Circular economy: opportunities for value chain and cross sectorial collaboration
Increase of Fossil price, Substance of Very High Concern, Reach, Sustainability

TERRITORIAL BIOREFINERIES

INDUSTRIAL NEEDS

Lca

Biobased Chemistry & biotechnology
BIOREFINERIES

Lca

BIOBASED CHEMICAL

BIOBASED MATERIALS

BIOFUEL 2G

FOOD AND FEED INGREDIENTS

FOREST AND AGRICULTURAL CROPS

LIGNOCELLULOSIC BIOMASS PRETREATMENT AND FRACTIONATION

BIOPROCESS
**BIOBASED PRODUCT IN CLEANING SECTOR**

**For Formulation or Packaging**

Increase of biobased ingredients on the markets

- **Biobased surfactants** (APG, APP, sucroesters, acyl AA, rhamolipids, sophorolipids… and new exploring routes using biotechnology: new yeast and biocatalitic, betaine)
- **Biobased solvent** and formulations
- **New Additives**: **Antitartring** for dish washer substances (glucaric derivatives) Antistatic additives, biocide,
- **Biopolymers** for packaging (PE, PEF)

**Biobased product on the market**

- Greenshield launch **biobased bottle** laundry detergent and surface cleaning
- Walmart: green value power clean
- SALVECO (solutions for cleaning and desinfection)
- BIOATTITUDE (ex: VEGECAR, Waterless car cleaner)

Household detergency: **Surfactant 42 000 T – marketshare: 20 - 25%** / cosmetic: **35 000 T – marketshare: 60 - 80 %**
Agrobiobase

The showcase of bio-based products

► An easier research with market approach

► 300 products available (90+ suppliers from 14 countries)

► Numerous references
Advantages: Reduce impact of the biobased products

DRIVERS:
- Anticipating the **Rarefaction of fossil fuel and Increasing in Oil prices** and risk of shortage sustainability
- **Tightening regulations** (on environment, labelling, industrial plant) as a leverage effect - REACH - **Substance of Very High Concern**
- Finding new outlets for the plant / crop co-products
- **Innovation or taking into the advantage of the biomass / drop in**

- 40 à 80% CENR; **G.H.G:** 50% CO2
- **C.O.V** emission; Tox et Ecotox
- Biodegradability

ISO PROCESS - ISO PRICE, ISO PROPERTIES - ISO PRODUCT - OR BETTER PERFORMANCE AND LOWER ENVIRONMENTAL IMPACT
HURDLES / CHALLENGES

Surfactents: Lower performance - Higher cost

=> OPEN INNOVATION R&D PROJECTS STILL NEEDED:

- **Raw material**: specifications, fonctionnalisation, increase hydrophilie, replace C14-16, use *algae*
- **Process**: increase the yield – new yeasts, new enzym
- **Applications limited**: multifunctional properties

**OPPORTUNITIES**

- **H2020 - BBI Calls**: +/- 1 Billion subsidies for development of biorefineries (RIA, Demonstrator, flagship) / Dead valley of innovation
- Discussion on Public Procurement
From the idea to the industrialisation of your biobased products

→ **Open Innovation R&D project** (biomass pretreatment, extraction, fonctionnalisation, to end users)

→ **Industrial or Academic Partners research**, state of the art, advices on R&D program and impacts...

→ **National and European Project** (BBI, H2020, SME instrument...)

Key Words: Biogas, biofuel, biopolymers, biobased composites, biobased chemistry, Food and Feed, Biotechnology, Biocatalysis

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**Chiffres clés**
- 192 projects financed:
  - 1,49 milliard d’€ (budget total)
- 47 Products and process
- 172 brevets (et autres titres de propriété intellectuel)

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BIOBASED SURFACTANTS

- Household detergency (lessives, adoucissants, produits vaisselles et d’entretien): 42 000 T – marketshare: 20 - 25%
- Cosmetic: 35 000 T – marketshare: 60 - 80 %
- Other (cuir, forage, textile...): 30 000 T
Environmental Advantages bioproducts:

Always necessary to make a LCA
IAR : INDUSTRIAL NETWORK

310 members

**Agro-Industries:**
- ARD
- CRISTAL UNION
- ROQUETTE
- SICLAE
- SOFIPROTEOL
- SOUFFLET
- BIOTECHNOLOGIES
- TEREOS

**Chemistry:**
- AIR LIQUIDE
- ARKEMA
- BOSTIK
- CLARIANT
- CCP composites
- NOVANCE/OLEON
- PCAS
- RHODIA/SOLVAY
- SEPPIC
- SOLVAY
- OMEGA CAT SYSTEM
- ...

**Energie / Envt :**
- EDF
- GDF
- IFPEN
- TOTAL
- VEOLIA...

**Biotech :**
- AGILENT TECNOLOGIES
- ALGENICS
- BIOAMBER
- BIOMETHODES
- CELLECTYS
- DEINOVE
- ECOSOLUTION
- FERMENTALG
- METABOLIC EXPLORER
- ROOTLINES TECHNOLOGY
- YNSECT...

**Processing :**
- ALFA LAVAL
- CLEXTRAL
- DUCAMP
- FINAXO
- LEBAS TECHNOLOGIE
- MAGUIN
- PROCESSIUM
- NOVASEP
- SNC LAVALIN...

**“Matériels” :**

- Transport
  - FAURECIA
  - TREVES
  - MICHELIN...

- Packaging
  - DANONE
  - VEGETAL & MINERAL WATERS...

**Cosmetics**
- CHIMEX
- L’OREAL...

**Ingredients:**
- BONDUEL
- LESIEUR...
IAR MEMBERS INVOLVED IN DETERGENT MARKETS

• WHEAT OLEO (Appyclean APP capryl wheat bran glycosides - sophorolipides)

• SME CREE (wide range of products based on hydrogen peroxide for cleaning and disinfectant)

• SALVECO (solutions for cleaning and disinfection – Biocides made from lactic acid derivatives)

• BIOATTITUDE (ex: VEGECAR, Waterless car cleaner)

• Biobased Solvent and surfactant: SOLVAY – ARKEMA – OELON – ARD – DRT - ROQUETTE - SEPPIC
PRACTICAL RECOMMENDATIONS FOR THE ENVIRONMENTAL ASSESSMENT OF BIOBASED CHEMICAL PRODUCTS

Acting for a sustainable Development

- LCA is a reference method for the evaluation of environmental impacts of products
- Bio-based raw materials, raises a number of specific issues that are currently not solved in a consensual manner

Consolidated and harmonized methodology in order to promote the environmental performance of these products.

The guide takes a pragmatic approach and is based on practices implemented by 5 industrials: Arkema, Bostik, Oleon, Roquette and Solvay
Which phases of the life cycle must be considered in a LCA?

What functional unit is to be used for the bio-product evaluation?

Which database is the best for generic secondary data?
How to ensure the quality of specific data?
Which cut-off rules can be applied to the inventory?
How to manage environmental burdens of the different products and co-products generated?
Which are the emissions to quantify?
Which data is necessary to calculate the emissions?

...
“Sustainability Drives Innovation” ? Common drivers

- Finding new outlets for the co-products - Anticipating the modification of the CAP (European common agricultural policy) and development of biorefineries (C5, sugar beet pulp, lignin)

- Tightening regulations (on environment, labelling, industrial plant) as a leverage effect
  - REACH - Substance of VErY High Concern: Replacement of phthalates, parabens, bisphenol A, isocyanate, silicones, flame retardant...
  - VOC volatile organic compounds - / Biosolvents

- Anticipating the Rarefaction of fossil fuel and Increasing in Oil prices and risk of shortage
  - Ex: BioButadiene for rubbers – Wax for candle

- Growing awareness of the environmental impacts by customers and a way to differentiate their product thanks to « natural and good image of non food use biomass» - Ex: cosmetic

- Industrial commitment in sustainability / Ecodesign / biolubricants (chain saw oil, metal work)

- Innovation or taking into the advantage of the biomass composition in niche market
MAIN BIOBASED INDUSTRIAL INNOVATION DRIVERS

“Sustainability Drives Innovation” ? Common drivers

- Finding new outlets for the co-products
- Anticipating the Rarefaction of fossil fuel and Increasing in Oil prices and risk of shortage sustainability - Tightening regulations (on environment, labelling, industrial plant) as a leverage effect - REACH - Substance of Very High Concern
- Innovation or taking into the advantage of the biomass

ISO PROCESS - ISO PRICE, ISO PROPERTIES - ISO PRODUCT - OR BETTER PERFORMANCE AND LOWER ENVIRONMENTAL IMPACT