Investing in Opportunities
This project has received European Regional Development Funding through INTERREG IV B.
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INTERREG IVB

Bio Base Europe Pilot Plant

Bio Base Europe Pilot Plant

Pilot Plant for the Key Enabling Technology 'Industrial Biotechnology' and the biobased economy

Lieve Hoflack, PhD
Project manager

Content

- What are KETs
- KET Industrial Biotechnology
- Role of Bio Base Europe Pilot Plant in the KET story
- Examples of Food innovations

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What are Key Enabling Technologies (KETs)?

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- **Industrial Biotechnology**
- Nanotechnology
- Nano- and micro-electronics incl. semi-conductors
- Photonics
- Advanced materials
- Advanced manufacturing

Where do KETs come from?

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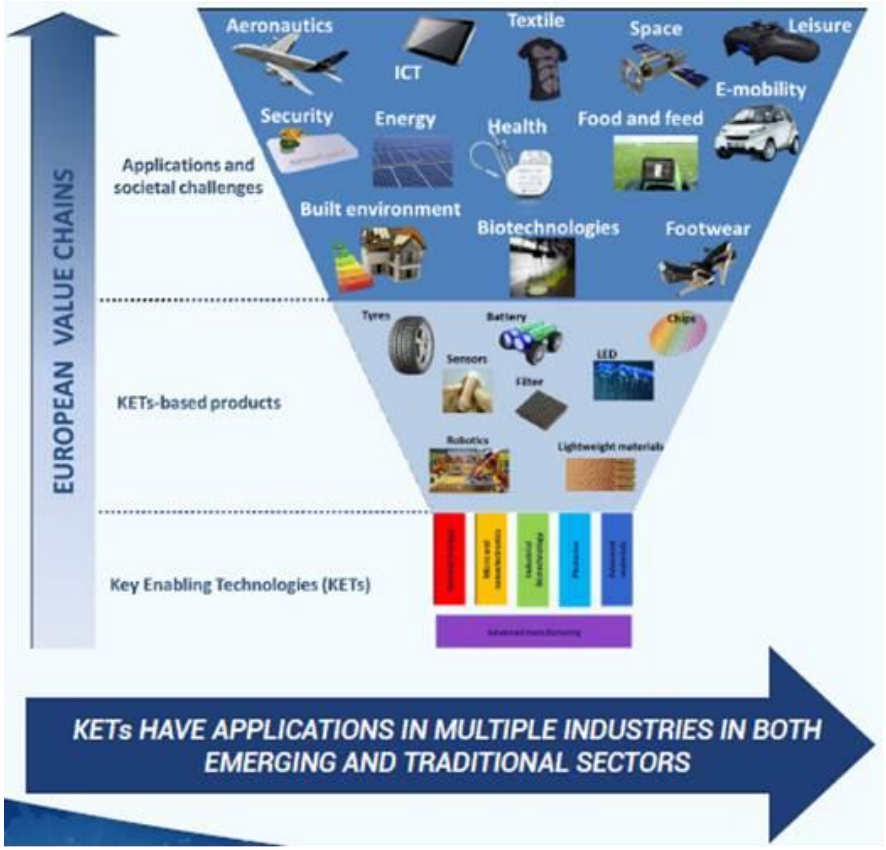
- European High level Group
- As an answer to the loss of jobs in manufacturing in Europe (3,8 million jobs lost between 2008-2012)
- To compete with ‘block economies’ (e.g. US, China)
- Emphasis on translating research into industrial application
- Key priority within Europe 2020 strategy (e.g. Horizon2020)

What does Europe expect from KETs?

- Impact on (emerging and traditional sectors)
  - automotive
  - food
  - chemicals
  - electronics
  - energy
  - pharmaceuticals
  - construction
  - telecommunications
  - applications in other industries expected to follow



What does Europe expect from KETs?

- a wide range of product applications e.g.
  - developing low carbon energy technologies
  - improving energy and resource efficiency
  - creating new medical products
- Stimulate Europe's competitiveness and generate jobs, growth and wealth
- To enable a shift to a low-carbon, knowledge-based economy -> job creation and re-industrialization of Europe

What does Europe expect from KETs?

- global market for KETs: estimated over EUR 1 trillion (2015)
- growth potentials of 10 – 20% per year
- SMEs: majority of future jobs in KETs

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- Role of Bio Base Europe Pilot Plant in the KET story
- Examples of Food innovations
- How can we cooperate?

The KET Industrial Biotechnology or White Biotechnology

The “colours” of Biotechnology:

Red Biotechnology — medical biotechnology:
e.g. vaccines, inuline

Green Biotechnology — plant biotechnology :
e.g. plant resistant to insects, diseases

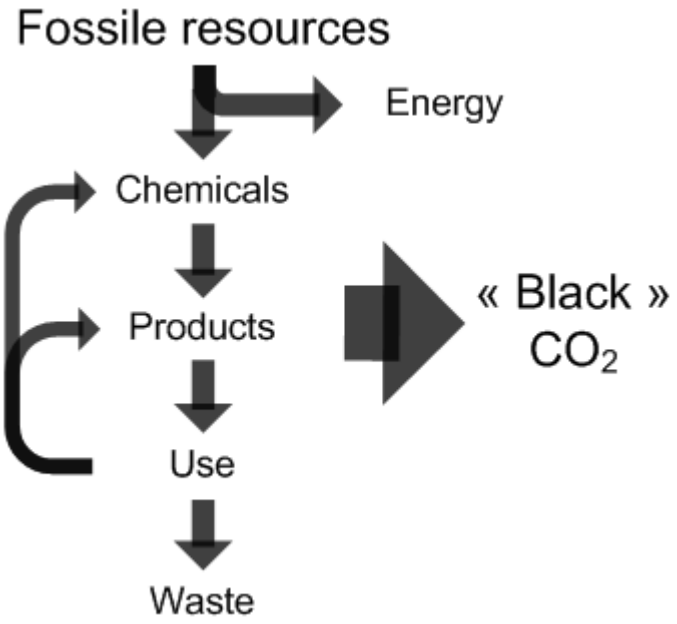
Grey Biotechnology — environmental biotechnology
e.g. removal contaminants

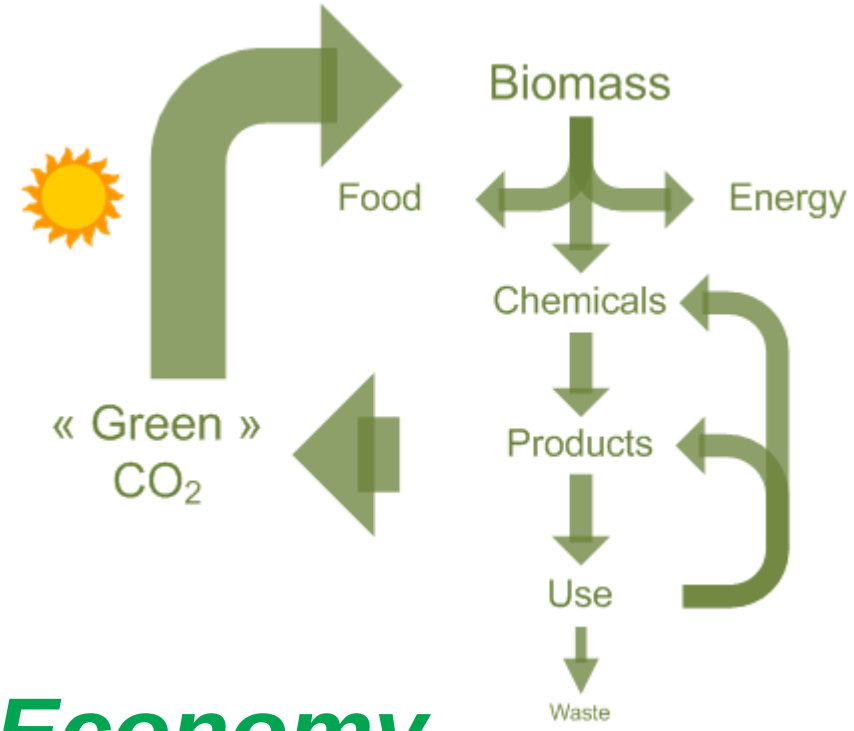
Bleu Biotechnology — marine biotechnology
e.g. increase seafood supply & safety

White Biotechnology — Industrial Biotechnology
e.g. enzyme washing powders

The KET Industrial Biotechnology: an important tool for building a environmentally sustainable bio based economy

Bio Base Europe Pilot Plant





Bio Based Economy

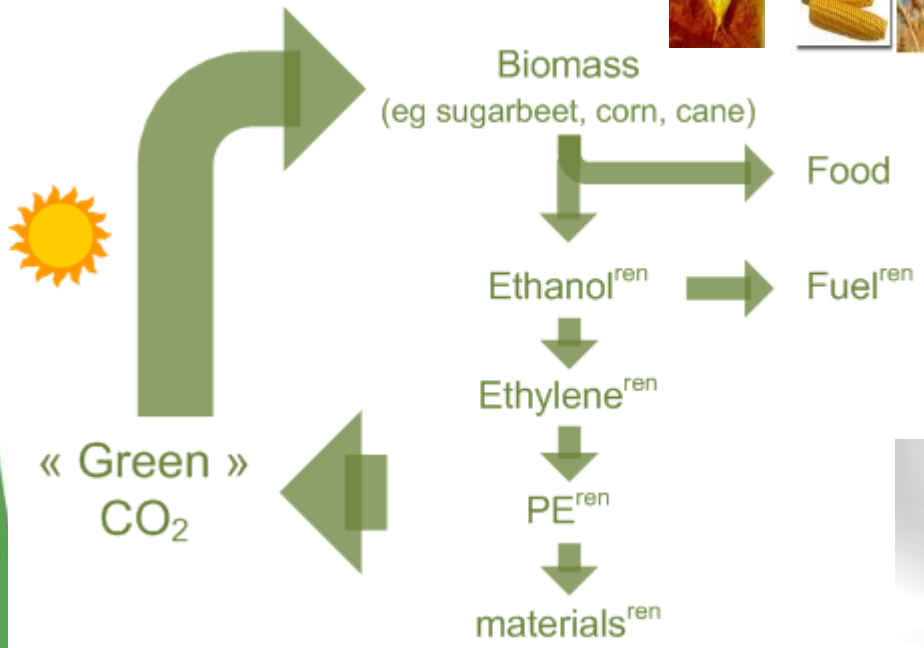
from fossil to renewable resources

The KET Industrial Biotechnology for re-industrialization of Europe

Bio Base Europe Pilot Plant

Industrial Biotechnology:

The use of microorganisms and their enzymes to produce chemical substances, materials and bio-energy from renewable resources



plantbottle™
up to 30% plant-based
100% recyclable bottle
redesigned plastic, recyclable as ever.

The Challenge:

Bio economy: from “easy” to “difficult”

Bio Base Europe Pilot Plant

GHENT BIO-ENERGY VALLEY

bioro biodiesel refinery

ALCO BIOFUEL power of nature

Electrabel

Cargill

EuroSilo

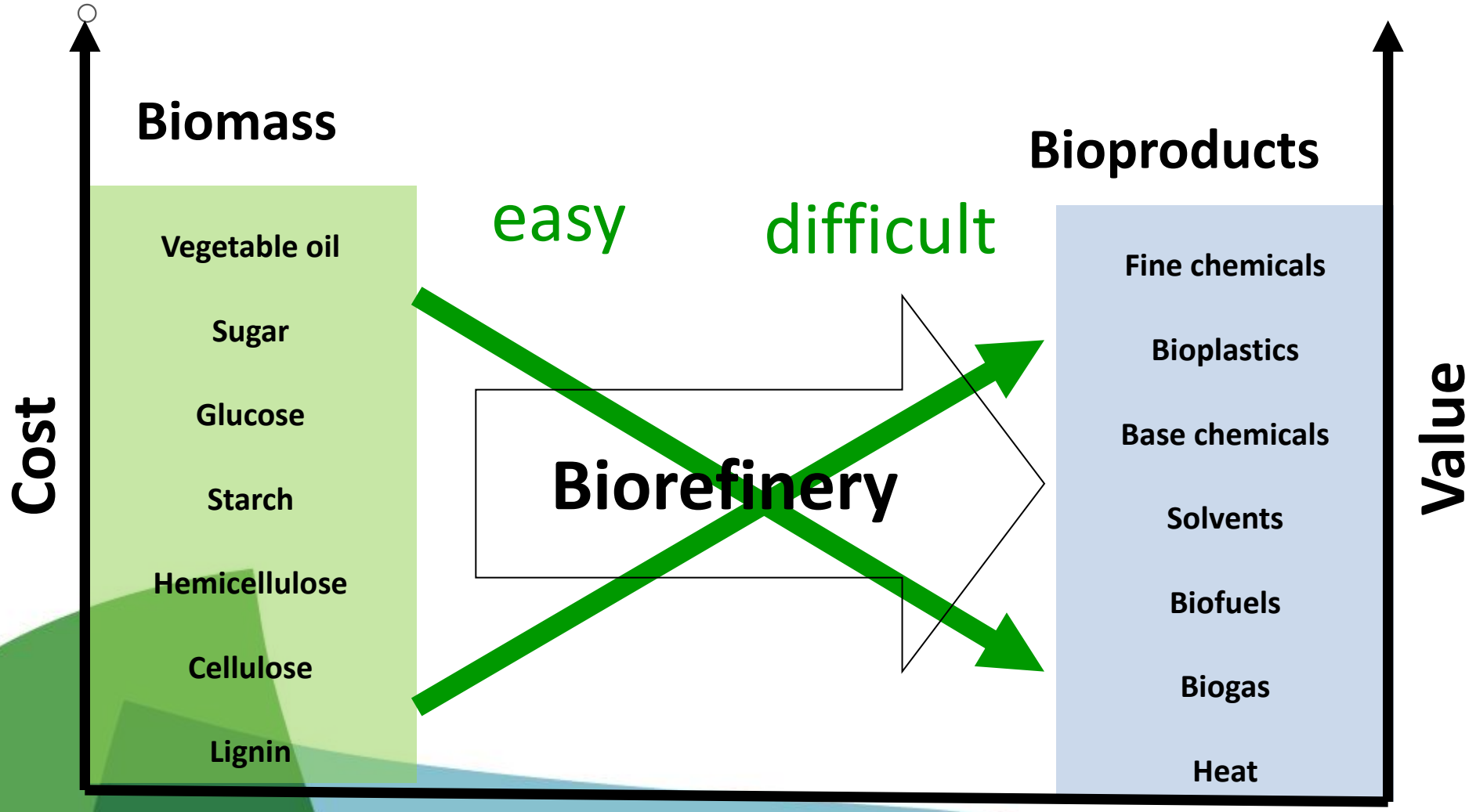
Oiltanking

Rodenhuizedok:

300 000 ton	Bio diesel
200 000 m³	Bio ethanol
240 MW	Bio electricity

The Challenge:

Bio economy: from “easy” to “difficult”



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- **Role of Bio Base Europe Pilot Plant in the KET story**
- Examples of Food innovations

The Role of Bio Base Europe Pilot Plant

Bio Base Europe Pilot Plant

Problem: Gap in the Innovation Chain

Discovery

Development

Knowledge & IP

Demo

Deploy

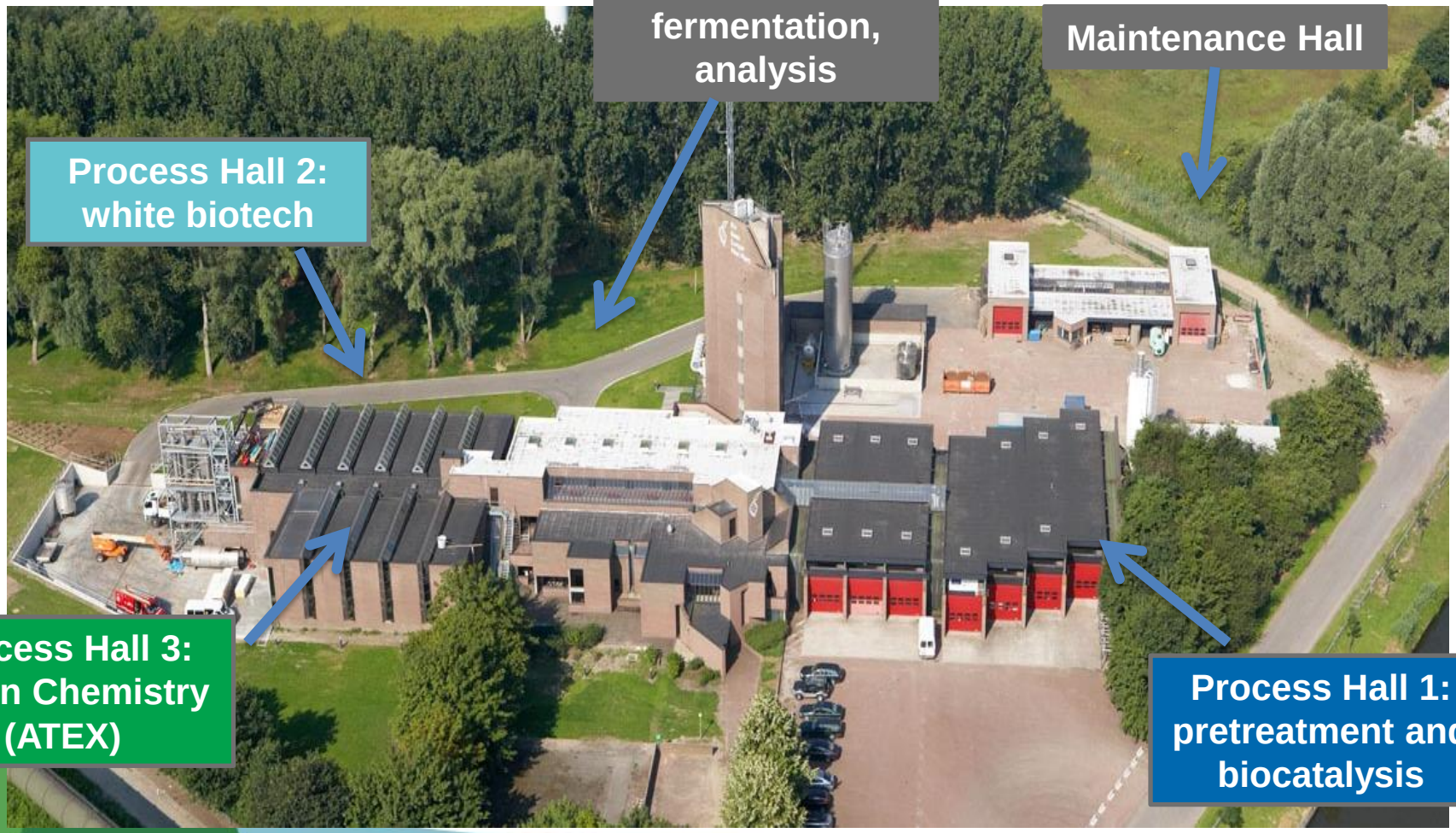
Process , Product & Market

- Knowledge and expertise are present but…
- Insufficient translation of knowledge into industrial innovation
- Not enough value creation on scientific results

multipurpose pilot plant

The Role of Bio Base Europe Pilot Plant

Bio Base Europe Pilot Plant



Hall 1: Biomass pretreatment, biocatalysis & DSP

Hall 2: White Biotech ~ fermentation and DSP

Hall 3: Green Chemistry and ATEX proof DSP (working with solvents)

Laboratory: Analysis, process development and tech transfer

The role of Bio Base Europe Pilot Plant

- **Multi-purpose** pilot facility for **bio-based** products and processes in Ghent (Belgium)
- **Independent** organisation without industrial shareholders
- Turnover in 2014: 4.1 M€
- Current number of employees: 48
- Selected by EC as a multi-KET-pilot line demonstrator

The role of Bio Base Europe Pilot Plant

Our Unique Selling Proposition

‘A flexible and diverse pilot plant that covers the whole proces, from green resource to final product, under one roof’

Content

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- **Examples of Food innovations**

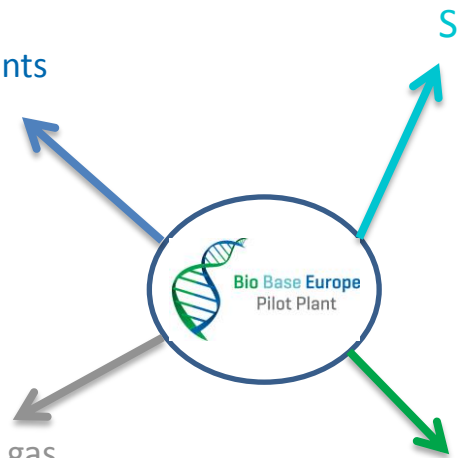
Type of projects

PRIVATELY FUNDED PROJECTS

Confidential

PUBLICLY FUNDED PROJECTS:
Technology development, scale up and
Creating awareness & building new value chains

- (financial) stability
- building expertise
- communication/ publicity



Examples of Food innovations:
Human milk oligosaccharides of Inbiose (FP7+ BBI-JU)

Bio Base Europe Pilot Plant

inbiose
Your partner for specialty carbohydrates

- No abundant natural source, production by fermentation
- Price range: 10 €/kg – 1.000 €/kg (reference sugar: 0.5 €/kg)
- Quantities: 1 kg – 10.000 tpa
- Research phase with national funding
- Spin-off from Ghent University in 2013 – Belgian SME
- Development phase with BBEPP and European funding (FP7 + BBI-JU)
- Now production at 15,000L scale

Examples of Food innovations:
Human milk oligosaccharides of Inbiose (FP7 + BBI-JU)

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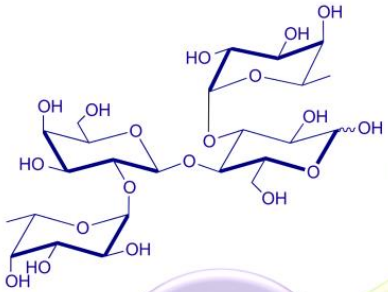
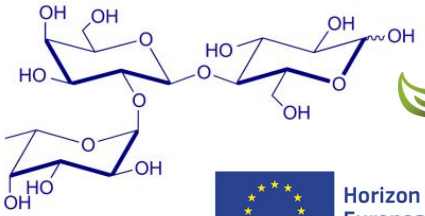


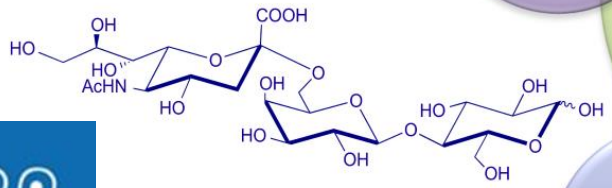


Bio-based Industries Consortium

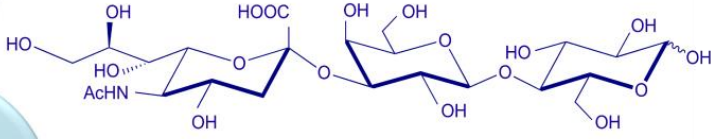
Horizon 2020 European Union Funding for Research & Innovation

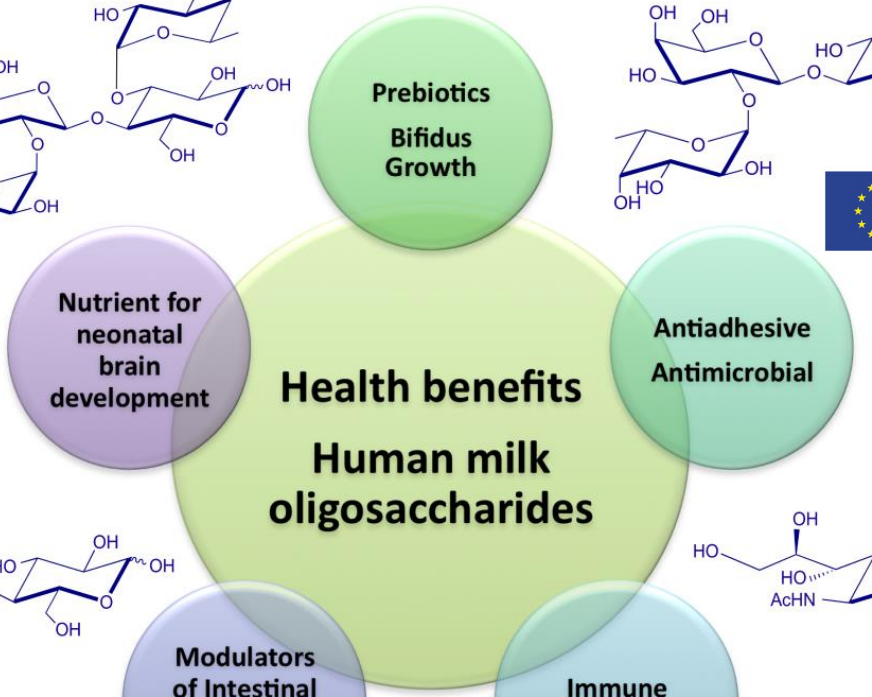
BIO-BASED INDUSTRIES Public-Private Partnership

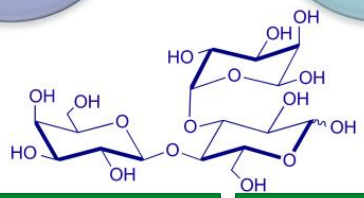
Fucosyllactoses



Sialyllactoses







IB2 Market

This project is funded by the 7th Framework Programme of the European Union

inbiose

Your partner for specialty carbohydrates

Infant formula | Prebiotics | Functional foods | Feed/Pet care

Examples of Food innovations:
Butanol from whiskey draff & pot ale

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Investing in Opportunities

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Celtic Renewables

- Scottish SME, university spin-off
- Raw materials:
  - Draff: the residue of husks after fermentation of the grain
  - Pot ale: residue in the pot after distillation
- Partnered with BBEPP for scale up after Bio Base NWE coupon
- Awarded Europe's most innovative SME & other awards
- £11million grant from Department for Transport to build a whiskey based demo bio refinery for advanced biofuel

Examples of Food innovations:
Butanol from whiskey draff & pot ale

Celtic Renewables

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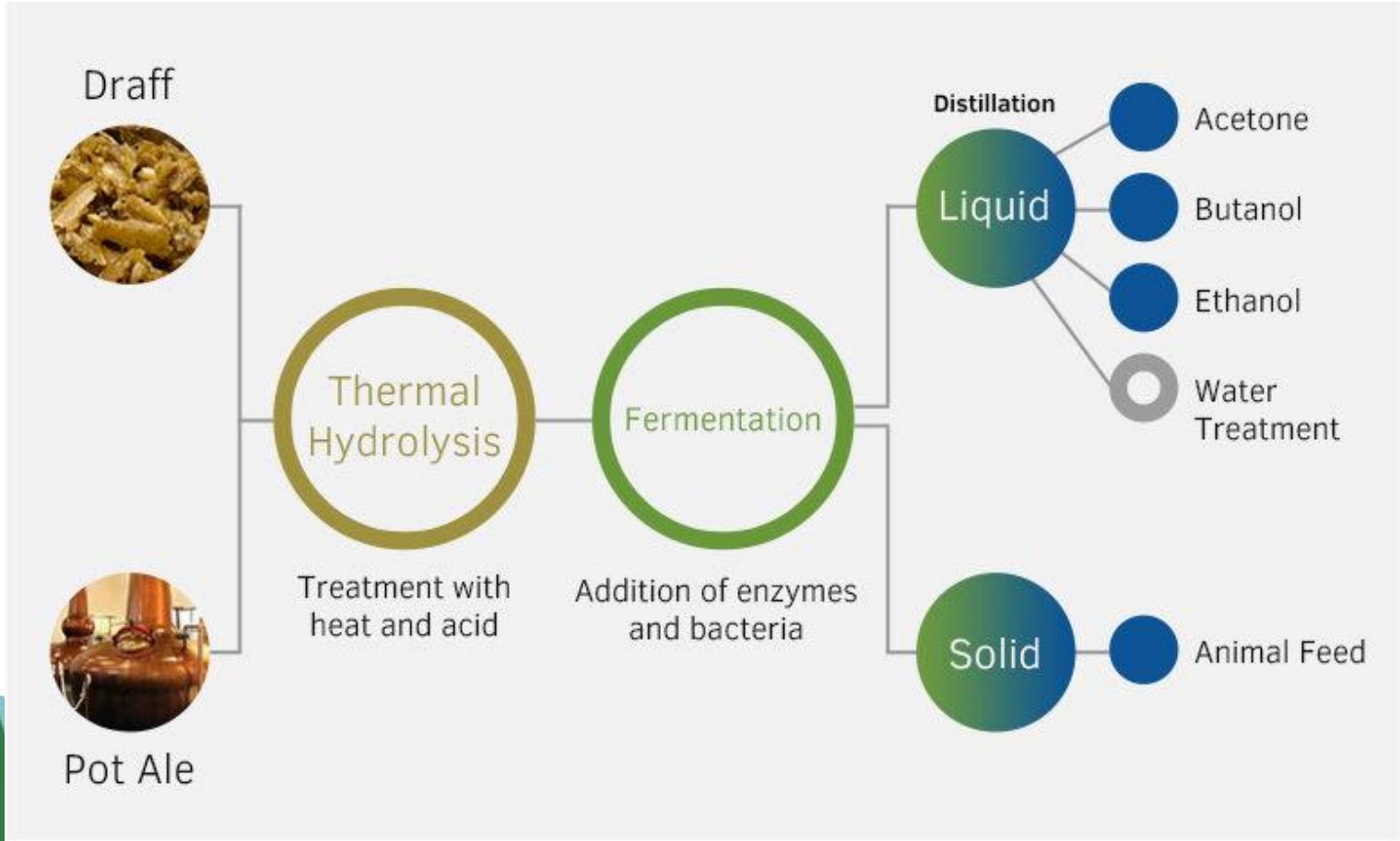

Examples of Food innovations:
PULP2VALUE (BBI-JU)

Bio Base Europe Pilot Plant

ROYAL COSUN

Bio-based Industries Consortium

Horizon 2020 European Union Funding for Research & Innovation

BIO-BASED INDUSTRIES Public-Private Partnership

- Royal Cosun (Dutch farmers cooperation: 10.000 shareholders, 4.000 employees, € 1,8 Billion turnover)

- Raw material: Sugar beet pulp
  - Current use as feed and biogas
  - Demo plant to produce microcellulose fibers, arabinose, and galacturonic acid to be used in detergents, personal care, oil & gas, paints & coatings and composites

- Partnered with BBEPP for support in process development
(from pilot to Demo scale)

Examples of Food innovations:
Anti-microbial agent from IMD Natural solutions (Carbosurf: BBI-JU)

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IMD NATURAL SOLUTIONS

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Horizon 2020 European Union Funding for Research & Innovation

BIO-BASED INDUSTRIES Public-Private Partnership

- IMD Natural Solutions (German SME)
- Natural biosurfactant coming from edible mushroom to be used as natural anti-microbial agent e.g. in beverages (avoid mold and fungus)
- BBEPP role: process development from lab scale protocol to industrial scale; optimization to get techno-economic viable process that meets specs

Examples of food innovations:
Extraction of pectin from coffee pulp (coffee-production)

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pectcof

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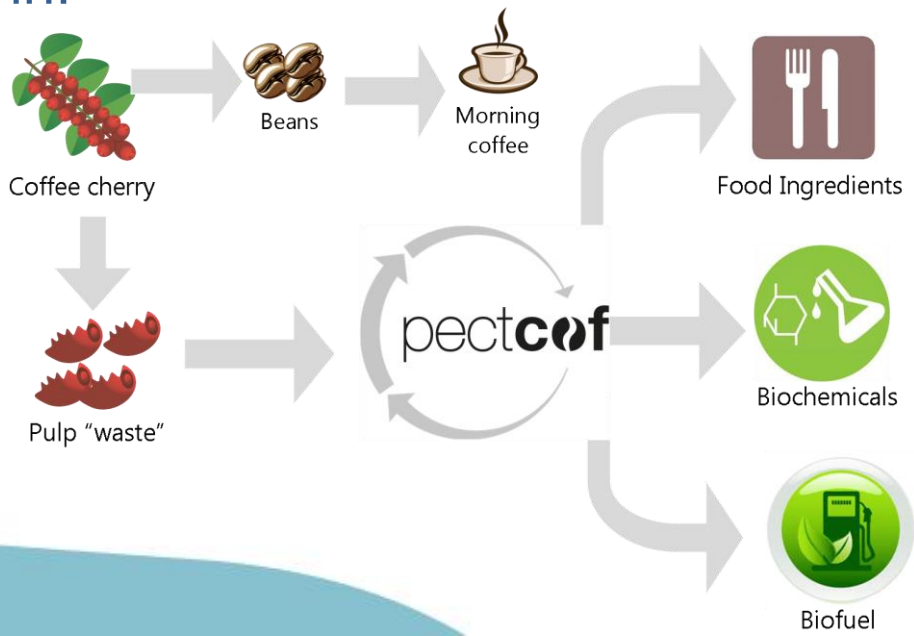
- Pectcof (Dutch SME)
- Scale-up tests at BBEPP resulted in:
  - process-related improvements
  - a basis for pilot-line calculations and as the basis for the purchasing of specific necessary equipment.



Examples of food innovations: Extraction of anti-oxidant from fruit seed

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eco treasures

- Eco Treasures (Belgian SME)
- Possible new client but needed to develop a new double extraction process (€1 Mio investment needed)
- Fruit seed extract: anti-oxidant
- Try test at BBEPP: success
- Deal with client was closed and investment done

Examples of Food innovations:
Marisurf (Horizon2020)

Bio Base Europe Pilot Plant

Funded by the European Union framework programme for research and innovation, Horizon 2020

- Heriot Watt university (Dr. Guttierrez): marine bacterial collection isolated for their oil degrading ability
- Screening for biosurfactants and emulsifiers
- Our role: process development and production of sufficient quantities for testing by end-users

Examples of Food innovations:
Novosides (FP7)

- Coordinated by Ghent University
- Enzymatic glycosylation of organic compounds for increased stability e.g. for food applications

- https://www.youtube.com/watch?v=D6O6d1BD6gc

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