Developing innovative and sustainable value chains in the biobased industries

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Bio-based Industries Consortium

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The Bio-based Industries Consortium

The Bio-based Industries Consortium (BIC)

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- > 200 **industry members**
  - 40 Large industries
  - >160 SMEs (of which >120 are represented by 17 SME Clusters)
- Several industrial **sectors** covered
  - Agriculture & Agri-food
  - Forestry and Pulp & Paper
  - Technology providers
  - Chemicals and materials
  - Energy
  - Aquatic
  - Waste
  - Brand owners
- 165 **Associate members**
  - Universities, RTOs, European associations & organisations, Technology Platforms (ETPs), public institutions, regional organisations, private banks, …

- **Mission**
  - Build new **bio-based value chains** (develop new technologies, products and applications; optimize feedstock use)
  - Create a favorable business and policy climate to **accelerate market uptake**
- **Activities**
  - Programming (BBI JU)
  - Networking
  - Access to finance

Public-private partnership: Biobased Industries Initiative (BBI)

A € 3,7 bn public-private partnership

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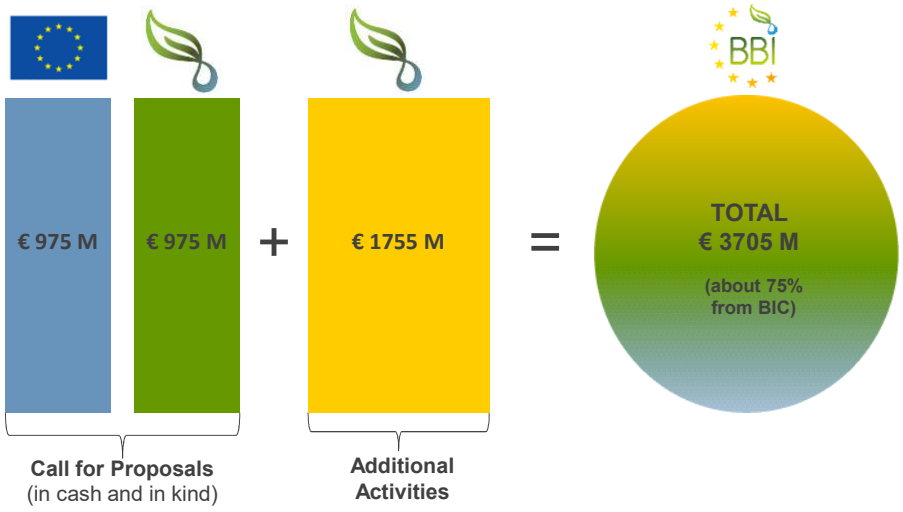

Bio-based industries value chains

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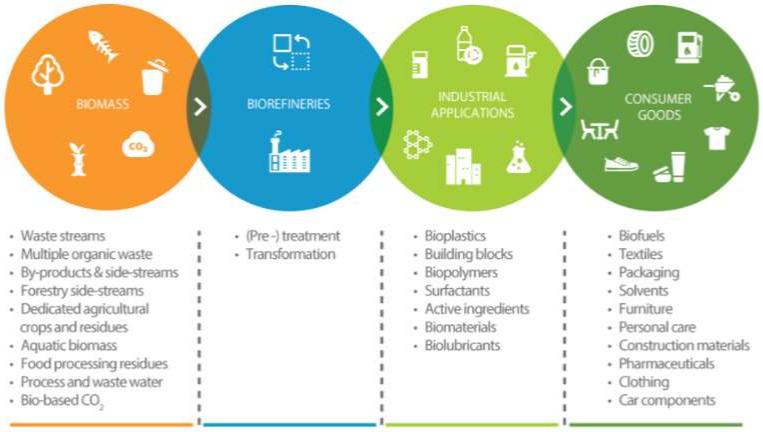
BBI JU value chains represent 3.7 million jobs* and € 698 bn turnover* but are **extremely fragmented** between **actors** and across **geographies**



Objectives & actions

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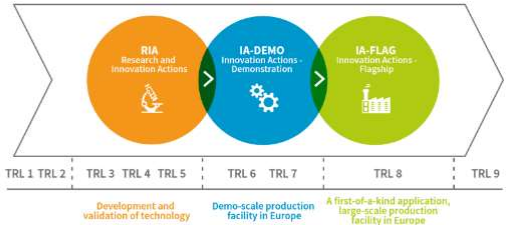
BBI JU's objectives are to contribute to a more resource-efficient and sustainable low-carbon economy and to increasing economic growth and employment, in particular in rural areas, by developing sustainable and competitive bio-based industries in Europe. These objectives will be based on advanced biorefineries that source their biomass sustainably, and in particular to:

1. *Demonstrate technologies that enable new chemical building blocks, new materials, and new consumer products from European biomass, which replace the need for fossil-based inputs*
2. *Develop business models that integrate economic actors along the value chain from biomass supply via biorefinery plants to consumers of bio-based materials, chemicals and fuels, including the creation of new cross-sector interconnections and supporting cross-industry clusters*
3. *Set-up flagship biorefinery plants that deploy the technologies and business models for bio-based materials, chemicals and fuels and demonstrate cost and performance improvements to levels that are competitive with fossil-based alternatives*

BBI JU Actions



Bio-based value chains envisioned in the BBI Initiative

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Biomass and organic waste

From the agro-based industries

- Feedstock originating from the agriculture and agro-food industries
- Agricultural crops such as flax, hemp and fibre
- Co-products, side streams, and residues from the agriculture, including animal manure and from the agro-food industries, including residues from food processing plants

From the forest-based industries

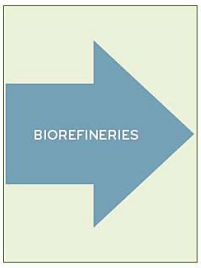
- Feedstock originating from the forest and forest-based industries
- 'Woody and non-wood forest feedstock'
- Co-products, side streams, and residues from the forest and forest-based industries, including the wood industry, saw mills, Paper and Pulp

From the aquatic-based industries

- Feedstock originating from the aquatic and aquatic-based industries, including aquaculture, the fish and fish processing industries
- Co-products, side streams and residues from the aquatic and aquatic-based industries

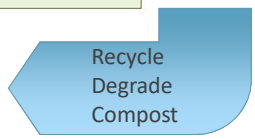
Bio-waste and CO_2

- Biodegradable garden and park waste
- Food and kitchen waste from households, restaurants, caterers and retail premises
- Waste water and sludge
- CO_2



Bio-based products & markets

- Bio-based chemicals
- Bio-based plastics, polymers, materials, packaging
- Specialties (for example bio-based surfactants, lubricants, pharmaceuticals, nutraceuticals, cosmetics)
- Textiles
- Food ingredients and feed
- Advanced biofuels



Impact of BBI JU (2014-today)

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- **Mobilisation of private investment in Europe:** keeping knowledge and innovation, and investments in innovative production processes in Europe. Attract companies from outside EU to invest in innovation in Europe!
- **Growing interest for BBI grants,** including growing number of demo and flagship proposals
- **Development of new innovative value chains**: e.g. food industry collaborating with the chemical industry, the forestry and pulp & paper sector collaborating with chemical and textile industry, etc.
- **New industrial sectors are joining** e.g. by creating value from waste and side streams (food processing sector, aquatic/marine sectors, bio-waste, …). As a result we also observe a **wider geographical spread** throughout Europe.
- **Linking the industry to policies and initiatives** such as the Circular Economy Package and COP21.
- **Increased market focus**: participation of brand owners is key as they help to develop new applications and create new markets. Their involvement also shortens time to market for innovative bio-based products.
- **Growing involvement of the regions**: BIC and BBI JU have strengthened their collaboration with the EU regions to exchange information and explore synergies and opportunities for joint financing, and deployment of new local value chains.
- **Growing awareness from EU-13 of the opportunities**.

BBI Flagship & Demo on-going projects (calls 2014 to 2017)

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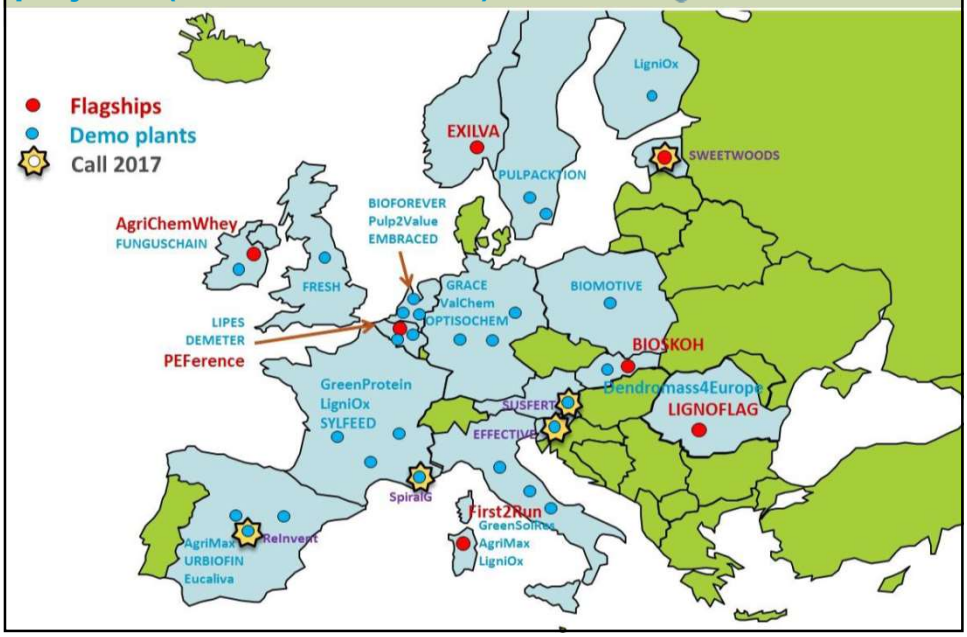

Some examples

First2Run

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The project, based in a rural area of Sardinia, demonstrates the techno, economical and environmental sustainability at industrial scale of a first-of-kind value chain where low input and underutilized oil crops (i.e. cardoon) grown in arid and/or marginal lands are exploited for the extraction of vegetable oils to be further converted into bio-monomers (mainly pelargonic and azelaic acids) as building blocks for high added value bioproducts, biolubricants, cosmetics, bioplastics, additives through the integration of chemical and biotechnological processes.

By and co-products from the process will be valorised both for energy, feed for animals and added value chemicals productions in order to increase the sustainability of the value chain.

ExCornSeed

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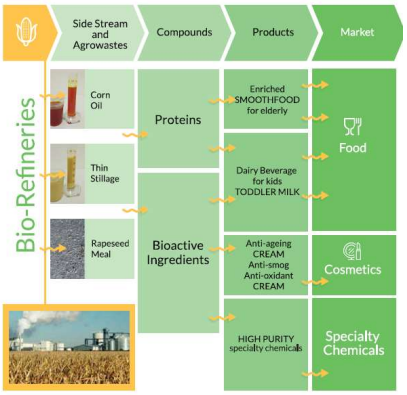
EXCornsEED

Separation, fractionation and isolation of biologically active natural substances from corn oil and other side streams to be used in food, specialty chemicals and cosmetic markets.



Lipes

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Life Integrated Process for the Enzymatic Splitting of Triglycerides

- 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.
- Replacing current thermal hydrolysis and saponification production routes, instead using a new enzyme-based alternative.

Expected impacts

- Using this approach will make the process far more resource efficient, saving at least 45% water, 70% enzymes and 80% energy over current approaches
- Strengthen the competitiveness of EU oleo-chemicals industry through a cost- effective process leading to high performance products
- Sustainable and innovative integrated new process leading to high quality products along the whole value chain
- Efficient enzyme for enzymatic splitting of oils
- New low trans FA for food application High quality FA
- New grade of dimer acids (C36 and C44)
- New grade of Co-polyesters co-products

Partners

Pro-Enrich

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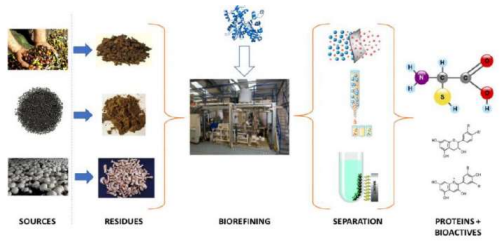
- Develop a flexible biorefinery approach able to processing a range of agricultural residues from rapeseed meal, olives, tomatoes and citrus fruit industries.
- Introduce pressed olive pomace, olive mill waste water, rapeseed meal press cake and fruit and vegetables processing residues as valuable bio-refining resources.
- It takes the process of fractionising biomass to a new level, identifying proteins, polyphenols, dietary fibres and pigments for use as food ingredients, pet food, cosmetics and adhesives



- Danish Technological Institute (Denmark)
- Bangor University (United Kingdom)
- Innorenew Coe Center Odlicnosti Za Raziskave In Inovacije Na Podrocju Obnovljivih Aterialov In Zdravega Bivanjskega Okolja (Slovenia)
- Gea Westfalia Separator Group GMBH (Germany)
- Anecoop Sociedad Cooperativa (Spain)
- Tailorzyme APS (Denmark)
- Agro Business Park AS (Denmark)
- Emmelev AS (Denmark)
- Vertech Group (France)
- Franka Marzi (Slovenia)
- Chimar Hellas AE (Greece)
- Eurizon SL (Spain)
- Olivar de Segura, S. Coop. And. (Spain)
- Mars GMBH (Germany)
- Natac Biotech SL (Spain)
- G. C. Hahn and Company Ltd (United Kingdom)

agrimax

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Four new agri-value chains from waste

Agrimax will demonstrate the potential of residues and by-products from the processing of tomatoes, olives, cereals and potatoes. The project will maximise the EU's sustainability, while providing new bio-based compounds for the chemicals, food-packaging and farming sectors.

Cascade of high-value, bio-based products

By applying multiple processes to these waste streams, a cascade of new, bio-based compounds will be produced with applications in:

- packaging (bio-polymers, bio-composites, bio-based coatings, active packaging, stabilising agents)
- food (additives, ingredients, natural flavourings, edible coatings, microbial growth media)
- agricultural materials (biodegradable pots, mulching films, bio-fertilisers)

End users will test these products to validate their cost effectiveness and performance. Any remaining biomass will be used for biogas or returned to the land for soil enrichment.

Flexible, multi-feedstock pilot processing plants

Two pilot processing plants (biorefineries) in Spain and Italy will use unavoidable waste from cereals, olives, potatoes and tomatoes. An online platform to coordinate the provision of waste will help maximise the use of these pilot plants throughout the year.

Co-operative routes to commercialisation

Along with assessments of the environmental, social and economic sustainability of this approach, the project will develop business models for its full-scale commercial adoption by agricultural cooperatives.

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BIO-BASED INDUSTRIES Public-Private Partnership

Bio-based Industries JU: a €3.7 billion partnership between the EU and the Bio-based Industries Consortium

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

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

AgriChemWhey
An integrated biorefinery for the conversion of dairy side streams to high value bio-based chemicals

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

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

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

BioCannDo
Bioeconomy Awareness and Discourse Project

A future PPP for the bioeconomy (2020-2030)

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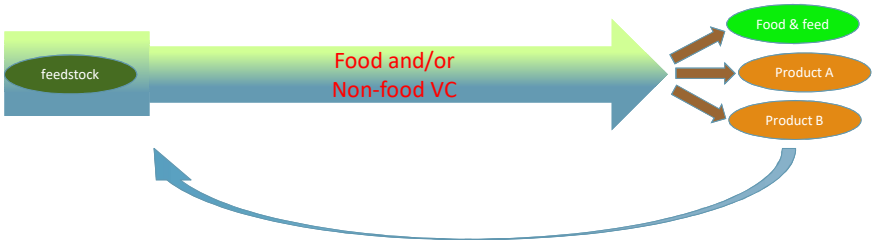

- **Create new, inclusive value chains** from feedstock to market application, driven by innovation and sharing benefits among all actors.
- **Production of feedstock, food & non-food**: co-production of food, feed, biobased products & materials, energy in a sustainable, circular manner. The focus is on "zero waste" value chains where all components of the feedstock are used in a sustainable way (additional partners: "Food & Drinks Europe"
- **Valorisation of side and residual streams from all primary sectors**: agriculture including horticulture, food and beverages; forestry including paper & pulp; marine and aquatic including aquaculture; bio-waste from municipalities and urban areas (and CO_2 from operations and from the atmosphere) (developing partnership with e.g. "Municipal Waste Europe" or FEAD)
- Better **integration of the primary sector:** by analyzing the results of the BBI study on the primary sector (BBI, BIC, DG RTD, DG AGRI) and the workshop DG AGRI on "Best practices in integrating primary producers in the bioeconomy value chains"
- **Contribution to SDGs**: new value chains should include in a more efficient way primary sector AND brand owners/consumers, and SDG contribution measurement should be integrated at project level.

A new Vision for the bioeconomy

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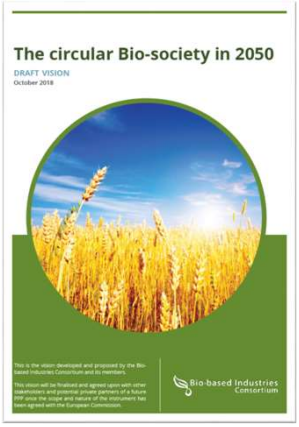

- BIC's first Vision was developed in 2012. It was the foundation of the 2014-2020 BBI JU.
- More companies and industrial sectors are involved, the circular economy concept has been introduced, the Paris Agreement on Climate Change has to be implemented, …
- BIC (and the members), with the support of interested parties, are updating the Vision.
- The Vision will be finalised and agreed upon with potential private partners of a future PPP and other stakeholders before end of 2018.

Conclusions

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- **Bioeconomy & Biobased Industries** are important industrial sectors in the European Bioeconomy (turnover, employment), with enormous potential in EU-13.
- Growing importance of the **valorisation of by-products and side streams** to develop new commercial value chains in Europe.
- **Partnerships and cross-industrial collaboration are crucial**: collaborations are started with industries from different industrial sectors.
- **BBI JU** has accelerated the development of such new value chains:
  - sustainable feedstock production, supply & management, including the valorization of by-products & waste streams
  - development of new products and applications (packaging, chemical building blocks, composites, fibers & textiles, automotive industry, furniture, …)
  - sustainability (e.g. zero-waste biorefineries).
- Several '**financing instruments**' are available in EU, but fragmented, different and long procedures, …
- There is a need for **different business models** where feedstock providers become a partner in new value chains