



Instructions

- General 1: please use the following colour code for the slide headings:
 - IAs/RIAs depending on main origin of feedstock: **agricultural**, **forestry**, **aquatic**, **biowaste & CO₂**, other.
 - **CSAs**
- General 2: please provide an appropriate image for the banner on the left side that fits the theme of the project
- General 3: Min font size 20 pt. Difference in font = 1.6. Please use speakers notes to include other relevant information in bullet points
- Slide 3, 4 and 5 should be completed by all types of actions (RIAs, IAs & CSAs)
- Slide 5-6 are to be completed by IAs and RIAs. We have provided guidelines but the exact content is optional and depends on the nature of the project.
- Slide 8 should be completed by IAs. RIAs may also contribute content if applicable.
- Slide 9 is optional for all actions. Please use one slide for each policy aspect your project contributes to. Please only include examples of concrete contributions.



Zero Waste Ligno-Cellulosic Biorefineries by Integrated Lignin Valorisation (Zelcor)



BBI JU contribution: € 5.3 million



Duration: October 2016 – February 2021



Feedstock: biorefinery lignocellulosic side streams

Zelcor : to demonstrate the **feasibility of transforming lignocellulose biorefinery recalcitrant side streams into high added-value products.**

Originality : to combine chemical and enzymatic catalysis with insect-based conversion to produce bioactive phenolic extracts, aromatic intermediates, and functional biopolymers (colloidal lignin, chitin and chitosans).

Achievements:

- producing **new biocatalysts** by exploring **microbial diversity**
- designing **new routes for lignin conversion**
- understanding **structure-properties relationships.**
- **Assesment of five new value chains** in terms of carbon footprint, economics and safety.



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Project lead: (INRAE, France)



BBI JU contribution: € 5.3 million

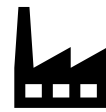
Duration: Oct 2016 – Feb 2021



6 RTOs



6 SMEs



2 Large Companies

1



Aalto University

2



3



4



5



6



7



8



9



10



11



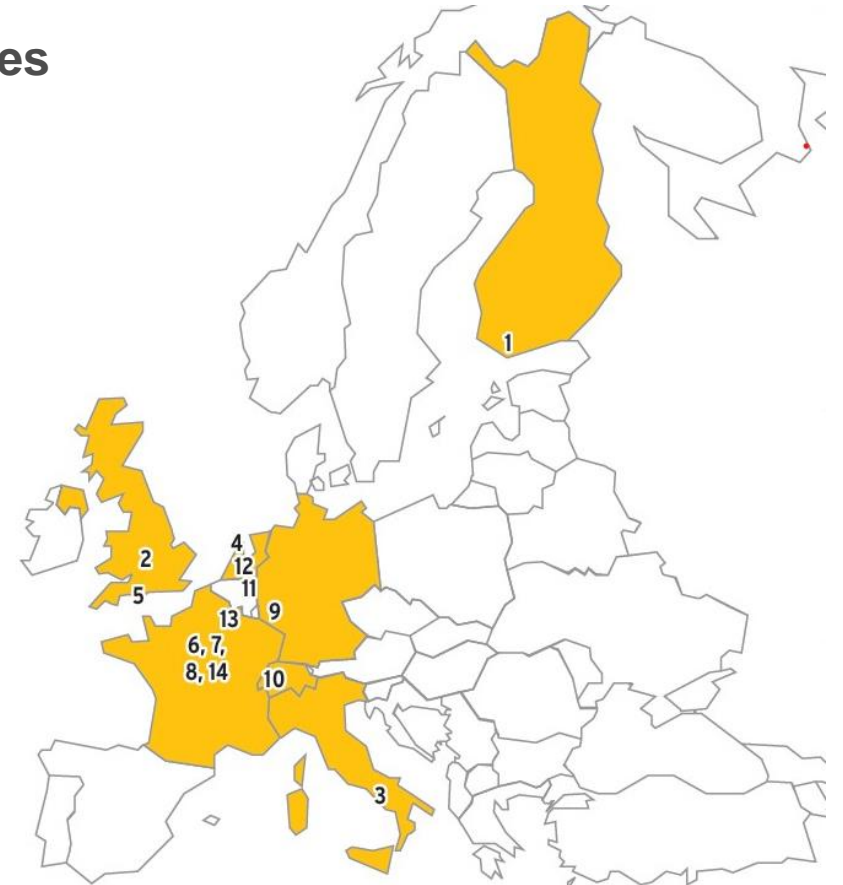
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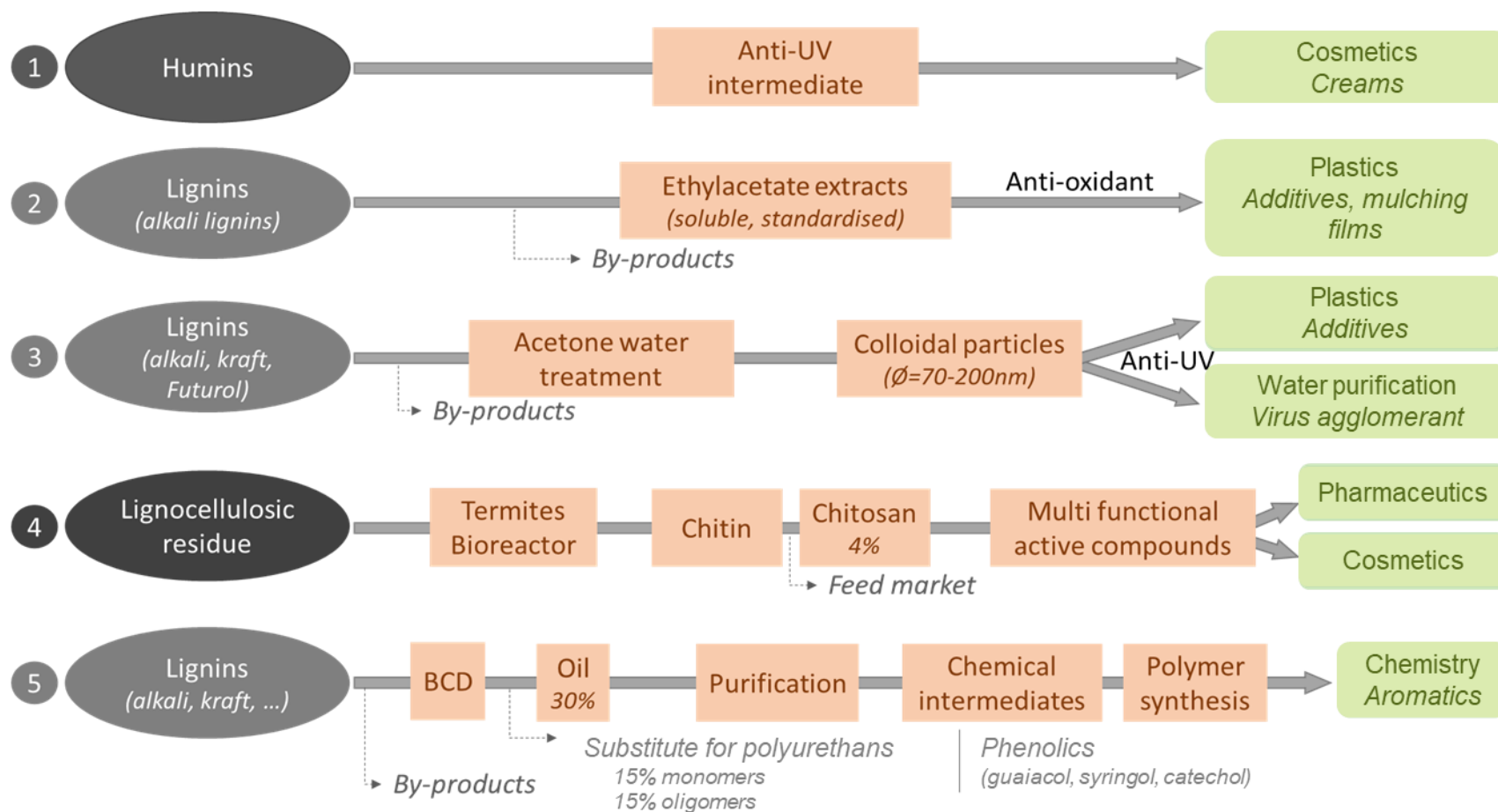


ZELCOR **Context and Objectives**

- **Context/challenges:**
 - Climate change and need to reduce green house gas emissions
 - Resource depletion
 - Low economic viability of lignocellulose biorefineries
 - Need to protect human health from hazardous chemicals and processes
- **Objectives:**
 - To develop safe and sustainable bio-based alternatives to existing fossil-based and/or toxic ones
 - To use side streams of existing lignocellulose biorefineries as raw materials
 - To favor processes based on green chemistry and biocatalysts



Technical content 1: main value chains designed and assessed through the project



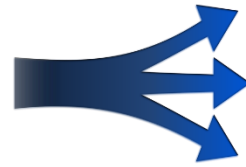
BCD = base-catalysed depolymerisation



Technical content 2: cascading process



kg scale fractionation of lignins (WFBR)



Multifunctional soluble fractions



Colloidal particles
Plastic additives
BCD conversion



10 g scale depolymerisation by ionic liquids (INRAE)



Standardised antioxidants

Recalcitrant residue



kg scale termite bioreactor (Ynsect)



Feed and chitin





Technical content 2: products formulation



Dissolved lignin

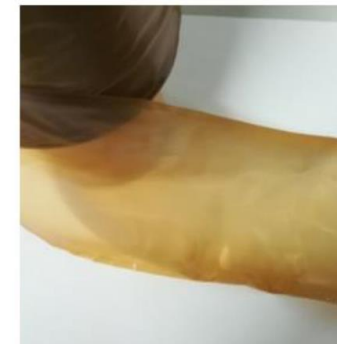


1-2 seconds step

From lignin extracts to stable colloidal particles in water (Aalto)



Humins formulated in skin care emulsions (Arterra)



From PE composite granules to films for mulching or insect-repellent packaging (Sabic)



ZELCOR **Benefits to society and the environment**



Possibility to produce bio-based products while **preserving** food feedstocks and **valorizing** lignocellulosic waste



Safer alternatives to existing packaging additives or technical solutions (e.g. insect repellent packaging)



Promotion of inherently safer innovative processes through innovative processes (e.g. lignin dispersion in aqueous media / use non-volatile solvents-reagents for depolymerization / proactive safety and biodegradability profiling of ionic liquid under interest) and better knowledge of the raw materials and products reactivity.

ZELCOR Local impacts

- **Reinforcement of the link between research and education**
 - A new European training programme in the field of Bioeconomy



With the support of the
Erasmus+ Programme
of the European Union



- **Consolidation of public-private research partnerships**
 - University of Warwick, INRAE, Biome Bioplastics, Nova Institute – Eranet “Milimo”
 - WFBR, Avantium BV – “Chaplin XL” project (Netherlands)
 - Aalto, Avantium BV – “IMPRESS” European project
 - LignoCOST Action “CA17128 Pan-European network on sustainable lignin valorisation” (coord. WFBR)
 - Ynsect, UPEC, INRAE, Ineris – French regional cooperation
 - Avantium BV, Ineris, INRAE – Safety of innovative bio-based processes
- **Promotion of linin valorization and insect biorefinery**



ZELCOR Contribution to EU policy

- **Contribution to European Green Deal by promoting the use of renewable resources and the sustainability of biofuels production**
- **Contribution to EU Bioeconomy policy in terms of education and innovation**
- **Optimization of research efficiency at EU level through project interconnection (e.g. Zelcor and Eucalivia EU-funded projects)**