Vanguard Case Bio-aromatics

Leader: Flanders (Ludo Diels)

Natural Fibertastic 2022,

13 October 2022, Bergen-op-Zoom

The profitable way to bioaromatics



Biorizon




Biomass residues & recycle streams

Effective conversion to biobased aromatics

Highly functio
renewable bu

It all started from the Biorizon initiative

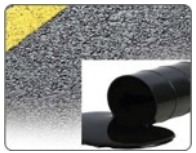
Bioaromatics are everywhere

Aromatics are **building blocks** for everyday materials, from plastics to textiles

40%

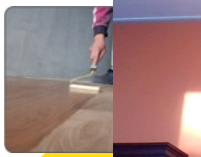
of all chemical building blocks are aromatics

Aromatics provide **functionality** like stiffness, scratch resistance, transparency, stability and other value-added properties

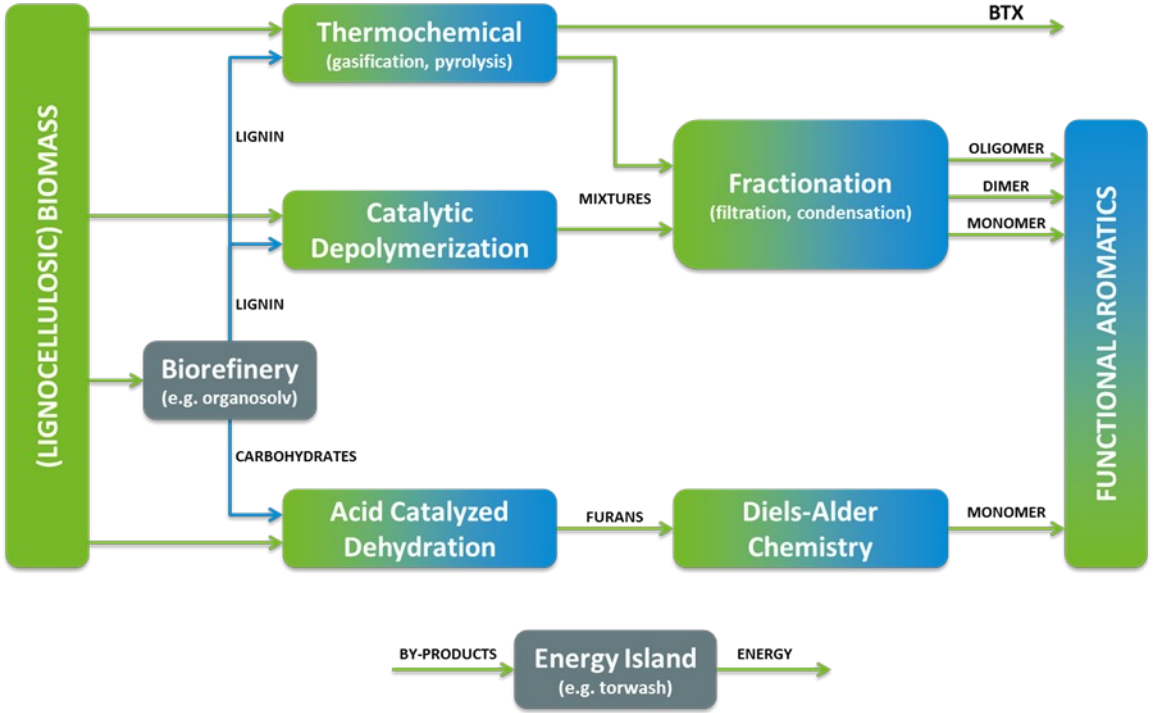









The lignocellulose Biorefinery



Development of the bioaromatics

Research & Development

PYRENA-PYPO Pilot

LignoValue Pilot

Pilot phase

Demonstration phase

Commercial production of bio-aromatics

Continuous DA skid

RELEMENT

Spin-off launched

2013 2015 2020 2025

Upscaling development

Pyrena-Pypo for thermochemical depolymerization of lignin and lignin-rich biomass

Pilots for development and production of furanics and bio-aromatics

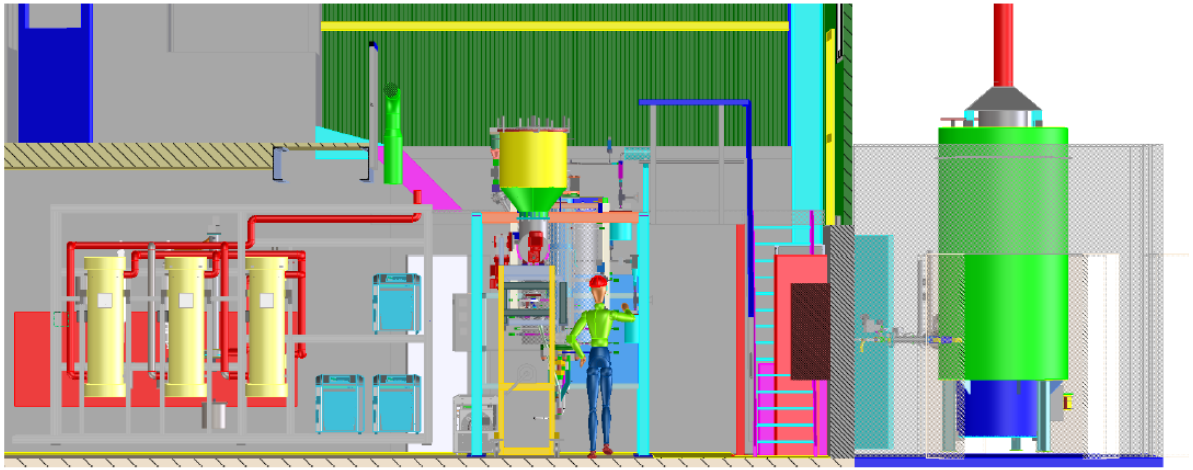
LignoValue Pilot Plant for depolymerization of lignin into bio-aromatic

New g

Business Model Development

- Primary business model is based on the Shared Research Center Biorizon
- From R&D to Pilot actions and Demo installed
- Several actions on pyrolysis
- Several actions on Sugar to aromatics (spin off Relement)
- Lignovalue Pilot plant operational January 2022,

Pyrolysis-based lignin valorization
Piloting at the Green Chemistry Campus BoZ

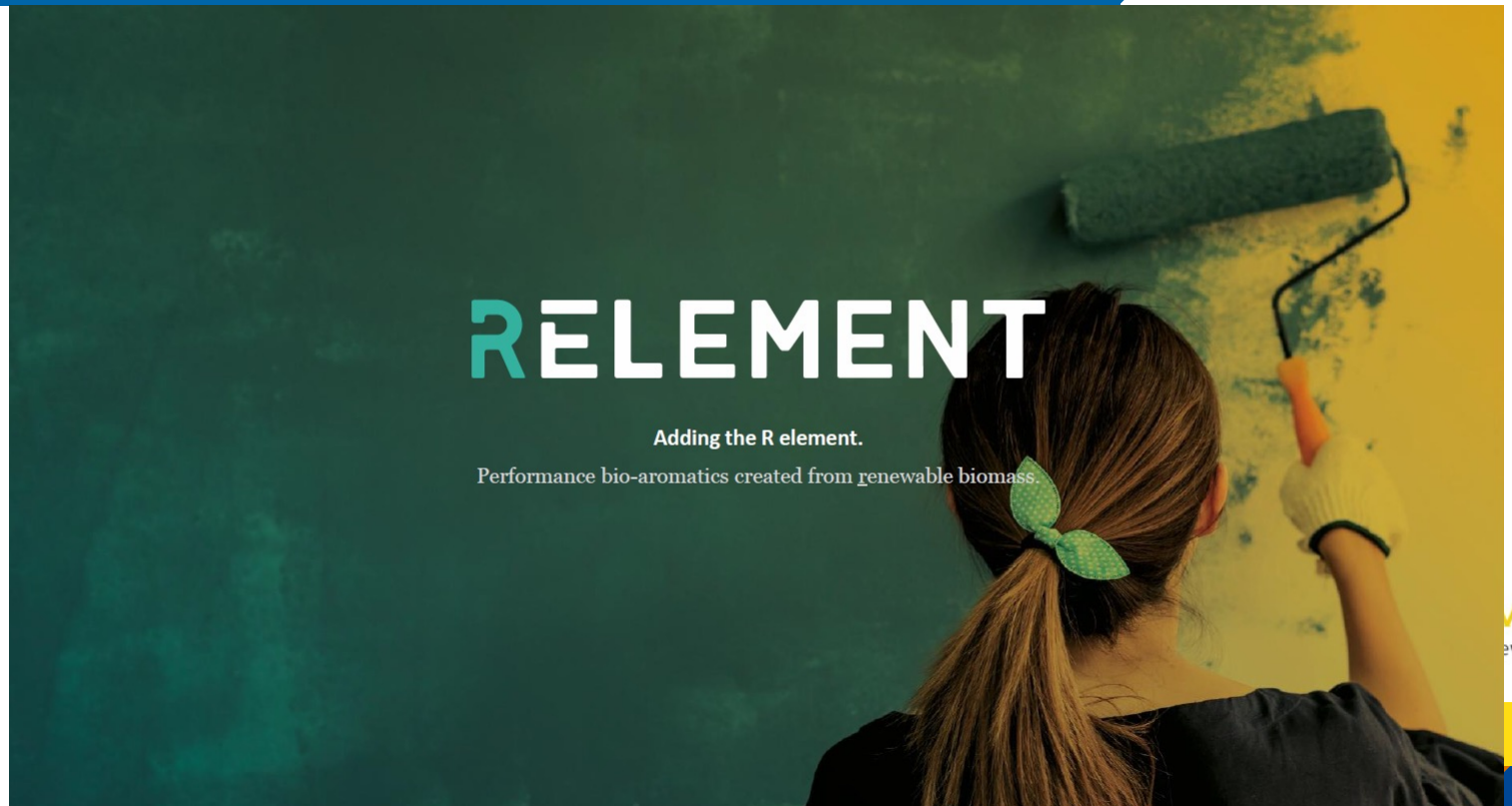


- 5 kg/h PYRENA/PYPO piloting facility: 5 kg/h PYRENA fast pyrolysis unit + directly coupled staged condensation unit (PYPO - Pyrolysis Product Obtention unit
- From Q3 2020, 4-5 day experimental campaigns, yielding typically 5-10 kg scale sample batches for application development
- Application development with a range of industry partners

Ability to offer a bioaromatics platform

	Hemimellitic Acid	Phthalic Anhydrides	Hexahydro Phthalic Anhydrides	Epoxy-Hexahydro Phthalic Anhydrides
Targeted Markets	Polyurethanes Specialty lubricants Plasticizers	UV resistant coatings Monomer	UV resistant coatings Plasticizers Epoxy Curing agent	Novel coatings Other innovative applications
Volume Possible	10's of kgs	10's of kgs	10's of kgs	10's of kgs
Performance	Dimensional stability High Temperature Stability	Higher UV resistance	Super UV resistance Electrical insulator	To be explored
Derivatives Available	1	2	3	3

Spin off for furans-based chemistry

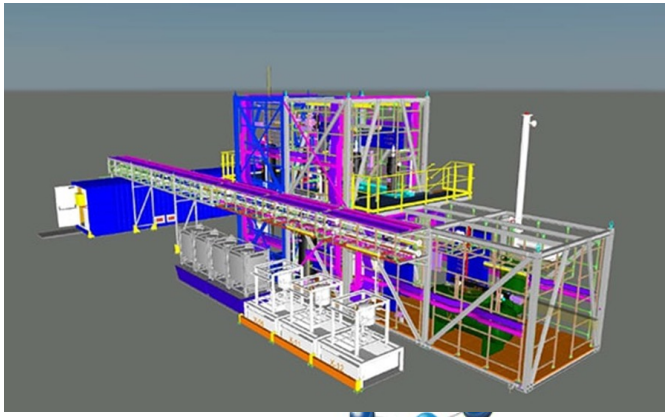


Lignovalue Pilot plant

€4.3 Mio budget

Design and construction of a pilot plant for the depolymerization of lignin/wood into innovative biobased aromatics

- ❑ Starting date: 30/05/2018
- ❑ Design of LignoValue Pilot plant
  - Continuous
  - Mobile
  - As flexible as possible
  - Treatment of lignin and wood
- ❑ Operational mid 2021



Technology choice

Metal-catalyzed conversion of lignin/wood in **solvent medium**

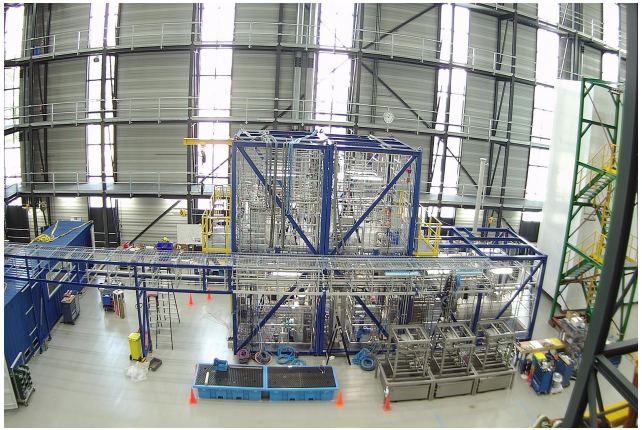
Feedstock

Solvents (Methanol, ethanol,...)

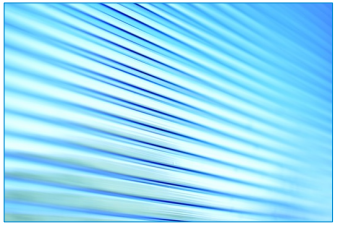
Inert atmosphere (N_2) or H_2

100 - ≥ 300 °C (medium to high)

Lignovalue Pilot plant opening

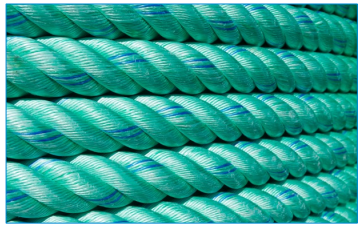


Application development with the industry

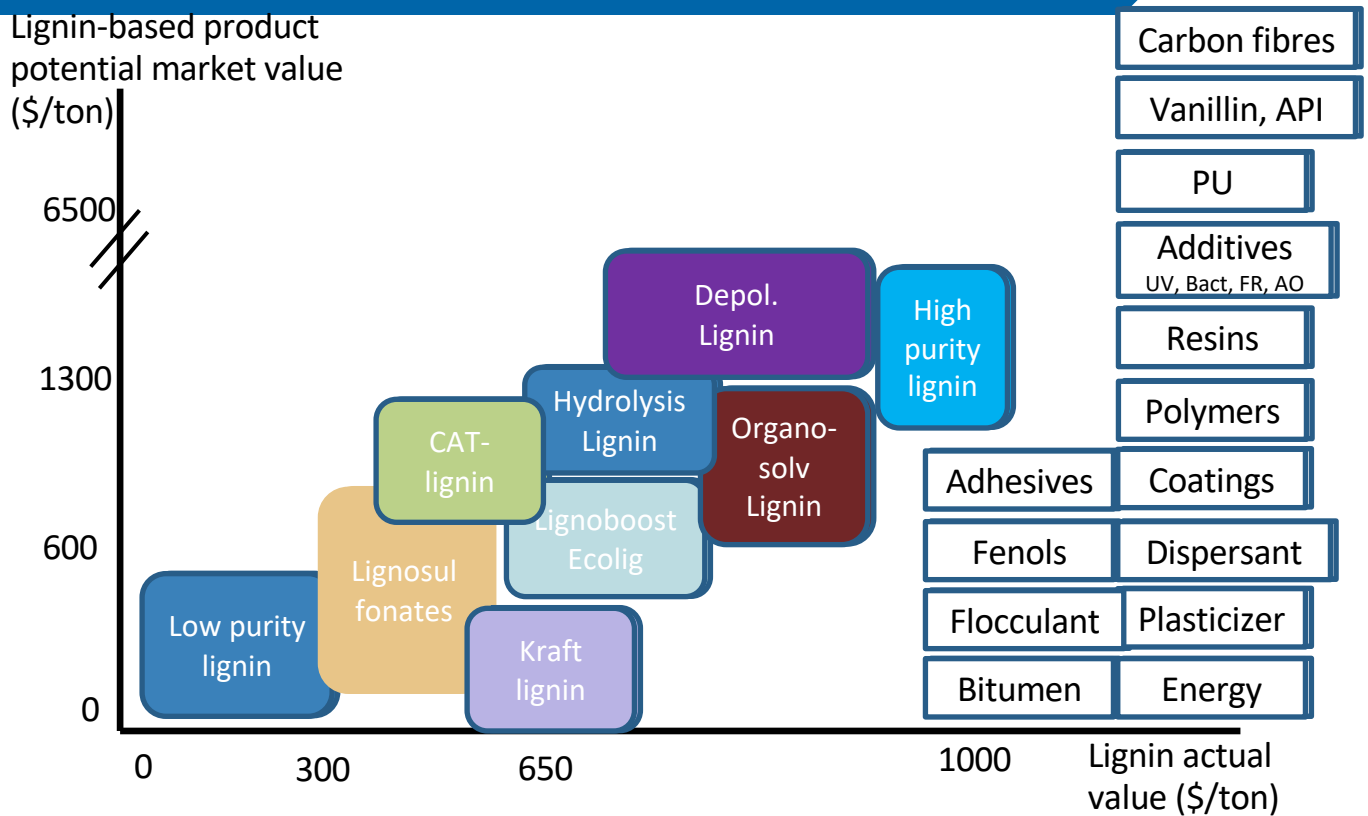




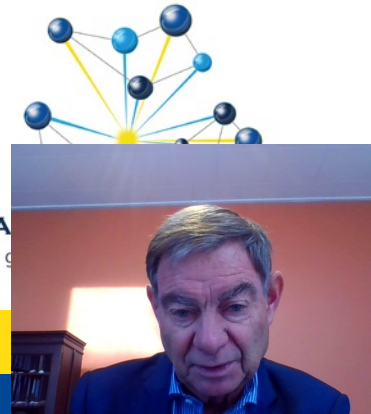





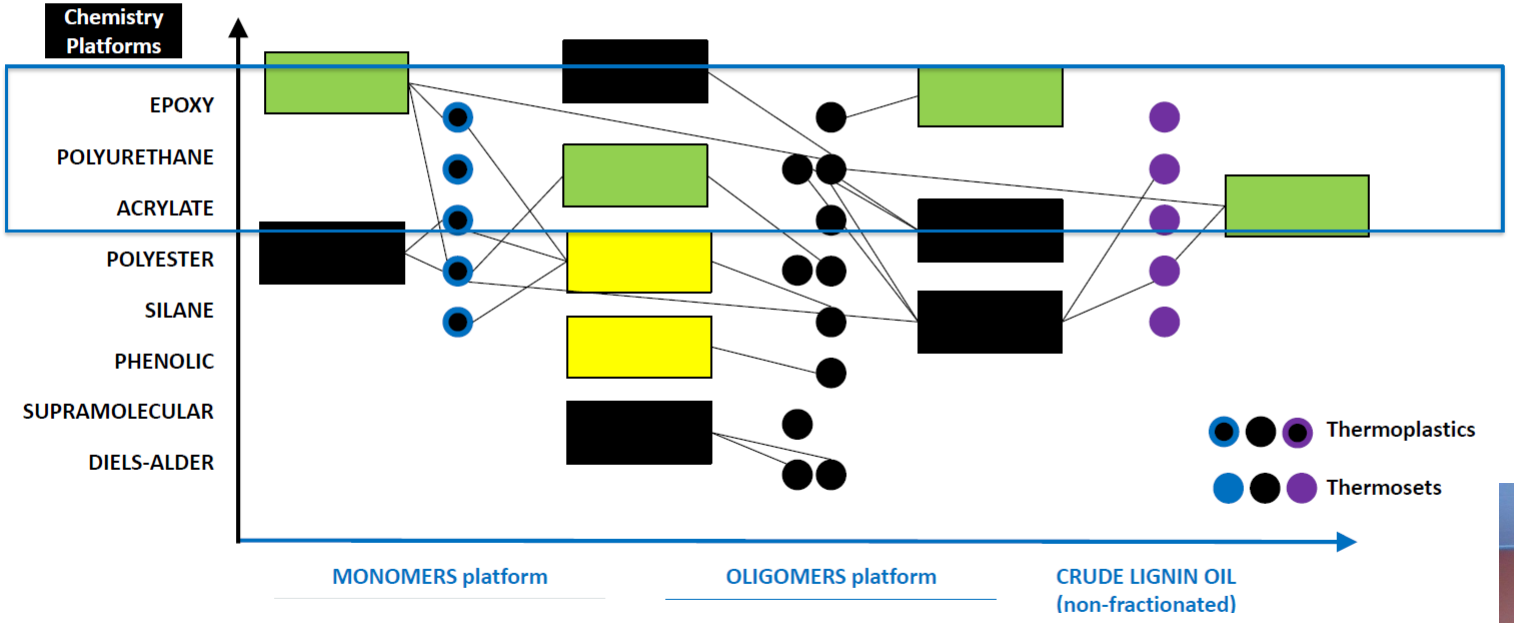
Lignin value vs lignin-based product value



- Polyurethanes
- Polyacrylamides



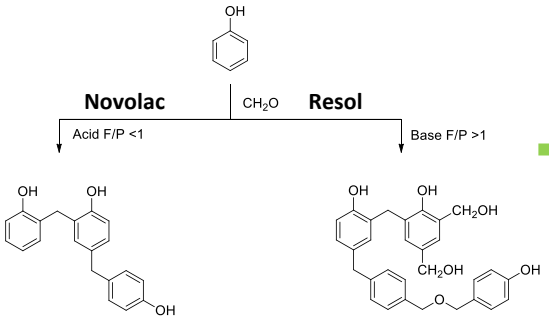
Linking the lignin fractions with chemistry



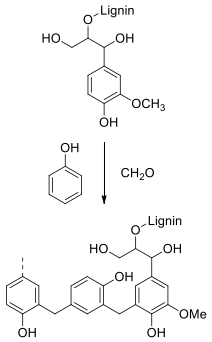
project

BIORESAL (BIObased RESins from Aldehydes and Lignin) Project aims to valorize technical lignins and depolymerized lignins to produce Lignin based phenolic resins for foam and molding applications→ **Replacement of phenol by lignin.**

PF resins



(L)PF resins



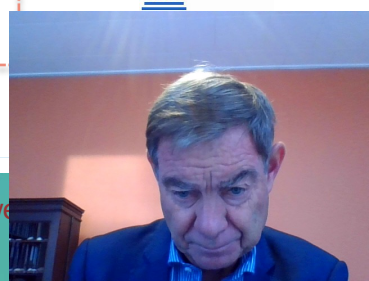
Chem. Modification
Tailoring lignin fractions

vito

TEA
Process design

INEOS
THE WORD FOR CHEMICALS

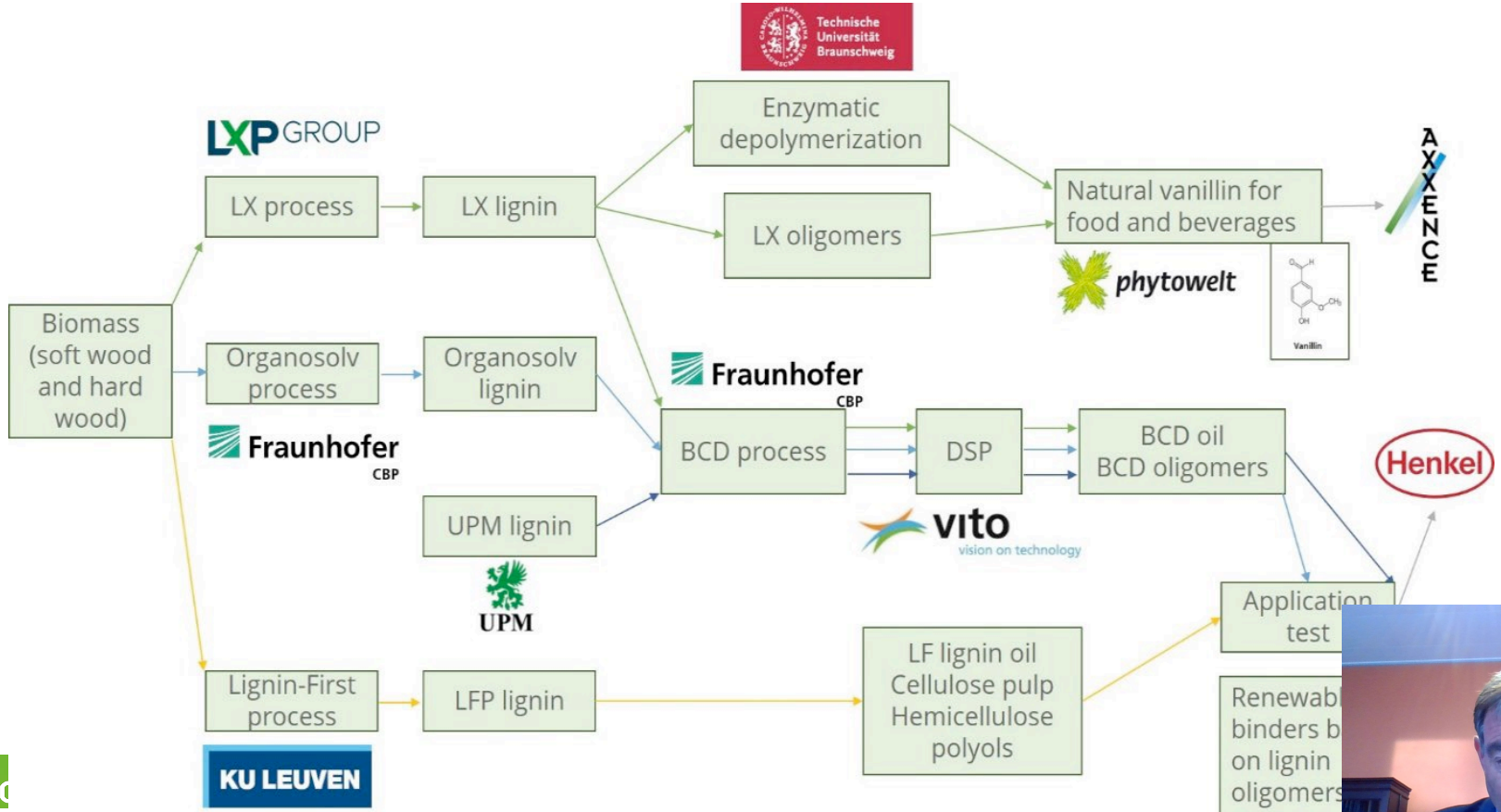
Chem. Modification
HCOH replacement

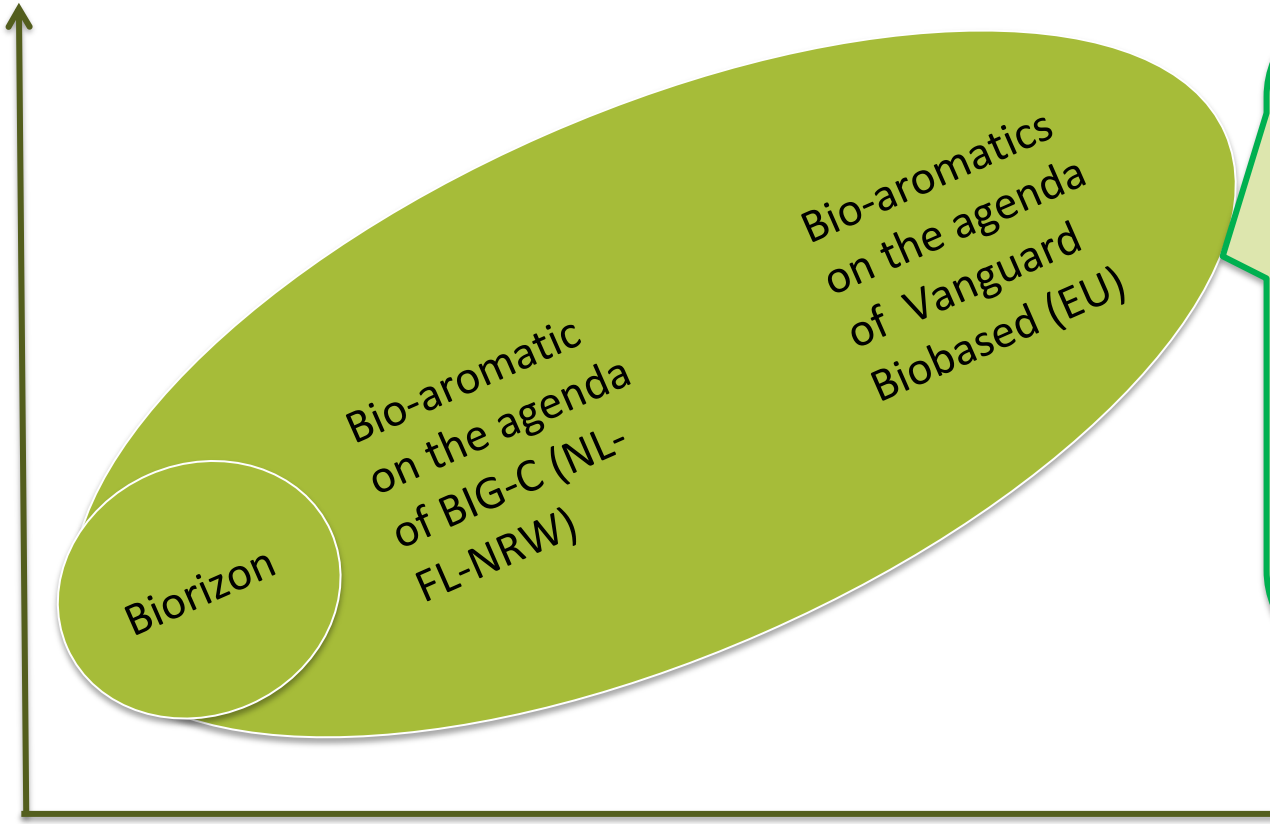


Biorizon
The way to aromatics

Powe

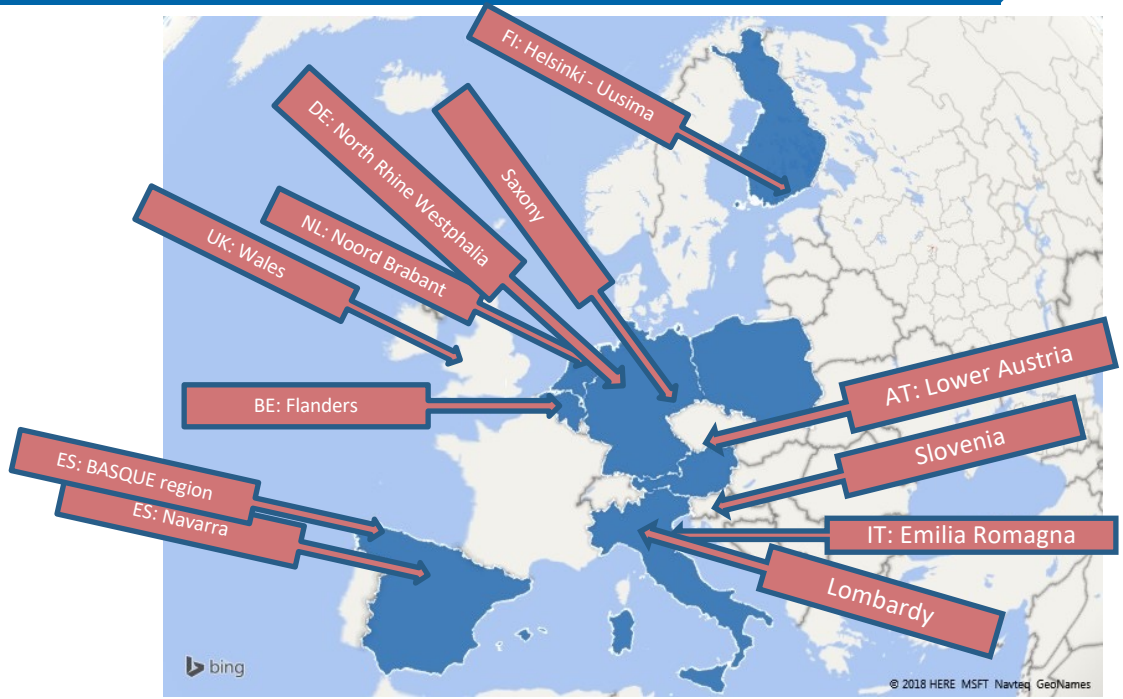
ALIGN, BMBF project in collaboration with Flanders





Thanks to Triple Helix bio-aromatics is nog very well on the regional, but also international agenda.
It starts from the strong chemical region Antwerp-Amsterdam-Rhein-ruhr Region
Ideal starting point

Partnerships that are still moving: collaboration over the value chain



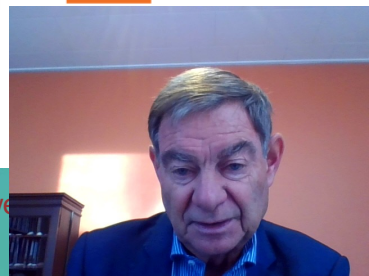
Projects on early stage→ Coming successful stories?

Sustainable COATings based on LIGNIn resins and bio-additives with improved fire, corrosion and biological resistance

LIGNICOAT project proposes the development of eco-innovative materials from lignocellulosic biomass in order to obtain bio-based sustainable coatings considering the availability and carbon footprint of resources.
The LIGNICOAT project aims to increase the bio-based content of the coatings while ensuring performance and providing anti-corrosive, fireproof, and antimicrobial features. The ambitious goal of the project is to assist in the transition of the Paints and Coatings industry from fossil-based to bio-based products.

Project Partners

tecnalia
AEP polymers
ARDITEC
AXIA INNOVATION
Barpimo
ecoat
FORESA TECNOLOGIES
HEXION
iris COATINGS
Junta de Castilla y León
NORCE
VencoreX
vito
VTT

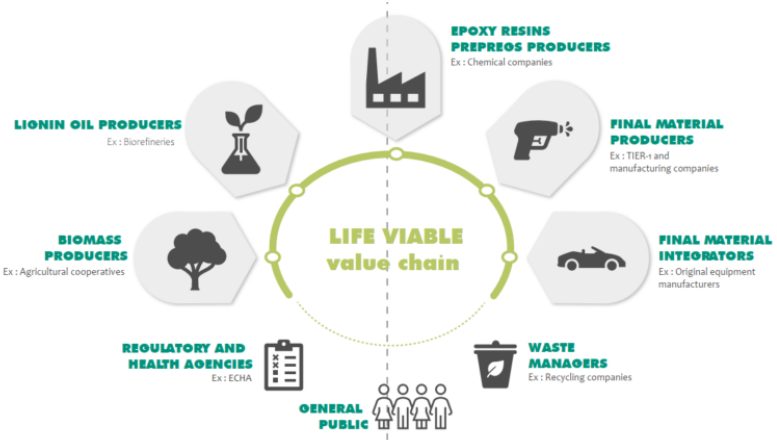


Biorizon
The way to aromatics

Powe

Projects on early stage→ Coming successful stories?

VIABLE



Valorization of lignin biomass into competitive components grAdually replacing BPA in the formuLation of Epoxy resins

CONTEXT OF THE PROJECT

BPA Bisphenol A (BPA) is a commodity chemical produced world-wide in a large volume every year. It is used in the production of epoxy resins and polycarbonates. However, its endocrine disrupting properties and its fossil-based composition raise concerns about its environmental impact and health toxicity as well as its sustainability.

The VIABLE project therefore aims to improve the sustainability and the environmental impact of epoxy resins manufacture by lowering the BPA content in the formulation of epoxy resins by 20 to 50%.

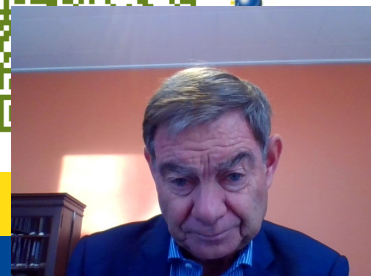
This project has received f
under grant agreement No

Biorizon
The way to aromatics

Are you serious about the transition?

- Are you serious about the transition to circular and biobased products?
- Do you have a need for feedstock or products that are based on aromatics?
- In applications such as coatings, resins, plastics, sealants, adhesives or elastomers?

- Challenge us to find the best possible solution
- Contact us & join the transition



Biorizon

The way to aromatics

ligno value

AGENTSCHAP INNOVEREN & ONDERNEMEN

EFRO EUROPEES FONDS VOOR REGIONALE ONTWIKKELING

Europese Unie

1 December 2022 14:30 - 17:15

- 9th Biorizon Annual Event on Bio-Aromatics
- Keynote by Decathlon
- Opportunities for participation
- Virtual Matchmaking
- Online

Registration

THANKS!

Any questions?

You can find me at

Ludo.diels@vito.be