosurf.eu

Start date

01 August 2015

End date

30 July 2018

BBI JU contribution

€ 2 730 605

ECOXY

Bio-based recyclable, reshapable and repairable (3R) fibre-reinforced EpOXY composites for automotive and construction sectors

BIOMASS: FLAX

IMPROVING ECO-FOOTPRINT

The lightweight and excellent mechanical properties of thermoset fibre-reinforced composites make them attractive materials for automotive & construction sectors. However, they are challenging to reprocess and difficult to repair and recycle increases the overall material cost and environmental concerns. The vast majority of existing products used in their manufacture rely on fossil-derived materials or use large amounts of energy.

BIO-BASED PARTS FROM FLAX FIBRES & PLA

ECOXY will develop at least two innovative bio-based epoxy resins and fibre reinforcements with a wide range of applications and at least two new bio-based composite materials. It will create demo parts for the construction and automotive sectors including a window profile for construction by pultrusion, a dashboard fascia and the rear seat back panel for automotive sector by resin transfer moulding.

'BIO-BASED' FOR SUSTAINABILITY

By reducing GHG emissions and energy use, labour & waste costs, ECOXY proves reduces raw material costs, lower energy costs for manufacturing the target components, lower production costs and reparability. This means that through bio-based fibres and resins for composite manufacturing, the automotive and construction sectors have equal or better sustainability.

Website

www.ecoxy.eu

Start date

01 June 2017

End date

30 November 2020

BBI JU contribution

€ 4 850 960

EFFORTE

Efficient forestry by precision planning and management for sustainable environment and cost-competitive bio-based industry

WOOD

IMPROVING EFFICIENCY IN FORESTRY

Forests and forestry will play a key role in making a European bio-based economy a reality. By applying modern technology to forestry techniques, the EFFORTE project will improve efficiency and sustainability throughout the entire forest-based value chain within EU.

ANALYSING ADDED VALUE

EFFORTE recognises that, like many businesses, forestry can be viewed as a chain of events over a long of time. As such, it can be improved using data analysis approaches that can optimise each stage adding value step-by-step and as a whole. In addition, deploying geographic information systems in combination with information about stand and soil properties, EFFORTE will help increase revenues and production while reducing undesirable environmental impacts.

INCREASING YIELD SUSTAINABLY

EFFORTE will improve efficiency in silviculture and harvesting operations & accessibility to wood resources leading to a significant increase in productivity in forest operations over a representative period of time. A 1% annual increase in forest growth over a 20 year period would increase yield by 22%, roughly equivalent to 2 years of forest growth gained. The project will also help by reducing negative environmental impacts on soil disturbance, thinning & extracted logging residues. It also aims at reducing fuel consumption in the forest harvesting process by at least 15%.

Website

www.luke.fi/efforte

Start date

01 September 2016

End date

31 August 2019

BBi JU contribution

€ 2 230 221

EnzOx2

New enzymatic oxidation/oxyfunctionalization technologies for added value bio-based products

BIOMASS: WILD TYPE AND ENGINEERED OXIDATIVE ENZYMES

BETTER BIO-CHEMICAL TECHNOLOGY

Biomass bio-refineries can be greener and even more effective if they use efficient bio-chemical technologies. EnzOx2 explores the potential use of wild type 'occurring in nature' and engineered oxidative enzymes as innovative solutions to existing production bottlenecks. The EnzOx2 project aims to provide innovative answers to improving processes already in place in current bio refineries.

BETTER PROCESS FOR NEW PRODUCTS

The ultimate goal is in enabling transformation of plant-based molecules cannot be attained using classical chemical technologies. It will do this by incorporating bio-chemical technologies making them more efficient and cost-competitive and by developing a new generation of bio-chemical technologies for future bio refineries. This could lead to new products with significantly higher value.

APPLYING TECHNOLOGIES INNOVATIVELY

These new bio-chemical technologies based on the use of wild-type and engineered oxidative enzymes are largely unexplored at the industrial level. They can be used to provide innovative solutions to some relevant bottlenecks concerning selectivity, yield and cost efficiency in the production of biomass for example sugar-, lipid- and terpene-based chemical building blocks, flavours and fragrance ingredients and active pharmaceutical ingredients. ENZOx2 try to take advantage of the unique characteristics of these biocatalysts & demonstrate their uses at pilot level and later at flagship level.

Website

www.bbi-europe.eu/projects/enzOx2

Start date

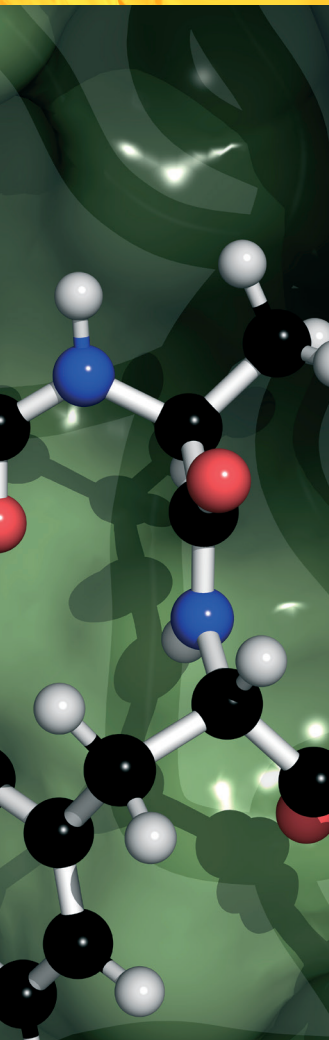
01 November 2016

End date

31 October 2019

BBi JU contribution

€ 3 000 000



GreenLight

Cost effective lignin-based carbon fibres for innovative light-weight applications

BIOMASS: LIGNIN

BIOBASED ALTERNATIVE

Carbon fibre's exceptionally high strength to weight ratio offers numerous advantages for many applications but is expensive to produce, meaning its restricted use in aerospace, high-end automotive construction and wind energy. A cheaper, renewable source is needed to tap into a ready and growing market.

ECONOMICALLY VIABLE ALTERNATIVES

The GreenLight project will demonstrate a value-chain for creating a new bio-based, renewable and economically viable carbon fibre precursor from lignin, produced in Europe with European raw materials. These precursors will be suitable for processing into carbon fibre and structural carbon fibre composites and make those more affordable and accessible, particularly in mass-market vehicles. By reducing weight fuel consumption is reduced and hybrids & electric cars can increase their range – a 10% weight reduction means a reduction of 7% in fuel consumption.

ADVANCED PROPERTIES, NEW OPPORTUNITIES

Greenlight will demonstrate the product's new customised properties to achieve a cost-efficient alternative to today's high-performing and relatively high-cost petroleum-based carbon fibre raw material, polyacrylo-nitrile. This will create new business opportunities and jobs in the pulp and paper industry though the separation and valorisation of the lignin from kraft pulp mills & contribute to the structural changes and increasing of competitiveness of the forest-based industry in Europe.

Website

www.greenlight-project.eu

Start date

01 July 2015

End date

30 June 2019

BBi JU contribution

€ 1 299 164

HYPERBIOCOAT

High performance biomass extracted functional hybrid polymer coatings for food, cosmetic and medical device packaging

BIOMASS: FOOD BY-PRODUCTS

SMART BIO-BASED FOOD PACKAGING

Biodegradable packing seems to be everywhere, but in fact is not used for a range of demanding applications. For many food products, current materials do not provide the required protection against water vapour, oxygen or flavours. The project HYPERBIOCOAT examines how existing technology can be used to develop biodegradable polymers derived from food processing by-products.

NEW MOLECULES WITH ADVANCED PROPERTIES

The project will identify potential biodegradable polymers, characterise their chemical composition and properties and focus on extraction processes that can be scaled up to industrial levels. These can provide the high levels of protection required for the demanding areas of food, cosmetic and medical device packaging. It will develop and validate at pilot scale a competitive & sustainable extraction process for candidate molecules from hemicellulose and bio-polyesters coming from waste side streams of lignocellulosic biomass like agro-food waste and side streams. Ultimately, this would permit packaging without the need for non-biodegradable additives.

REDUCING COSTS

It will synthesise & up-scale of the process of a novel functional hybrid bioORMOCER® lacquer. Hyperbiocait is expected to discover at least two new functional molecules for surface treatment, with enhanced or equal properties for the developed molecules with respect to conventional counterparts, measured against relevant industrial standards. This should reduce current costs by more than 10 % as compared with conventional molecules.

Website

www.hyperbiocoat.eu

Start date

01 September 2016

End date

31 August 2019

BBi JU contribution

€ 4 617 423

A tall cornfield in the foreground with two large, blue, dome-shaped structures in the background under a cloudy sky.

BIOMASS: AGRO-INDUSTRIAL & FOOD SIDE-STREAMS

Currently, agro-industrial & food side-streams are often used as feed or bio-energy source. Most biorefineries today are designed to process only one kind of feedstock with constant properties. The INDIRECT project introduces a new biorefinery concept that will process mixed feedstocks via its conversion to a homogenous biomass by insects. In many areas of Europe, where production is higher than can be recycled, animal manure has become a pollution problem. INDIRECT offers a new approach to recycle manure by utilising insects such as the larvae of the black soldier fly that can grow on manure by extracting nutrients.

Insects have high feed conversion efficiency. Crickets, for example, require only 2 kg of feed for every 1 kg of bodyweight gain, compared to 8 kg for cattle. A 4x better biomass conversion efficiency for insects compared to cattle. The indirect biorefinery approach that will be used by InDIRECT aims to convert 1 ton of side streams into at least 300–400 kg of fresh insect biomass representing a 50% improvement of conversion efficiency.

The success of new farming types and the introduction of new products in the market, is also dependent on their acceptance by the society. The project will communicate about its results and public acceptance of recycled products from manure, insects, can be speed up. InDIRECT will lead to products with significantly higher values than the current application of the biomass.

Website	www.bbi-europe.eu/projects/indirect
Start date	01 November 2016
End date	31 October 2019
BBi JU contribution	€ 1 347 947

LIBBIO

Lupinus mutabilis for Increased Biomass from marginal lands and value for BIOrefineries

BIOMASS: LUPINS

IMPROVING THE LUPIN YIELD

The Andean lupin has long been grown in Ecuador, Peru and Bolivia. These plants are also suitable for cultivation in Europe, where they can thrive on what is currently marginal land. The LIBBIO project aim is to develop consumer food, feed, non-food and bio-energy products from Andean lupin varieties adapted to European farming conditions. It will apply bio-refinery cascading principles for crop value creation and modern crop breeding technologies.

NEW BIO-BASED FEEDSTOCK

Once adapted for European conditions, these plants will offer the potential to produce food, animal feed and bio-energy products by applying bio-refinery cascading principles and modern crop breeding technologies. The LIBBIO project will aim to increase the crop yield and the percentage of lupin beans in the overall harvest weight known as the 'harvest index'.

NEW PRODUCTS FOR CONSUMERS

LIBBIO will also aim to establish consumer demand by developing a number of products, including food applications based on lupin oil and seed protein, and some cosmetic uses. The project will also seek to accelerate development of the supply chain for lupin-derived products. This will bring economic benefits for farmers and the whole supply chain, and environmental benefits and benefits on a European level.

Website

www.libbio.net

Start date

01 October 2016

End date

30 September 2020

BBI JU contribution

€ 4 923 750



LIBRE

Lignin based carbon fibres for composites

BIOMASS: PULP & PAPER

BIO-BASED ALTERNATIVE

The global carbon fibre based composites market is worth an estimated €25 bn. However, using fossil resources to produce the main precursor for carbon fibre, polyacrylonitrile, has limited production capability and high costs. In addition, it depends on finite resources. This means that the development of an alternative source of polyacrylonitrile, using innovative and novel bio-industrial feedstocks and processes, has huge potential to deliver an economic win-win. LIBRE will develop a product made from waste lignin.

MORE RESOURCE-EFFICIENT

The LIBRE project will utilise this side stream feedstock from the pulp and paper industry, blended with a biopolymer precursor fibre, to create a more resource-efficient and sustainable carbon fibre production process. The ultimate aim of the LIBRE project is to create carbon fibre materials with a superior structure that will open up potential new markets.

SUSTAINABLE & PERFORMANT COMPOSITE

This will lead to the development of new bio-based composite materials utilising lignin from the pulp and paper industry blended with biopolymers as a precursor. It offers reductions in energy consumption and greenhouse gas emissions during the manufacturing process through the use of microwave and radio frequency heating technologies. New technologies like surface functionalisation using non-aqueous processes can enhance performance in polymer composites. This brings an increased sustainability of composite materials and a competitive edge for end-user sectors such as transportation, renewable energy and construction.

Website

www.libre2020.eu

Start date

01 November 2016

End date

31 October 2020

BBI JU contribution

€ 4 919 060

MACRO CASCADE

Cascading Marine Macroalgal Biorefinery

BIOMASS: MACROALGAE

HARVESTING 'BLUE POTENTIAL'

Europe will need more food; 70 per cent more by 2050. Project MACRO CASCADE will help Europe increase the amount of food from the sea from a mere two percent, growing a valuable new technology sector for Europe and increasing food security for the future. It will do so while creating zero waste.

SHORT & LONGER-TERM GAINS

MACRO CASCADE will develop patentable feed and food products with health promoting functionalities through innovative microbial refining methods of macroalgae in combination with rape seed. It offers novel business opportunities for on short term for feed and food products, and on midterm for high value pharma- and nutraceuticals, large volume chemicals and bio materials and marine based proteins and fatty acids in high demand.

BLUE PRINT FOR BLUE BIOECONOMY

MACRO CASCADE will develop sustainable business cases for a “Blue Print” of the cascading marine macroalgal biorefinery. MACRO CASCADE will obtain optimized strains of seaweeds to increase levels of target components in sugar kelp, kombu and red seaweed and improve methods for seaweed biomass preparation and storage stability.

ADDING VALUE

By scaling up macro-algae cultivation and the pre-treatment industry, there will be an impact on the innovative biorefinery processes for turning seaweed into a commodity. The model created by MACRO CASCADE should increase total value of biomass from €25/tons ww to €1000/tons ww, corresponding to an annual revenue of €2 Billion in 2025.

Website

www.macrocascade.com

Start date

01 October 2016

End date

30 September 2020

BBI JU contribution

€ 4 156 356



MAGNIFICENT

Microalgae As a Green source for Nutritional Ingredients for Food/Feed and Ingredients for Cosmetics by cost-Effective New Technologies

BIOMASS: MICROALGAE

HIGH PERFORMANCE AND LOW ENVIRONMENTAL IMPACT

MAGNIFICENT seeks to develop a new value chain for food, aquafeed and cosmetic ingredients based on microalgae. Currently, market opportunities for microalgae-based products are restricted to high-value products, as production costs are currently prohibitive to use it as a feedstock. MAGNIFICENT will develop ten new bio-based value chains by 2020, including sustainable production of high-value food, drink and cosmetic ingredients. By using green solvents, it aims to establish truly sustainable value chains.

MAKING PRODUCTION OF MICROALGAE ECONOMICALLY VIABLE

There is an existing capacity for large scale production, but both the variety of products and number of market opportunities is currently limited, mainly to dietary supplements and cosmetics. Magnificent will use these facilities to develop the biorefinery concept further, validate the value chains and develop new ingredients.

NEW AND SUSTAINABLE PRODUCTION TO AREAS SUCH AS COASTS AND DESERTS

MAGNIFICENT will seek to expand the range of products and their market volume substantially and sustainably, improving current applications and developing new ones, such as food and aquatic feed. It will do this by developing and validating a new value chain for cultivating and processing microalgae, addressing both upstream and downstream processes.

Website

www.bbi-europe.eu/projects/magnificent

Start date

01 June 2017

End date

31 May 2021

BBi JU contribution

€ 5 330 573

NeoCel

Novel processes for sustainable cellulose-based materials

BIOMASS: CELLULOSE PULPS

TEXTILES FOR A SUSTAINABLE FUTURE

As the world's population increases, it needs more textiles. A source with great potential for long term increase in production volumes are man-made cellulosic fibres. The NeoCel project will develop innovative and techno-economically feasible processes for producing high quality textile fibres from reactive high cellulose pulps. It will enhance the use of cellulose from sustainable sources, with a special focus on textiles.

REDUCING ENVIRONMENTAL IMPACT

NeoCel will reduce the environmental impact and occupational health issues relating to man-made cellulose fibre production and promote sustainably produced, good quality man-made cellulosic fibres for the textile and fashion industries.

HIGHLY COMPETITIVE BIOBASED ALTERNATIVE

NeoCel will develop innovative and techno-economically feasible alkaline processes for sustainable production of high quality textile fibres from reactive highcellulose pulps in connection to pulp mills.

REDUCED COSTS, IMPROVED PERFORMANCE

NeoCel aims to strengthen the market position of regenerated cellulose fibres for textile application by an expected reduction of production cost of at least 15% for the developed process in the project. The market share is expected to increase to 15% even if the total market for textile fibres is also expected to strongly increase.

Website

www.neocel.eu

Start date

01 September 2016

End date

31 August 2019

BBi JU contribution

€ 1 934 233



NEWFERT

Nutrient recovery from bio-based Waste for Fertiliser production

BIOMASS: BIOWASTE

CONVERTING WASTE TO FERTILIZERS

Converting waste into resources is key to a circular economy. Europe produces more than 2.5 billion tonnes of waste per year. Around 20% is classifiable as biowaste. NewFert will design & develop technologies to re-use & valorise biowaste components, making them suitable as secondary raw material in the fertilizer industry.

RECOVERING & REUSING SOIL NUTRIENTS

Newfert will develop a new value chain based on nutrient recovery bioprocesses from waste streams and residues for manufacturing a new generation of bio-based fertilisers. It will turn bio-based solid and liquid residues, specifically ashes of different origins and livestock effluents, into bio-based fertilisers. The project will build up a breakthrough concept for the fertiliser industry & develop a viable and cost-effective nutrient recycling scheme and effective bio-refining technologies aimed at increasing nutrient recovery ratios.

REDUCING EUROPE'S NEEDS FOR FOSSIL RAW MATERIALS

This will lead to a decrease raw material dependency, prevent resource depletion and reduce the environmental impact increasing the fertiliser industry sustainability. Enabling the substitution of a minimum of at least 10% of nitrogen and phosphorus with recycled components in commercial fertilisers will contribute to a reduction of imports of mineral resources while enhancing the reuse of waste products. In this way NEWFERT will improve fertilisers in view of environmental impact and price competitiveness as compared to the current non-bio-based alternatives.

Website

www.newfert.org

Start date

01 July 2015

End date

31 December 2018

BBJ JU contribution

€ 1 209 520

PERCAL

Chemical building blocks from versatile MSW biorefinery

BIOMASS: MUNICIPAL SOLID WASTE

INCREASING THE VALUE OF SOLID MUNICIPAL WASTE

PERCAL will use Municipal Solid Waste (MSW) as a feedstock for developing intermediate chemical products, producing high yield with high purity, making it attractive for industry. These will be complementary to the bioethanol (existing PERSEO Bioethanol® technology), thus creating a cascade of valorisation from the MSW components.

MAKING HIGH-VALUE PRODUCTS USING CASCADING TECHNIQUES

PERCAL aims to produce three main compounds. Lactic acid, which can be used to make eco-friendly ethyl lactate. This can be used in cleaning products, in ink and for hot-melt adhesives for cardboard; succinic acid, as an intermediate building blocks for the production of polyols for the polyurethane industry as well as biosurfactants from the remaining fraction of the MSW fermentation.

NEW VALUE CHAINS THROUGH VALORISING WASTE

The project should lead to four main innovations; new enzymatic cocktails to maximize hydrolysis of fermentable organic matter with low inhibitors production; high yield, specific and robust strains for each selected acid; extraction of fermentation by-products acting as inhibitors to succinic acid production via novel membrane electrolysis and optimised simultaneous saccharification and fermentation for lactic acid production followed by a downstream separation process. These should minimise issues of heterogeneous MSW composition.

Website

www.percal-project.eu

Start date

01 July 2017

End date

30 June 2020

BBI JU contribution

€ 2 518 518



POLYBIOSKIN

High performance functional bio-based polymers for skin-contact products in biomedical, cosmetic and sanitary industry

BIOMASS: BIOPOLYMERS

PERSONAL CARE PRODUCTS

Biopolymers offer high antimicrobial, antioxidant, absorbency, skin compatibility for high performance demanding skin-contact applications. POLYBIOSKIN will develop and validate four new bio-based materials based on biopolyesters and biopolymers that are capable of replacing current petrochemical-derived materials. It will develop and validate pilot processes for successfully converting the bio-based polymers into 'consumer' products, specifically preparing prototypes for three globally significant, high performance skin-contact products, namely nappies, beauty masks and wound dressing.

TECHNOLOGY BEHIND BIOPOLYMERS

Many of the polymers used in biomedical and cosmetic applications rely on fossil-derived sources. Although a number of alternative bio-based polymers is the subject of recent research, more effort is still needed to increase their specific functionalities and performances in order to proceed with their true translation into market.

CONSUMER-FRIENDLY BIOPOLYMERS

PolyBioSkin products will add benefit and value for consumers by broadening the use of biopolymers in strategic and demanding skin-contact applications. By developing skin-contact bio-polymer based product parts with increased performance and functionality derived from biomass and food waste, providing a more environmentally friendly end of life given their biodegradability allowing organic recycling.

Website	www.polybioskin.eu
Start date	01 June 2017
End date	31 May 2020
BBJ JU contribution	€ 3 438 048

PROMINENT

Protein Mining of Cereal side-streams Exploring Novel Technological Concepts

BIOMASS: WHEAT AND RICE SIDE STREAMS

USING RESOURCES BETTER

A growing population means a growing demand for protein. However, we can no longer fully depend on animal sources to meet our protein needs; it is simply not sustainable. PROMINENT is identifying ways to make sure we get as much as we can from our existing food sources for new plant-based protein ingredients in pasta, biscuit, cake and/or beverage production processes.

RE-CAPTURING LOST PROTEIN

In processing existing foods, even common cereal crops like rice and cereals, a great deal of protein is currently lost. PROMINENT is dedicated to finding ways to capture these proteins from production side streams, providing alternatives to animal proteins and making better use of both crop and land resources. The project will develop protein-based ingredients and foods based on the side streams of wheat and rice processing industries, and with desirable taste and texture.

BRINGING TO MARKET

The project will test the concepts, ensuring safety quality and feasibility of these processes, all the way to the technical considerations of food formulation and consumer acceptance. It will investigate different relevant parameters along the whole food chain: food safety and quality, techno-economic feasibility, (environmental) sustainability, as well as market potential of the new protein ingredients and foods. This provides new market opportunities for the agro-food industry & new plant-based end products for the consumer food market.

Website	www.prominent-protein.eu
Start date	01 July 2015
End date	30 June 2018
BBi JU contribution	€1 685 006



A large pile of discarded cardboard boxes and paper waste, illustrating the problem of waste management. The image shows a dense, chaotic stack of flattened and torn cardboard boxes, with some colorful fragments of other materials visible. The perspective is from a low angle, looking down into the pile, emphasizing the volume of waste.

BIOMASS: WOOD, PAPER AND AGRO-SIDE STREAMS

PROVIDES will develop a new, sustainable and techno-economically feasible pulping technology for wood and agro-based lignocelluloses. The PROVIDES project will provide tools that encourage radical innovations and a move towards low-energy mild pulping processes, which provide high quality cellulose, hemicellulose and lignin fractions.

The project will work to achieve technological breakthroughs spurring innovation across cellulose-based sectors. Its technology will reduce process energy intensity by at least 40% as compared to traditional pulping processes & reduce investment costs by 50% as compared to current pulping installations, due to a pressure-free layout and a simplified chemical recovery. It will map, select and develop appropriate lignin-dissolving DESs for new wood and agro-based lignocellulose pulping technologies and for cellulose-dissolving DESs, as well as others DESs for new paper for recycling pulping technologies that can add further value in papermaking.

Using a new class of solvents, known as deep eutectic solvents (DES) with a lower investment cost and reduced carbon footprint will strengthen the market position of current wood-based products like paper & board and provide new applications with a high added value in the textile and chemical industries.

Website	www.providespaper.eu
Start date	01 July 2015
End date	30 June 2018
BBI JU contribution	€ 1 079 551

RefuCoat

Full recyclable food package with enhanced gas barrier properties and new functionalities by the use of high performance coatings

BIOMASS: FOOD BY-PRODUCTS

RE-DESIGNING FOOD PACKAGING

RefuCoat seeks to develop hybrid bio-based high oxygen/water barrier and active coatings to be used in monolayer bio-based packaging (films and trays) as alternative to current metallised and modified atmosphere (MAP) packages. Developing new full recyclable solutions with improved barrier properties from renewable origin creates an important competitiveness opportunity for Europe.

REDUCING FOSSIL-BASED MATERIALS

Replacing oil-based packaging materials with bio-based ones could give a competitive advantage due to their more sustainable and greener image. Currently, bio-plastics represent about one percent of the about 300 million tonnes of plastic produced annually. But as demand is rising and with more sophisticated materials, applications, and products emerging, the market is already growing by about 20 to 100 percent per year.

CREATING THE MARKET PLACE

RefuCoat will seek to demonstrate the potential and economic opportunity offered by the use of bio-based polymers, including PHA from food by-products and other commercial bio-polymers. It will enable European industries to better bridge the 'innovation gap' and the 'valley of death' between technology development and commercialisation.

Website	www.refucoat.eu
Start date	01 June 2017
End date	31 May 2020
BBJ JU contribution	€ 2 300 735



ReSolve

REnewable SOLVENTs with high performance in application and improved toxicity profile

BIOMASS: LIGNOCELLULOSIC SIDE-STREAMS AND WOOD

SAFER BIO-BASED PRODUCTS

ReSolve sets out to replace two hazardous solvents – toluene and NMP (N-methyl-2-pyrrolidone) with safer alternatives derived from non-food carbohydrates. The new, safer solvents will have a wide range of applications which will improve public health and safety by reducing the use of the toxic and environmentally damaging substances. It will also demonstrate that bio-based alternatives provide sustainability, low health impact and high application performance.

HIGHER SAFETY STANDARDS

The REACH regulation presents a major opportunity for Europe's bio-based industry to bring alternatives on stream. These bio-based solvents will allow Europe's solvent industry to avoid the negative economic impact of the regulatory restrictions on the use of aromatic and nitrogen-containing solvents. It will also make a difference for many thousands of downstream users, while reducing the health impact on millions of European citizens that are routinely exposed to solvents as part of their job.

NEW JOBS FOR EUROPE

ReSolve intends to create a pipeline of new solvent candidates with candidates at TRL 5, & other candidates for specific applications moving towards to TRL 3-4, offering further substitution options for hazardous solvents in the near future. ReSolve can sharply reduce EU imports of solvents and create thousands of new jobs.

Website

www.resolve-bbi.eu

Start date

01 June 2017

End date

31 May 2020

BBi JU contribution

€ 4 358 413



SHERPACK

Innovative structured polysaccharides-based materials for recyclable and biodegradable flexible packaging

BIOMASS: WOOD

DEVELOPING THE NEW GENERATION OF BIO-BASED PACKAGING

The SHERPACK project will develop a renewable, biodegradable and recyclable flexible paper-based packaging material that can be converted by heat-sealing and folding, with improved stiffness and grip. It will replace materials currently used to manufacture FFS (Form Fill Seal) packaging, such as plastics or aluminium foil with an advanced biomaterial.

LIGHTER, BETTER PERFORMING, NOVEL PAPER-BASED PACKAGING

This new packaging material will at least match the technical performance of existing competitor materials while reducing the weight/performance and the cost/performance ratios. This material will also meet end-of-life requirements by developing a new material that is both recyclable and biodegradable and which will enter in the paper waste stream, thus reducing the recyclable content in landfilled waste.

REDUCED PRODUCTION COSTS MAKE IT THE MATERIAL OF CHOICE

It will also reduce costs compared to existing materials over the entire lifecycle, not only by using a bio-based material but also by producing packaging with better stiffness-to-weight and lower weight, reducing transport costs.

SMARTER SOLUTIONS TO REDUCE RELIANCE ON PRECIOUS RAW MATERIALS

This means we can replace materials such as plastics or aluminium foil in many applications. SHERPACK will address all current challenges for a future packaging value chain - technical performance, customer safety and cost effectiveness.

Website

www.sherpack.eu

Start date

01 June 2017

End date

31 November 2020

BBI JU contribution

€ 1 294 445



SmartLi

Smart Technologies for the Conversion of Industrial Lignins into Sustainable Materials

BIOMASS: LIGNIN

DEVELOPING BIOBASED ALTERNATIVES

Currently, manufacturers using aromatic chemicals to manufacture polymers which come from fossil-based sources. Biobased raw material lignin has the potential to replace these non-renewable resources. By providing a lignin-based source for these chemicals, SmartLi can make a major contribution to a true bio-based economy, reducing greenhouse gas emissions and creating value from currently underexploited biomass sidestreams.

NEW GREENER COMPOSITES

The project SmartLi will develop valorisation routes for lignin, creating materials such as composite materials and resins & source them from underutilised lignin by-products from the pulp and paper industry. The project will develop and demonstrate technologies & processes to use technical lignin products as raw materials to produce biomaterials, such as components with improved properties for composites, plasticisers and different types (PU, PF, epoxy) of resins. This will enable, for example substituting 25-75% of phenol in formaldehyde resins, to replace at least 50-70% of polyols in polyurethane foams.

TESTING SUSTAINABILITY

The project will conduct a Life Cycle Analysis to assess the economic, environmental and social sustainability of the developed products and identify a strategy for market penetration. It will also identify the most promising technologies and evaluate their wider sustainability potential. The project will facilitate market penetration of these bio-based products in the respective sectors with high demand, thereby creating business opportunities and jobs.

Website

www.clicinnovation.fi/activity/smartli

Start date

01 July 2015

End date

30 June 2018

BBi JU contribution

€ 1 481 258



SSUCHY

Sustainable structural and multifunctional bio-composites from hybrid natural fibres and bio-based polymers

BIOMASS: PLANT FIBRES

PLANT FIBRES FOR THE FUTURE

SSUCHY will contribute to developing bio-based composite products with advanced functionalities and high structural properties for transportation sectors and in high value market niches. The use of plant fibres is increasing dramatically, with demand expected to grow by 300 percent in the next 25 years.

NEW FUNCTION & MARKETS

Plant fibres offer superior renewable resource usage, recyclability, biodegradability and offer wide availability with low production costs. SSUCHY will create opportunities to expand market applications for bio-based composites to semi-structural and functional applications in ground transportation and aerospace along with new opportunities in high value niches such as acoustics and electronic sectors.

EXPLORING BIO-BASED POSSIBILITIES

The SSUCHY project will increase the sustainability and the competitiveness of Europe's industry through engagement in the bio-based composite sector through the materials and process technologies it develops and create new bio-based composite structures and products and demonstrate their advanced functionalities at demonstrator level. The project will create new bio-based material, in this case specialty fibres, plastics, composites and packaging solutions. It will develop new consumer product demonstrators derived from bio-based chemicals and materials.

Website

www.bbi-europe.eu/projects/ssuchy

Start date

01 September 2017

End date

31 August 2021

BBI JU contribution

€ 4 457 195



TECH4EFFECT

Techniques and Technologies for Effective Wood Procurement

BIOMASS: WOOD

GREATER EFFICIENCY

Europe's forests are a major source of sustainable materials and essential to Europe's ambitions as a leading bio-economy. As we strive for a genuinely circular economy, greater efficiency in how we manage our renewable resources becomes increasingly important.

MAXIMISING VALUE OF RESOURCE

Increased biomass demand generates a need for more accessible forests to maintain a sustainable supply and maximise the value of this resource. The TECH4EFFECT project aims to deploy technological advances to advance forest management to a new level. The project will increase efficiencies including both lowering the cost and the environmental impact of harvesting from forests.

EXPLOITING DATA

By developing a state-of-the-art knowledge-based decision-support system aimed at increasing efficiency, TECH4EFFECT will offer a novel way to exploit the increasing amounts of data generated in modern forestry. TECH4EFFECT seeks to implement the developed efficiency management tool in five participating countries.

BENCHMARKING TOOL

The project will develop the TECH4EFFECT web-based benchmarking tool to collect and systematize data from forest management and provide a foundation for knowledge-based management of European forest operations in the future. This will help to improve efficiency in silviculture and harvesting operations, and a significant increase in productivity in forest operations.

Website

www.bbi-europe.eu/projects/tech4effect

Start date

01 October 2016

End date

30 September 2020

BBi JU contribution

€ 4 999 902

US4GREENCHEM

Combined Ultrasonic and Enzyme treatment of Lignocellulosic Feedstock as Substrate for Sugar Based Biotechnological Applications

BIOMASS: LIGNOCELLULOSIC FEEDSTOCK

GREEN TECHNOLOGIES REDUCE COSTS

Bio refinery feedstocks in Europe can be sourced from agro-forestry feedstocks. The European Forest based sector can provide a range of materials and products and is the largest single producer and consumer of bioenergy in Europe. The US4GREENCHEM project aims to design a bio-refinery concept for the complete valorisation of lignocellulosic biomass that is energy and cost-efficient and based solely on green technologies. By developing efficient and integrated pre-treatment processes it will lead to a tangible reduction of costs over the entire conversion process.

NEW PROCESSES

US4GREENCHEM will deliver fermentable sugars at prices comparable to current market prices at the same time as reducing greenhouse gas emissions by at least 30% over the whole value chain of the targeted products. The project combines mechanical pre-treatment methods with ultrasound pre-treatment capable of disrupting the lignocellulosic matrix with reduced energy input and minimal production of inhibitory by-products.

OPTIMISING YIELD

Ultrasound can be up to three times less energy than current approaches for lignin removal. It will also examine further breaking down lignocellulose with carbon dioxide technologies to maximise release of sugars as the main target products. This should lead to the optimisation of yield and reduce the cost of enzymatic hydrolysis of cellulose fibres by 50%.

Website

www.us4greenchem.eu

Start date

01 July 2015

End date

30 June 2019

BBI JU contribution

€ 3 457 602



VALUEMAG

Valuable Products from Algae Using New Magnetic Cultivation and Extraction Techniques

BIOMASS: ALGAE

INCREASING DEMAND ON WORLD RESOURCES

It is estimated that by the 2050 world population will exceed nine billion adding pressure to the demand for more energy, food, recycled nutrients and water. Interdisciplinary research projects like VALUEMAG have the potential to offer a valid alternative: large-scale rapid biomass production.

MICROALGAE CAN BE USED IN NEW PRODUCTS FOR FOOD, COSMETIC AND NUTRACEUTICALS

Micro-algae produce approximately one half of the oxygen generated on earth while simultaneously consuming CO₂ during photosynthesis and fixing NO_x during their anabolism. Moreover, biomass from micro-algae is a promising source of primary/secondary metabolite products with considerable use in the aquaculture, food additive industry, bio-fertilization, pharmaceutical and cosmetic industry.

MAGNETIC NANOPARTICLES HOLD SECRET FOR PRODUCTION & HARVEST OF MICROALGAE

VALUEMAG aims to provide ground-breaking solutions for microalgae production and harvesting as well as scaling up biomass transformation systems in order to provide new technologies for aquatic/marine biomass integrated bio-refineries.

SUSTAINABLE BIO-BASED VALUE CHAINS

In VALUEMAG, nothing is wasted. All the cultivated micro-algae are used to develop useful products and all the used water is self-cleaned by the cultivation process. The magnetic methodology proposed within the VALUEMAG project is effectively the solution for the sustainable development of large-scale micro-algae cultivation.

Website	www.valuemag.eu
Start date	01 April 2017
End date	31 March 2020
BBJ JU contribution	€ 4 789 000

Zelcor

Zero Waste Lingo-Cellulosic Biorefineries by Integrated Lignin Valorisation

BIOMASS: LIGNOCELLULOSIC RESIDUES

EXTRACTING THE LIGNIN

Lignocellulosic feedstocks like dry matter plant biomass are commonly used in the production of biofuels and bio-based chemicals. However, a major disadvantage of these feedstocks is the presence of substantial amounts of lignin, an aromatic polymer that is difficult to break down. This so called “recalcitrance” means lignocellulosic feedstock is often considered primarily as a waste product, utilised to produce energy through burning.

IMPROVING SUSTAINABILITY

The Zelcor project will place strong emphasis on the benefits of insects in bioconversion, as insects, especially termites and their gut microbia, are some of the few organisms capable of utilising lignins and soil humins as carbon sources. The project aims to recycle waste bio-based products while seeking to improve the sustainability of existing second generation biorefining.

NEW BIO-BASED PRODUCTS

The project should optimise the economic values from agricultural residues & valorise the lignin fraction of lignocellulosic biomass into valuable products, reaching at least a 3-fold value increase as compared to the current energy value. This should produce at least three new bio-based products resulting from purified lignin.

Website

www.bbi-europe.eu/projects/zelcor

Start date

01 October 2016

End date

30 September 2020

BBi JU contribution

€ 5 256 993





CSAs Coordination and Support Actions

A close-up, vertical photograph showing a person's hands. One hand is typing on a dark laptop keyboard, while the other holds a white smartphone. Warm, golden sunlight streams in from the right side, creating a soft glow and lens flare effects. The background is blurred, showing hints of an indoor setting with light-colored walls.

€ 998 345

BiOPEN

BIOOPEN

CONNECTING PROJECTS, KNOWLEDGE AND NETWORKS

The bio-based economy thrives on integrated value chains that cross sectoral barriers, oriented to developing products driven by societal needs. These require sectors to collaborate across these bio-based value chains, from feedstock to products. Rather than hope they will form spontaneously, it can be advantageous to stimulate their development.

OPEN INNOVATION WILL ADDRESS STRATEGIC CHALLENGES

The BiOPEN project is a specialised consortium made up of five European bio-based clusters, three open innovation expert companies, and one research centre. It intends to drive a programme of collaboration and knowledge sharing within the bio-based industry. This will stimulate innovation partnerships for developing new products and markets in the sector. In doing so, it will provide a single voice for the bio-based industries in Europe, bringing together expertise and promoting engagement and involvement of industry, researchers and academia at European and national level, by setting up an Open innovation platform addressing strategic cross-cutting challenges.

COORDINATED APPROACH TO DEVELOPING EUROPEAN BIO-BASED SECTOR

By offering an open platform for collaboration, the BiOPEN project will help realise the business and innovation potential of Europe's bio-based sector.

Website

www.biopen-project.eu

Start date

01 May 2017

End date

31 October 2019

BBI JU contribution

€ 994 531

BIOWAYS

Increase public awareness of bio-based products and applications supporting the growth of the European bioeconomy

COMMUNICATING THE POTENTIAL

The European bio-economy is an exciting prospect. BIOWAYS will provide the materials and activities to engage the public and excite them about its potential. The project will analyse the potential of the sector and identify champions to help increase its visibility. It will also identify and develop a method for ensuring there is ongoing communication on the value of bio-based products. It will help build constructive dialogue between BIOWAYS and the other bio-based initiatives in Horizon 2020.

EDUCATING & INFORMING

BIOWAYS will oversee the development of educational materials on the benefits of the bio-economy, while helping to ensure that the BBI JU programme as a whole is implemented effectively. It will increase awareness amongst Europe's general public, students, scientists, media and policy makers of the value of bio-based products and applications to industry, the economy and the whole of the wider society, both in terms of what they deliver now and in terms of their future potential.

IMPROVING VISIBILITY OF BIO-BASED

BIOWAYS will seek to understand the potential of bio-based products & bio-based stakeholders to create sustainable multidisciplinary communities that enhance the visibility of bio-based products and applications. It will communicate on general bio-based and scientific knowledge in an accessible, non-scientific way for citizens to improve awareness about bio-based products and applications and to increase the societal confidence related to bio-based products and industries.

Website

www.bioways.eu

Start date

01 October 2016

End date

30 September 2018

BBI JU contribution

€ 965 750

Pilots4U

A network of bioeconomy open access pilot and multipurpose demo facilities

KEEPING INNOVATION MOVING

A key challenge for the bio-economy is to bring newly developed molecules and techniques from the lab to the market. The main bottleneck in the innovation chain is the step from technology development to deployment. This step has to be performed first in a pilot plant and later in a demonstration plant where a production process can be tested and optimized in an industrial production setting. Pilot- and demo-plants are expensive, require specific expertise to run and most SMEs and also a lot of large companies have no direct access to such facilities. As a result, promising innovation processes can grind to a halt.

PILOT FACILITIES ACROSS EUROPE

A solution to this problem are 'open access pilot- and multipurpose demo-infrastructure'. However, these infrastructures are not well known in Europe. Pilots4U builds on existing projects that gather pilot and multipurpose demo-infrastructure, and will reach out to all European regions.

EUROPEAN NETWORK OF PILOT FACILITIES

Pilots4U will help innovators, especially SMEs, bridge the so-called 'Valley of Death' in the innovation phase between the developments in the laboratory and market introduction, by showing them the way to shared scale up facilities. Pilots4U will group all European open access bio-economy pilot- and multipurpose demo facilities under one, very visible and easily accessible network.

Website

www.BioPilots4U.eu

Start date

01 June 2017

End date

31 May 2019

BBI JU contribution

€ 902 462

RoadToBio

Roadmap for the Chemical Industry in Europe towards a Bioeconomy

GREEN CHEMISTRY FOR EUROPE

The focus of the European chemical industry will have to change within the next 15 years because of the diminishing fossil resources, climate change and growing chemical industry in Asia. RoadToBio's focus on globally competitive bio-based chemicals will help shape the future of Europe's chemical industry and help to secure jobs in Europe's rural and less developed regions.

OPPORTUNITIES FOR MULTIPLE SECTORS

RoadToBio's key function is to act as change agents to inspire the fossil-based sector. Specifically, RoadToBio will deliver and act on a roadmap and action plan illustrating the 'sweet spots' for Europe's chemical industry towards the Bioeconomy over the coming decade, up to 2030.

CONNECTING THE CHEMICALS INDUSTRY AND SOCIETY

RoadToBio will create a platform to bring together the chemical industry, civil society and governing bodies to deliver the full potential of its action plan. By connecting the chemical industry with governmental organisations, it can help communicate the chemical industry's critical role as a driver of change into the bioeconomy and the circular economy, and for the removal of regulatory hurdles. Finally through connecting the chemical industry with non-governmental organisations, it will identify societal needs and show benefits of bio-based products to increase public awareness and trust in the bio-based chemical sector.

Website

www.roadtobio.eu

Start date

01 May 2017

End date

30 April 2019

BBI JU contribution

€ 996 820

Standards and Regulations for the Bio-based Industry

A proactive regulatory approach is an important driver in developing emerging industries and attracting investment. Similarly, a proactive approach to standardisation can help harmonise supply chains and create an environment that stimulates investment by reducing risks and offering a better potential return on investment.

The STAR4BBI project will help establish a coherent, well-coordinated and favourable regulatory framework that helps develop a cutting-edge bio-based economy for Europe. STAR4BBI will support the adaption of the regulatory framework and of relevant standards for the full deployment of selected existing value chains and for the concrete development of new value chains based on biomass from forests, from agriculture and from organic waste.

STAR4BBI will support the adaption of the regulatory framework and of relevant standards for selected existing value chains and the development of new value chains based on biomass from forests, from agriculture and from organic waste. It aims to establish a level playing field for bio-based products. It should contribute to more coherent policy environment, better interrelations between regional, national, EU and global bioeconomy policies and the removal of barriers to investments to grow towards a bioeconomy, for example link to waste legislation.

www.biobasedeconomy.eu

01 September 2016

31 August 2019

€ 995 880





DEMOS

Innovation Actions - Demonstration

AgriMax

Agri and food waste valorisation co-ops based on flexible multi-feedstocks biorefinery processing technologies for new high added value applications

BIOMASS: CROPS AND FOOD PROCESSING WASTE

FOOD SIDE STREAMS REVALORISED

Around a third of all food produced globally is wasted each year. This waste occurs throughout the whole value chain, from farmers to consumers. However, there are significant amounts of valuable compounds contained in the wasted food that could and should be recovered. AgriMax will establish the technical and economic viability using bio-refining process on waste from crops and food processing to deliver new bio-compounds for the chemical, bio-plastic, food, fertilisers, packaging and agriculture sectors.

AFFORDABLE PROCESSING

The project will map the available Agricultural and Food Processing Waste (AFPW) and their features & aims to set up two flexible pilot plants for processing bio-wastes to process AFPW into value added biocompounds. It will combine affordable and flexible processing technologies, including ultrasound assisted and solvent extraction, filtration, thermal and enzymatic treatments for the valorising side streams from horticultural and food processing industries that can be used in a cooperative approach by local stakeholders.

NEW BUSINESS MODELS

AgriMax will also demonstrate the safety & regulatory compliance & environmental & economic sustainability of the developed processes and products.

Website	www.agrimax-project.eu
Start date	01 October 2016
End date	30 September 2020
BBI JU contribution	€ 12 484 461

A close-up photograph showing a dark, circular metal disc, likely a part of a mulch machine, resting on a thick layer of light-colored wood mulch. The mulch consists of many small, irregular wood chips. The disc is partially buried in the mulch, and its surface appears slightly worn or coated with wood dust.

€ 9 937 998

BIOMOTIVE

Advanced BIObased polyurethanes and fibres for the autoMOTIVE industry with increased environmental sustainability

BIOMASS: ENEWABLE BIOMASS FEEDSTOCK

BIO-BASED OFFERS ADVANTAGES

Automotive manufacturers are under growing pressure to either use less fuel or go further on same battery charge. Much of this improved performance will come from making cars lighter, known as 'light weighting', which is decreasing the weight they need to move. Every 10% reduction in vehicle weight delivers a 5-7 percent reduction in fuel usage.

LOWER CARBON FOOTPRINT

As a result, manufacturers are showing increasing interest in lightweight material. A noticeable fraction (around 20%) of modern cars is made of plastic and such an amount is expected to increase thanks to the recognized properties of polymers in absorbing sound and vibration. Despite these advantages, there is no single bio-based plastic that provides the aesthetics and haptics that the automotive manufacturers seek in tandem with the technical properties (shock resistance, heat resistance, fire resistance and weight reduction) they require.

BIO-BASED CAR PARTS & COVERINGS

The BIOMOTIVE project aims to demonstrate, in relevant industrial environments, the production of innovative and advanced bio-based materials such as thermoplastic polyurethanes, 2-k thermoset polyurethane foams and regenerated natural fibres specifically for the automotive industry. The improved performance of these materials within the automotive sector, will allow massive penetration of biobased polyurethanes and regenerated fibres into additional large volume markets.

Website	www.biomotive.info
Start date	01 June 2017
End date	31 May 2021
BBi JU contribution	€ 10 659 353

DEMETER

Demonstrating more efficient enzyme production to increase biogas yields

BIOMASS: AGRICULTURAL, INDUSTRIAL AND MUNICIPAL WASTE

POWER OF ENZYMES

A recently developed enzyme has the potential to increase biogas yield by 10% or more. However, the current fermentation process does not yield enough to make it cost effective for industrial deployment. DEMETER wants to increase this yield by at least 20%, making it far more cost effective and more easily available for widespread use.

IMPROVING THE YIELD

The project will improve and scale-up fermentation to improve protein yields while retaining quality using a number of techniques. It will improve downstream processing of the fermentation broth, reducing costs by at least 15% and demonstrate industrial and economic the feasibility of the entire project using a 15,000 litre pilot plant. It will also develop a model that can predictive how adding the enzyme will impact biogas yield.

DEMONSTRATING THE MODEL

It will demonstrate a yield increase and cost reduction of the C1-LC4 enzyme production process and its positive effect on biogas production in Europe. It aims to improve and scale-up the C1-LC4-producing fermentation process to yield at least 20% more protein while retaining quality & to improve downstream processing of the fermentation broth leading to a cost reduction of at least 15%.

Website

www.demeter-eu-project.eu

Start date

01 August 2016

End date

31 July 2019

BBi JU contribution

€ 4 629 586

Dendromass4Europe

Securing Sustainable Dendromass Production with Poplar Plantations in European Rural Areas

BIOMASS: LIGNEOUS BIOMASS, BARK AND WOOD

NEW USES FOR MARGINAL LAND

Dendromass4Europe aims at establishing sustainable, short-rotation coppice)-based (SRC) regional cropping systems for agricultural dendromass production on marginal land. Its value chains are based on dendromass which originates from agricultural tree crops that are created “de novo” on marginal land.

DEVELOPING THE DENDROMASS SECTOR

D4EU will establish a large regional SRC dendromass supply chain dedicated for separate material use of wood and bark. The supply chain will meet European structural and legal framework conditions. It will include efficient supply logistics to reduce CO2 emissions along the value chains. The dendromass feedstock from D4EU's plantations will be harvested for 20 years in four five-year rotations.

BOOSTING THE REGIONAL ECONOMY

Biomass production will take place on unused land for conversion into added-value products while boosting rural and industrial development. The various activities of the D4EU project consortium aim to generate profit for the rural economy on a regional scale through value adding processes and marketing activities that will allow access for innovative bio-based materials to specific consumer markets. D4EU brings together three industrial partners in an innovative bio-economy cluster to cooperate for the first time to exploit lightweight Slovakian & Hungarian poplar wood and the poplar bark.

Website

www.bbi-europe.eu/projects/dendromass4europe

Start date

01 June 2017

End date

31 May 2022

BBi JU contribution

€ 9 801 014

EMBRACED

Establishing a Multi-purpose Biorefinery for the Recycling of the organic content of AHP waste in a Circular Economy Domain

BIOMASS: ABSORBENT HYGIENE PRODUCTS (AHP) WASTE

RECYCLED WASTE

Absorbent Hygiene Products (AHP) waste, which includes post-consumers nappies, adult incontinence products, feminine hygiene items, wipes, etc. are currently considered a non-recyclable fraction of the Municipal Solid Waste (MSW), with 8,500,000 tons of such waste incinerated or landfilled in Europe each year. The EMBRACED project will turn Absorbent Hygiene Products waste destined to landfill or incineration into a source of valuable bio-based materials

ADDED VALUE & NEW JOBS

EMBRACED will demonstrate a replicable, economically viable and environmentally sustainable model for an integrated biorefinery to valorise the cellulosic fraction of post-consumer AHP waste to make bio-based building blocks, polymers, and fertilizers. The biorefinery will use a circular economy approach, closing the cycle of raw materials and minimising the use of primary resources.

NEW VALUE CHAINS

EMBRACED will demonstrate one new bio-based value chain from AHP waste to building blocks, polymers and fertilizers. It will also create three new bio-based materials and products including packaging films for AHP products, medical devices with PHB based polymers and organic fertilizers. The project will also bring new jobs to the sector.

Website

www.bbi-europe.eu/projects/embraced

Start date

01 June 2017

End date

31 May 2022

BBi JU contribution

€ 10 695 211

A close-up, vertical photograph of vibrant green, elongated leaves, likely from a willow or similar plant. The leaves are shown in various orientations, with some displaying prominent parallel veins. The lighting is bright, creating a high-contrast image with deep green shadows and bright, almost yellow-green highlights on the leaf surfaces. The background is a soft, out-of-focus green, suggesting a dense foliage environment.

€ 1 795 010

FRESH

Fully bio-based and bio-degradable ready meal packaging

BIOMASS: CELLULOSE-BASED COMPOSITE

BIO-BASED & BIO-DEGRADABLE

Ready meal consumption continues to grow throughout Europe – 6.5 billion and growing. The trays they come in are creating vast quantities of waste, many of which go for landfill. The FRESH project will demonstrate an innovative, cellulose-based alternative to existing fossil-based plastic trays, which is a fully bio-based and biodegradable composite material. FRESH will deliver a full value chain that will demonstrate the techno-economic viability, including customer satisfaction, of a 100% bio-based, biodegradable alternative made from an innovative cellulose-based composite, using a new lamination technology.

BETTER PERFORMANCE, LOWER FOOTPRINT

The overall objective is to do a demonstration with an innovative cellulose-based packaging composite material as fully bio-based and biodegradable alternative for the PET/ CPET ready meal trays. These will be food safe, GMO-free and 100% bio-based and biodegradable product which is at least 10% lighter than the fossil alternative (PET). The product should have the same or better technical and functional properties than a PET food tray with a radically improved environmental footprint over the product lifecycle than competing fossil-based packaging material.

NEW APPLICATIONS & OPPORTUNITIES

FRESH will open up new applications and markets and increase the competitiveness of the European pulp, board and paper making industries, additionally showing high potential in terms of job creation in rural areas, moreover showing high potential for replicability in Europe.

Website

www.bbi-europe.eu/projects/fresh

Start date

01 October 2016

End date

31 March 2020

BBi JU contribution

€ 5 636 813



€ 5 700 547

€ 12 324 633

A vibrant collage of various fruits and vegetables, including bananas, oranges, lettuce, tomatoes, and broccoli, arranged in a circular pattern. The image is a vertical strip showing a variety of fresh produce. At the top, there's a whole orange. Below it, several bananas with brown spots are visible. There are also green leafy vegetables like lettuce, red bell peppers, and a green cucumber. Broccoli florets are scattered throughout. A large, light-colored, textured object, possibly a piece of bread or a large mushroom, is in the foreground. The background is a mix of white and light green, suggesting a clean, bright setting.

€ € 4 227 361

GreenSolRes

Demonstration of solvent and resin production from lignocellulosic biomass via the platform chemical levulinic acid

BIOMASS: LIGNOCELLULOSE

SCALING UP GREEN CHEMICALS

Exploiting the sustainability potential of bio-based products from a renewable non-food feedstock means the increased usage of lignocellulosic residues for high value-added products. Levulinic acid has long been identified as a versatile 'green' chemical precursor for many applications. It is widely recognised as a platform substance for chemical synthesis and is seen as a key element in moving Europe towards bio-based manufacturing. However, to make that a reality, there has to be adequate production to meet demand at a realistic price.

NEW CONSUMER PRODUCTS

GreenSolRes will demonstrate the commercial viability of converting lignocellulosic biomass to levulinic acid for the manufacturing of solvents and adhesive resins with added-value and/or functionalities. GreenSolRes will pave the way to the first commercial plant for sustainable production of levulinic acid (at 50 kta), and its derivatives, leading to a rapid gain in spectrum and production volume of bio-based consumer products. This includes bio-based derivatives for industrial and consumer adhesives.

NEW COMPETITIVE VALUE CHAIN

GreenSolRes will demonstrate the competitiveness of the levulinic acid value chain in terms of costs, environmental impact and technical performance. It will use a novel process to convert the platform chemical levulinic acid into 2-methyltetrahydrofuran, gamma-valerolactone and methyl butanediol with development of novel catalyst. This will optimise a competitive value chain for bio-based LA and down-stream products.

Website

www.greensolres.eu

Start date

01 September 2016

End date

31 August 2020

BBI JU contribution

€ 7 451 945



€ 4 338 375



LIPES

Life Integrated Process for the Enzymatic Splitting of triglycerides

BIOMASS: VEGETABLE OILS AND FATS

ENVIRONMENTALLY-FRIENDLY ENZYMES

Trans fatty acids are a common by-product of processing plant oils, particularly seed oils. These are notably difficult to dispose of in downstream processing. The LIPES process, using enzymes rather than heat or saponification, recycles the amount of the by-product while offering a more environmentally friendly approach. This will create a new source of high value products while reducing waste releases into the environment and associated water treatment costs. Using this approach will make the process far more resource efficient, saving at least 45% water, 70% enzymes and 80% energy over current approaches.

HEALTHIER GREENER FATTY ACIDS

LIPES is dedicated to bringing the first market replication of greener and healthier fatty acids. The objective is to create high purity bio-based intermediates and end products from vegetable oils and fats. The LIPES approach replaces current thermal hydrolysis and saponification production routes, instead using a new enzyme-based, environmentally friendly alternative.

NEW APPLICATIONS FOR FOOD, COSMETICS AND POLYMERS

Enzyme-based approaches such as LIPES are increasingly important in converting renewable resources into high purity chemicals and into valuable materials displaying new properties. This approach will increasingly deliver more stable products for use in food, cosmetics, lubricants and specialty polymer applications.

Website

www.lipes.eu

Start date

01 September 2016

End date

31 August 2021

BBI JU contribution

€ 4 295 153



OPTISOCHEM

OPTimized conversion of residual wheat straw to bio-ISObutene for bio based CHEMicals

BIOMASS: RESIDUAL WHEAT STRAW

ALTERNATIVE TO FOSSIL-BASED ISOBUTENE

OPTISOCHEM will demonstrate the feasibility of transforming excess wheat straw into bio-Isobutene (bio-IBN) derivatives. It will create at least one new bio-based value chain, centred on IBN, while facilitating others centred on butadiene and propylene, as well as establishing two bio-based products families. IBN will also be a major biomass-based building block that currently stems from the petrochemical industry.

NEW VALUE FOR WASTE WHEAT STRAW

The process will provide two different groups of chemical compounds derived from bio-IBN, currently used in a wide range of applications such as lubricants, adhesives, sealants, flavours and fragrances and substituted phenols. Now this market relies on products derived from fossil-based isobutene.

INCREASING RENEWABLE PRODUCTS FOR MARKET

Comparable performance of products provides a renewable supply for a sizeable and valuable market. OPTISOCHEM will be a true breakthrough, using bio-IBN to feed existing processes designed for fossil-based isobutene to obtain the first bio-based PIBs and DIB. OPTISOCHEM could lead to significant substitution of fossil-based equivalents in a wide market, paving the way for several production plants in EU.

Website

www.optisochem.eu

Start date

01 June 2017

End date

31 May 2021

BBI JU contribution

€ 9 755 493

PULP2VALUE

Processing Underutilised Low value sugar beet Pulp into VALUE added products

BIOMASS: SUGAR BEET PULP FROM WASTE AND SIDE STREAMS

EUROPE'S SUGAR BEET POTENTIAL

Europe produces more than one third of all sugar beet in the world – more than 100 million tonnes per year. This activity produces around 13 million tonnes of sugar beet pulp each year. Currently, most of this pulp finds its way into low value feed, bio-fertilizer or it is used for creating green fuel gas.

NEW HIGH-VALUE PRODUCTS

By using multiple extraction techniques, PULP2VALUE will extend the high value products by between 20-50 times. The process will convert of 65% of the pulp's dry mass into high value products of microcellulose fibers (MCF), arabinose and galacturonic acid. these high value applications will find their way into products like detergents, personal care, oil & gas, paints & coatings, flavour and food products or cosmetics. This has a market potential of 350k tonnes and value of € 200 million.

CASCADING PRINCIPLES

The project demonstrates an integrated and cost-effective cascading bio-refinery. By creating local cross-sectoral value chains involving the sugar, chemical and food industries, PULP2VALUE will spur rural development in sugar beet growing districts by linking them to value chains with the chemical and food industry.

Website	www.pulp2value.eu
Start date	01 July 2015
End date	30 June 2019
BBI JU contribution	€ 6 589 180

PULPACKTION

Optimised moulded pulp for renewable packaging solutions

BIOMASS: WOOD PULP

REDUCING PACKAGING WASTE

A key component of achieving Europe's circular economy ambitions will be the reduction of materials that cannot be recycled. Packaging is major part of this challenge. The most common of these are multilayered materials with high barrier requirements. The latter are usually difficult to recycle or valorise. Adapting high cellulose-level packaging to compete with existing approaches will reduce waste by at least 30% and by reducing total weight, these bio-based alternatives would lower the product's footprint by reducing the impact of transport.

SAFE AND 100% BIODEGRADABLE

The PULPACKTION project will develop cellulose-based packaging solutions for the specific demands of the food and electronic packaging industries, reducing dependence on non-renewable fossil fuel based plastics. PULPACKTION will take advantage of the flexibility in wet-moulding production of wood pulp based materials, delivering a safe 100% bio-based and biodegradable product. Products are expected to be at least 10% lighter than the fossil alternatives at the same functional properties and show a radically improved environmental footprint over the product lifecycle

NEW APPLICATIONS

PULPACKTION will develop applications for new bio-based polymer blends to be processed into multilayer films, composites and coatings that will deliver 100% bio-based integral packaging with similar properties to existing fossil-based packaging. 100% biobased inks together with a specific QR codes will be used for implementing a full traceability system.

Website

www.bbi-europe.eu/projects/pulpacktion

Start date

01 October 2016

End date

30 September 2020

BBI JU contribution

€ 8 303 374



SYLFEED

From forest to feed: enable the wood industry to bridge the protein gap

BIOMASS: WOOD RESIDUES

BRIDGING THE PROTEIN GAP

Europe faces a major protein deficit, ranging between 80–70% in the past 40 years and this has to be covered by imports. As the world population grows, the demand for food will increase globally. Agriculture uses large amounts of water, fertilizers and land. Disruptive animal feed and protein solutions must look at raw materials other than purely agricultural products.

PROTEIN FROM SUSTAINABLE FORESTRY RESIDUES

The production of fish feed from wood residues has the potential to be a game changer, reducing dependence on soybean derivatives. SYLFEED will start to bridge this gap by upscaling a bio-refinery concept that can convert woody biomass into high-value Single Cell Protein (SCP) for use as animal feed, most notably in increasing fish production. SYLFEED will create a demonstration plant with a capacity to process up to 15t/day of lignocellulose into SCP for use in aquaculture. This will demonstrate a synergy between forestry industry and protein fish feed market, creating new high value opportunities for the former and an alternative, sustainable, protein source for the latter.

NEW VALUE CHAINS

It will create a new cross sectorial interconnection between bio-based economy clusters. It will create another connection between the historic bio-based industry of paper mills and bio-refineries. In addition, it will create a new bio-based value chain, in this case incorporating feedstock suppliers and protein end-users.

Website

www.bbi-europe.eu/projects/sylfeed

Start date

01 September 2017

End date

31 August 2020

BBi JU contribution

€ 10 892 599



ValChem

Value added chemical building blocks and lignin from wood

BIOMASS: WOOD

PLENTIFUL RAW MATERIAL IN WOOD

Wood is available all year round and is relatively easy to transfer & store at industrial levels. Effective large-scale harvesting and logistics systems for forestry are well established in many European countries, all in rural areas. The ValChem project will stimulate investment and employment in these rural areas & aims to demonstrate the technical & economic viability of producing wood-based chemicals that are competitive with similar products based on fossil-based raw materials in terms of quality and production costs.

EXPANDING MARKET

In the field of lignin-based epoxy resins, lignin has the potential to replace Bisphenol-A, a highly hazardous compound. The current annual market for monopropylene glycol in Europe is around €650m. In Europe alone, there is additional annual demand for monopropylene glycol equivalent to the entire production of one medium-sized bio-monopropylene glycol production facility. Valchem will demonstrate a sustainable integrated process where wood is transformed into lignin-based performance chemicals and mono-propylene glycol as a platform chemical.

POTENTIAL IMPACT

Potential future plants based on this technology will need to be located in rural areas due to biomass availability. The project will demonstrate valorisation of over 75 % of the wood raw material, and 2-6x higher added value of wood-based chemicals compared to traditional products. It will contribute to increased sustainability of wood production, as more wood with PEFC and FSC certificates will be used and industrial processing.

Website	www.valchem.eu
Start date	01 July 2015
End date	30 June 2019
BBi JU contribution	€ 13 125 941



URBIOFIN

Demonstration of an integrated innovative biorefinery for the transformation of Municipal Solid Waste (MSW) into new bio-based products

BIOMASS: MUNICIPAL SOLID WASTE (MSW)

ORGANIC WASTE RECYCLED

Every European generates an average of 500kg of municipal solid waste (MSW) per year. Around 50% is organic waste, made up of carbohydrates, proteins and lipids, which represent useful raw materials for creating valuable products. Converting these will reduce pollution and help us to the shift to a circular economy. URBIOFIN will demonstrate the techno-economic and environmental viability of converting the organic fraction of MSW on a semi-industrial scale


ADDING VALUE

Digesting and composting help reduce biodegradable fraction of MSW sent to landfill but the low economic value of compost and biogas means that citizens need to pay higher taxes for separate sourcing systems, slowing the potential uptake. New bio-based products can help to improve sustainability of such approaches.

NEW VALUE CHAINS

URBIOFIN will connect materials (bio-plastics) with horticulture (bio-plastic PHA used in agricultural applications) and chemicals (bio-based ethylene) with AgriFood (fruit ripening gas). It will also create two new bio-based value chains from municipality to agriculture using bio-plastics & fertilizers. It will also deliver a new cooperation between the chemical & agrifood industries in a cross-using bio-plastics, horticulture, ethylene and fertilisers and fruit producers.

Website	www.urbiofin.eu
Start date	01 June 2017
End date	31 May 2021
BBI JU contribution	€ 10 946 366



FLAGS Innovation Actions – Flagship

BIOSKOH

BIOSKOH's Innovation Stepping Stones for a novel European Second Generation BioEconomy

BIOMASS: SIDE STREAMS FROM WHEAT STRAW

ABUNDANT RAW MATERIALS

Lignocellulosic biomass is one of the most abundant resources of fixed renewable carbon on earth. While bio-ethanol produced from food crops is already on the market, the second generation (2G) bio-ethanol which can be produced from lignocellulosic feedstock opens up huge opportunities for enhancing sustainability and ultimately making bio-ethanol affordable as a fuel. The BIOSKOH project will demonstrate a first of its kind full commercial scale 2G biorefinery in Europe.

RURAL REGENERATION

The BIOSKOH project will improve bioethanol yields using easily copied technology at low capital costs. The project will use a brownfield site, specifically abandoned infrastructure in Slovakia, minimising capital expenditures on greenfield sites. It will demonstrate a new regional bio-based value chain by valorising side streams from conventional land and by growing and valorising cellulosic fractions of dedicated crops grown on marginal land. This model offers regions an opportunity to regenerate rural areas bring jobs & investment from industry, supporting the local economy.

TRANSFERABLE 'STEPPING STONES' MODEL

The project has identified four 'Innovation Stepping Stones' for a breakthrough in the techno-economic viability of lignocellulosic bio-refineries. These stepping stones deliver superior bio-refinery technology, with a 15 – 20% higher biomass to ethanol yield than currently. It will produce its own energy from renewable sidestreams.

Website	www.bioskoh.eu
Start date	01 June 2016
End date	31 May 2021
BBJ JU contribution	€ 21 568 195

EXILVA

Flagship demonstration of an integrated plant towards large scale supply and market assessment of MFC (microfibrillated cellulose)

BIOMASS: FORESTRY SIDE STREAMS

ADDED VALUE FROM FORESTRY SIDE STREAMS

Using a novel scaling up technology the Exilva project is extracting the value from forestry side and waste streams and creating Microfibrillated cellulose (MFC), a high value product with multiple uses in a range of business and consumer products. MFC has potentials in a huge range of applications, like personal care & cosmetics, home care, pharmaceutical excipients, adhesives and sealants, composites and resins, agricultural chemicals, oil field, fish, bait, concrete, and CO₂ capture. It could also replace many fossil fuel-based products.

FIRST OF ITS KIND FLAGSHIP

Commercialisation of production of MFC has proved challenging. The process still needs adjustment. The project will promote a successful technology transfer from the pilot plant to the flagship plant and optimization of the full scale process. The plan is to reach a stable production of at least 1000 tons MFC per year of sufficient quality. Through the support of the BBI JU programme this flagship in Norway has a unit capital intensity of € 33 million per 2000 tonnes of MFC.

ADDED VALUE & JOBS

The project brings mutual economic benefits between biomass industry and advanced market segments by supplying high performance MFC for an array of applications. It has a low CO₂ footprint in marketable applications and during MFC manufacturing, and is creating direct and indirect jobs throughout the entire value chain.

Website

www.bbi-europe.eu/projects/exilva

Start date

01 May 2016

End date

30 April 2019

BBI JU contribution

€ 27 433 610



FIRST2RUN

Flagship demonstration of an integrated biorefinery for dry crops sustainable exploitation towards biobased materials production

BIOMASS: CARDOON THISTLES

FIRST-OF-A-KIND BIOREFINERY

Europe needs to move towards a bio-based economy at the same time as regenerating rural areas for economic and social benefits. The FIRST2RUN project will demonstrate the environmental sustainability and economic profitability of an integrated biorefinery to treat cardoor thistles and other low input & underutilized oil crops grown in arid and marginal lands, not in competition with food nor feed.

ADDING VALUE TO LOW-VALUE CROPS

The project is working on the potential valorisation of currently unexploited 3500 ha of marginal lands, to produce at least 0.375 ton/ha of vegetable oil processed to bioproducts, and 16.2 MWth of installed thermal power from the energy generation plant using the lignocellulosic fraction. The project is looking at ways to turn the whole of the plant into a variety of useful materials. The extracted vegetable oils are converted into bio-monomers like pelargonic and azelaic acids and used as building blocks for high added value products like biolubricants, cosmetics, bioplastics, additives.

RURAL REGENERATION

The project creates a cost-effective and environmentally sustainable closed-loop system that will have no impact on valuable land use for food production. It will also generate new incomes for local farmers. It demonstrates the potential revitalization of the local economy by reconvertng old industrial sites and the creation of skilled jobs, providing an estimated 60 new skilled jobs per kton of bioplastic produced, looking at the whole value chain, from agriculture to the end life of the final products.

Website	www.first2run.eu
Start date	01 July 2015
End date	30 June 2019
BBJ JU contribution	€ 16 995 882



LIGNOFLAG

Commercial flagship plant for bioethanol production involving a bio-based value chain built on lignocellulosic feedstock

BIOMASS: AGRICULTURAL LIGNOCELLULOSIC RESIDUES

BIO-BASED SOLUTIONS

Europe needs to increase its bio-refinery capacity quickly to meet its commitments on climate and energy. The cellulosic ethanol from project LIGNOFLAG will provide biofuels for the transport sector, an area that is growing rapidly with considerable implications for CO₂ emissions. A solid and robust supply of bioethanol will make a substantial contribution to the EU strategy of decarbonising the transport sector aiming at reducing greenhouse gas emissions.

ADVANCED LIQUID FUELS FROM WASTE

LIGNOFLAG will create an integrated bio-refinery that will transform agricultural lignocellulosic residues including straw into advanced liquid transportation fuel, heating power and fertilizer. The low quality feedstock means that it will not compete for agricultural land. Collaboration and linking of agricultural, logistics, energy and chemical sectors will create a new biobased value chain for cellulosic ethanol production, mobilizing an underutilized renewable feedstock.

LOOKING TO THE FUTURE

LIGNOFLAG will create green growth and jobs in in Visonta, Hungary, a rural area countering underemployment and economic downturn. Ultimately, the flagship production plant will have a yearly production capacity of 60,000 tonnes per year from lignocellulosic biomass. LIGNOFLAG will provide proof of commercial production of cellulosic ethanol and thus creation of a new, competitive and sustainable source of domestic renewable energy for the EU.

Website	www.bbi-europe.eu/projects/lignoflag
Start date	01 June 2017
End date	31 May 2022
BBi JU contribution	€ 24 738 840

PEference

From bio-based feedstocks via di-acids to multiple advanced bio-based materials with a preference for polyethylene furanoate

BIOMASS: GLUCOSE FROM STARCHY-BIOMASS

BIO-BASED REPLACES FOSSIL-BASED

PEference aims to replace a significant share of fossil-based polyesters, such as polyethylene terephthalate (PET), and packaging materials like glass and metal with 100% bio-based furanics polyesters (PEF). PEF's excellent barrier properties and its calculated cost price indicate that it can compete on price and performance when produced at scale with traditional, packaging products like aluminium cans, multilayer packaging and small size multilayer PET bottles. PEF is sustainable and also completely recyclable.

BIO-BASED BUILDING BLOCKS

Bio-based FDCA can be used to make a wide range of chemicals and polymers such as polyesters, polyamides, coating resins and plasticizers and, crucially, can also be used to make PEF (polyethylene furanoate), a 100% bio-based polyester used to make bottles, films and fibres. Other promising materials to be validated in the project include PBF (Polybutylenefuranoate) and FDCA-based polyurethanes.

INNOVATING FOR SUSTAINABLE GROWTH

PEference will establish a unique, industrial scale, cost-effective biorefinery flagship plant making a bio-based building block to produce high value products. PEference will maximise the use of regional agricultural resources and decreasing dependence on oil imports while increasing added value to the European economy. It will establish a new bio-based value chain that will create jobs in rural areas while developing technological know-how and translating it into industrial products.

Website

www.peference.eu

Start date

01 September 2017

End date

31 August 2022

BBi JU contribution

€ 24 999 610

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