MACRO CASCADE BIOREFINERY OVERVIEW

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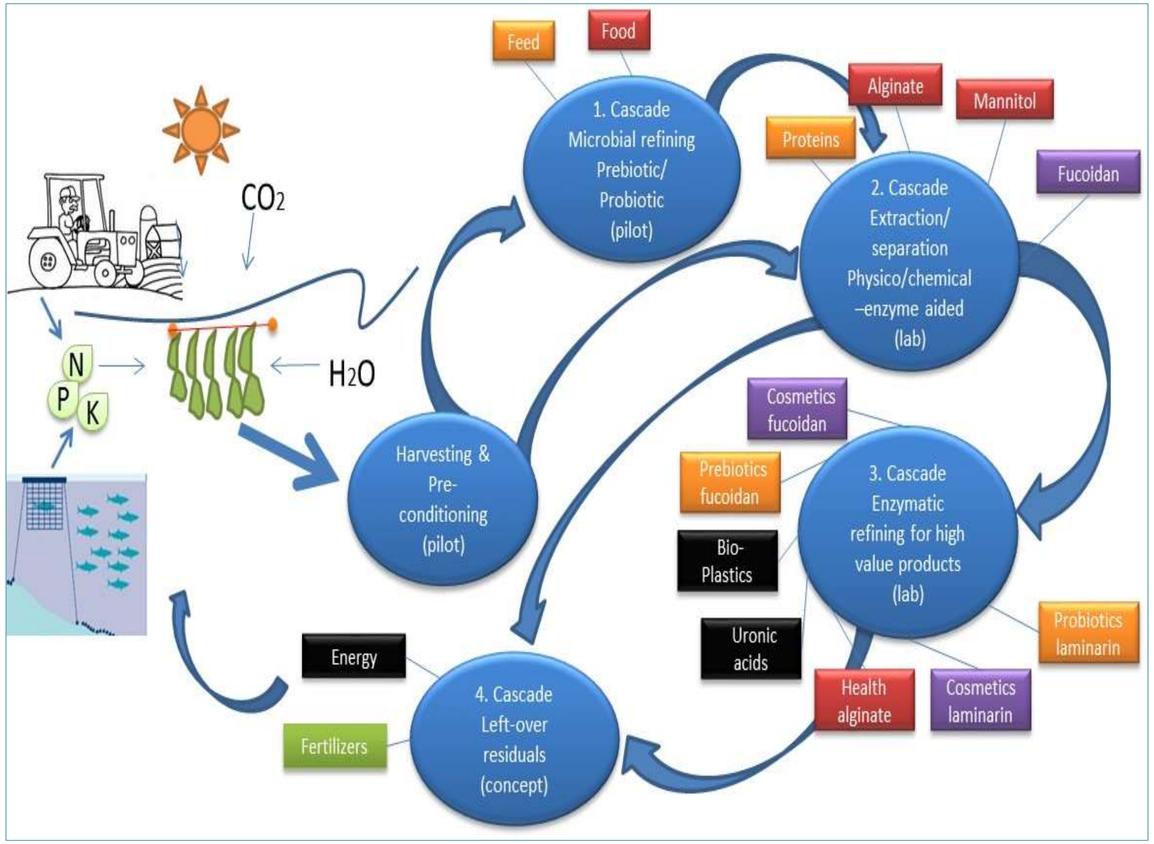
Cultivation and four macro-algae cascading technologies

OUTLINE



Cultivation and breeding trials (ORF, HortiMare)

The first real attempt in Europe to do breeding and cultivating of macroalgae for targeted high value-added biomolecules according to the (food and feed) industrial requirements

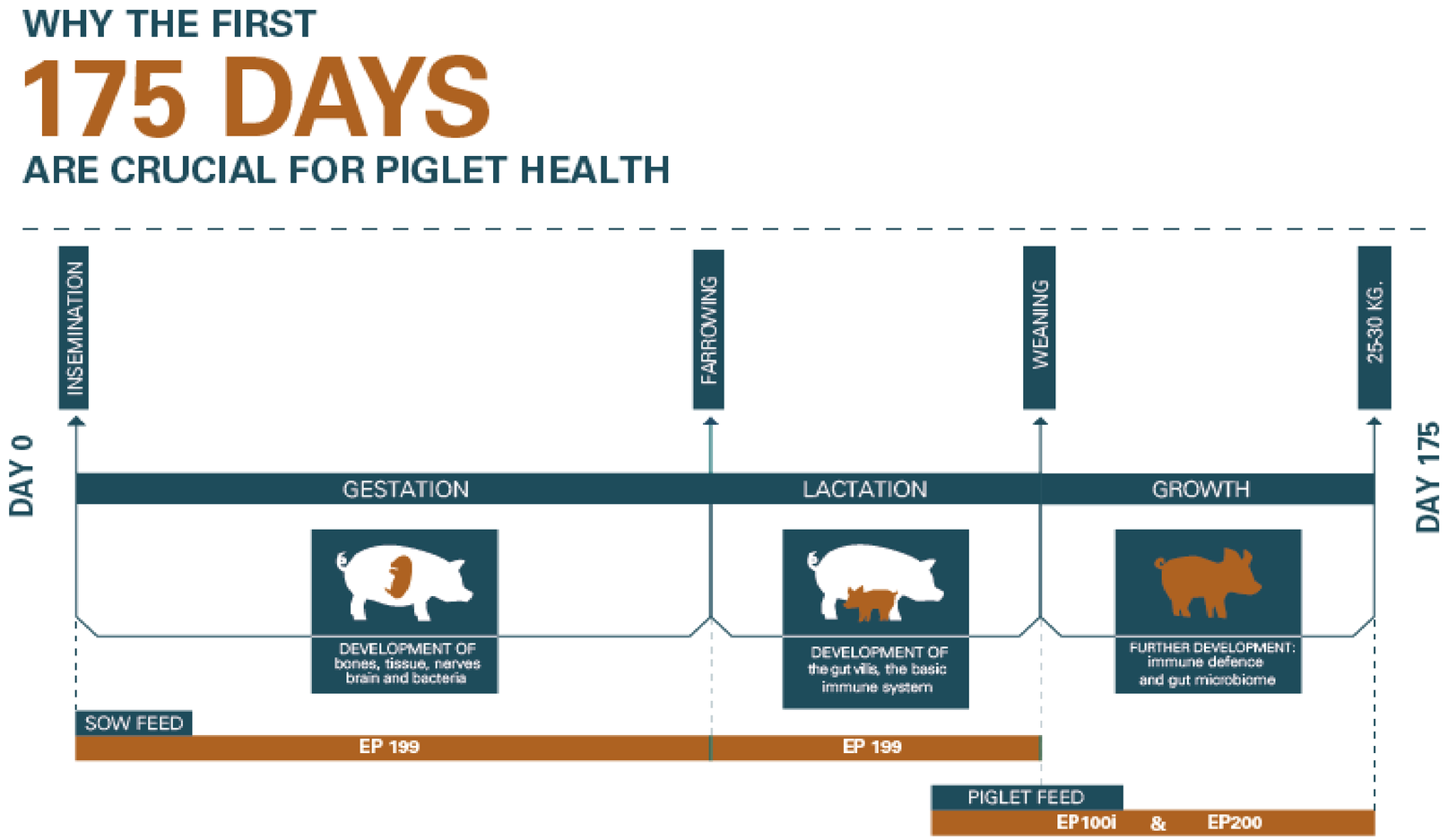
1. cascading: Fermentation process using seaweed and canola to feed additives (FermentationExpert)

Value chain 1: From seaweed to novel feed ingredients i.e. fermented canola and seaweed for pigs (and poultry)

Prebiotics
Probiotics
Bioactives

Validation: best results when the sow was fed for minimum 4 weeks before farrowing and during lactation

FERMENTATIONEXPERTS
Tomorrow's solutions... today



Strong evidence that piglets inherit the mother sows gut flora!

New and ground-breaking understanding of gut flora, not only for pigs but expectedly for all animals!

Clinical Trial involving patients with chronic inflammation. SILKEBORG Hospital

A food supplement with documented effect on the immune system developed (at TRL 3-4) and the effects are validated by clinical trials (at TRL 5-6)

Fermented canola-seaweed product produced at food approved facility

-Similar composition as feed additive

Tested as adjuvent treatment on 49 patients at Silkeborg Hospital with

-inflammatory diseases in intestines

- 50% of included patients also have arthritis (gaut)

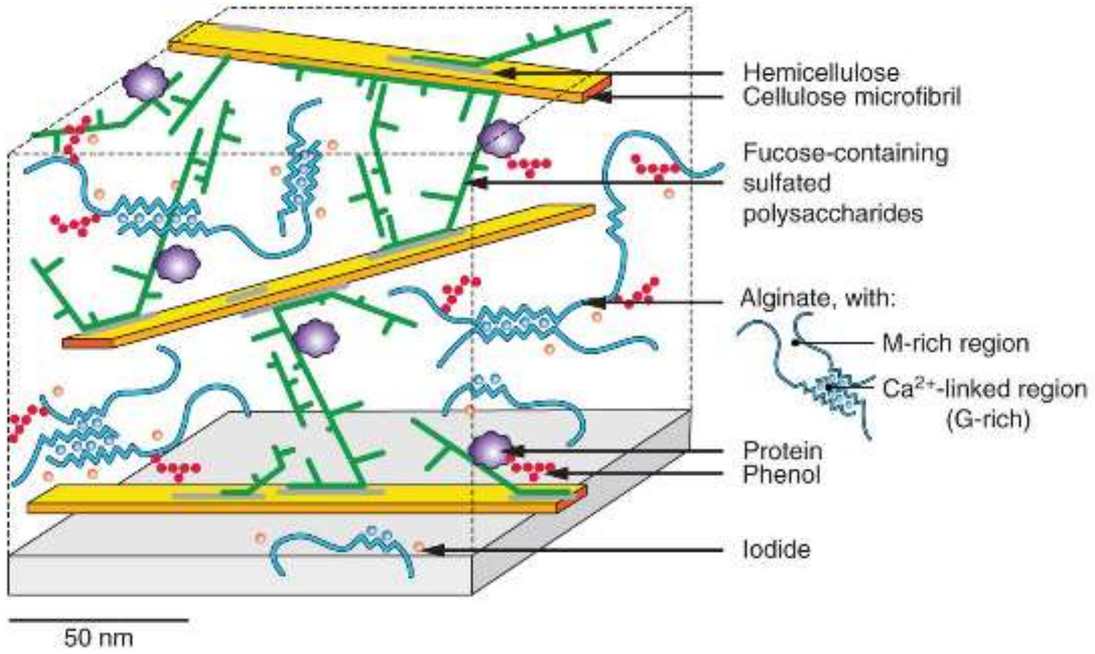
Status:

Preliminary results of clinical trials: 33% of the included patients demonstrate subjective and biochemical anti-inflamatory effect compared to placebo

Analysis of the microbiome change is ongoing

2nd Cascading – extraction of food ingredients

Extraction of Saccharina Latissima and Laminaria digitata to a port-folio of products by industrially relevant processes



Cell-wall model for brown algae (Deniaud-Bouet et al 2014)

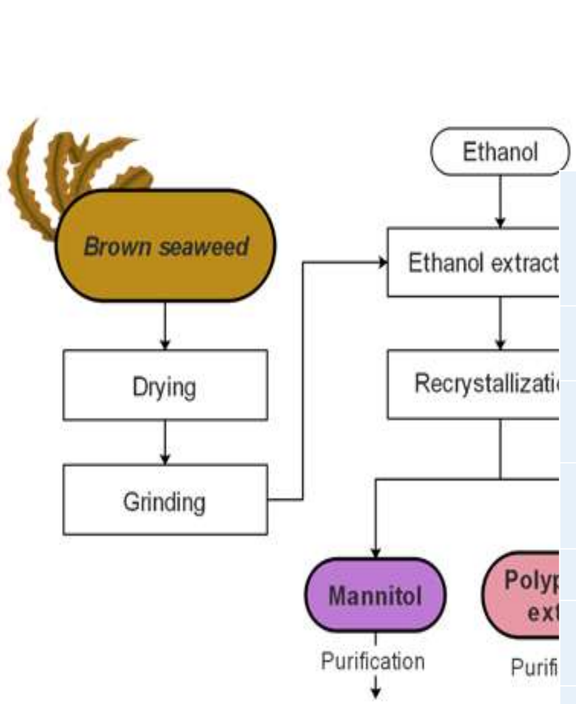
Target products

- *Cell wall*
  - Alginate
  - Fucoidan
  - Phenols
  - Protein
- *Storage components*
  - Mannitol
  - Laminarin

2nd cascading processing

Value chain 3: food ingredients – demonstrated at TRL 5-6 (at DTI)

DANISH TECHNOLOGICAL INSTITUTE



Product category	Global market in Million €	Global market in tonnes DW	Average price kg/DW in €
Alginate	500	50,000	10
Mannitol	1000	142,857	7
Fucoidan	3	15	200
Laminarin	300	100,000	3
Plant Nutrition	500	52,632	9.5
Sea vegetables	100	6,667	15
Total	2,403	352,170	

**Bior

Conclusion

Six value chains have been identified:

i. ***Value chain: From brown seaweed to novel feed ingredients i.e. fermented canola and seaweed for pigs (and poultry) with health promoting effects***

ii. ***Value chain: From brown seaweed to novel food supplement i.e. fermented canola and seaweed with health promoting effects***

iii. ***Value chain: From brown seaweed to novel food ingredients i.e. laminarin, fucoidan, protein, mannitol, and minerals***

iv. ***Value chain: From alginate (coming from brown seaweed species) to chemical building blocks to e.g. bioplastics***

v. ***Value chain: From brown seaweed to high-value-added products i.e. health-benefiting food additive i.e. oligo-betaglucans from laminarins.***

vi. ***Value chain: From brown seaweed minerals to biofertilizer***

Final Macro Cascade Conference

- March 24th, 2021, 10-15 CET
- Free
- Programme:
- https://www.macrocascade.eu/about/
- You can register here:
- https://www.dti.dk/specialists/final-macro-cascade-conference/k90922

Acknowledgement

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https://www.macrocascade.eu/

Jaap van Hal TNO
11.03.2021

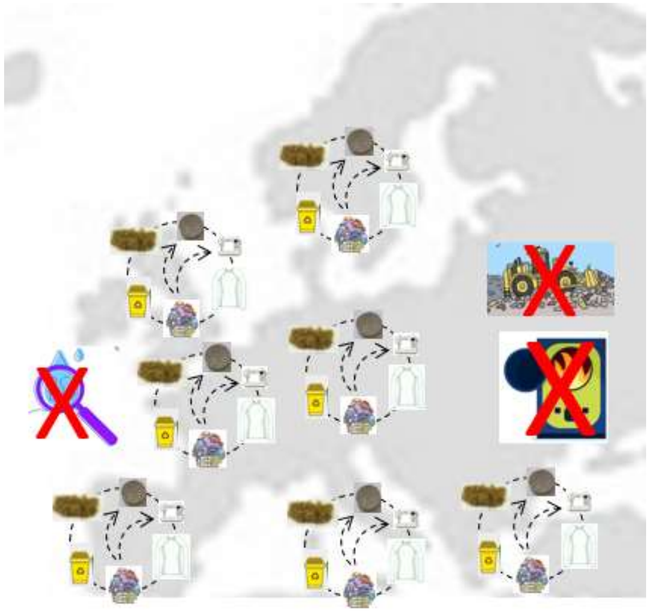
HEREWEAR

ENABLING LOCAL, CIRCULAR & BIO-BASED TEXTILES

HEREWEAR GOAL

Lichtkogel
Jaap van Hal, TNO
11-03-2021

HEREWEAR garments
Fast fashion (current)
Garment assembly
Cotton growth
Oil winning
Micro plastics
Incineration
Landfilling
Textile waste
Bio-based waste
Bio-based raw materials



Lichtkogel
Jaap van Hal, TNO
11-03-2021

HEREWEAR GOAL

Design and manufacture clothing that is **truly sustainable** via:

- Textiles made from locally-sourced **bio-based** materials/waste
- Local small-scale automated production and **networked manufacturing**
- Minimizing **microfibre** release

KEY OBJECTIVES

Lichtkogel
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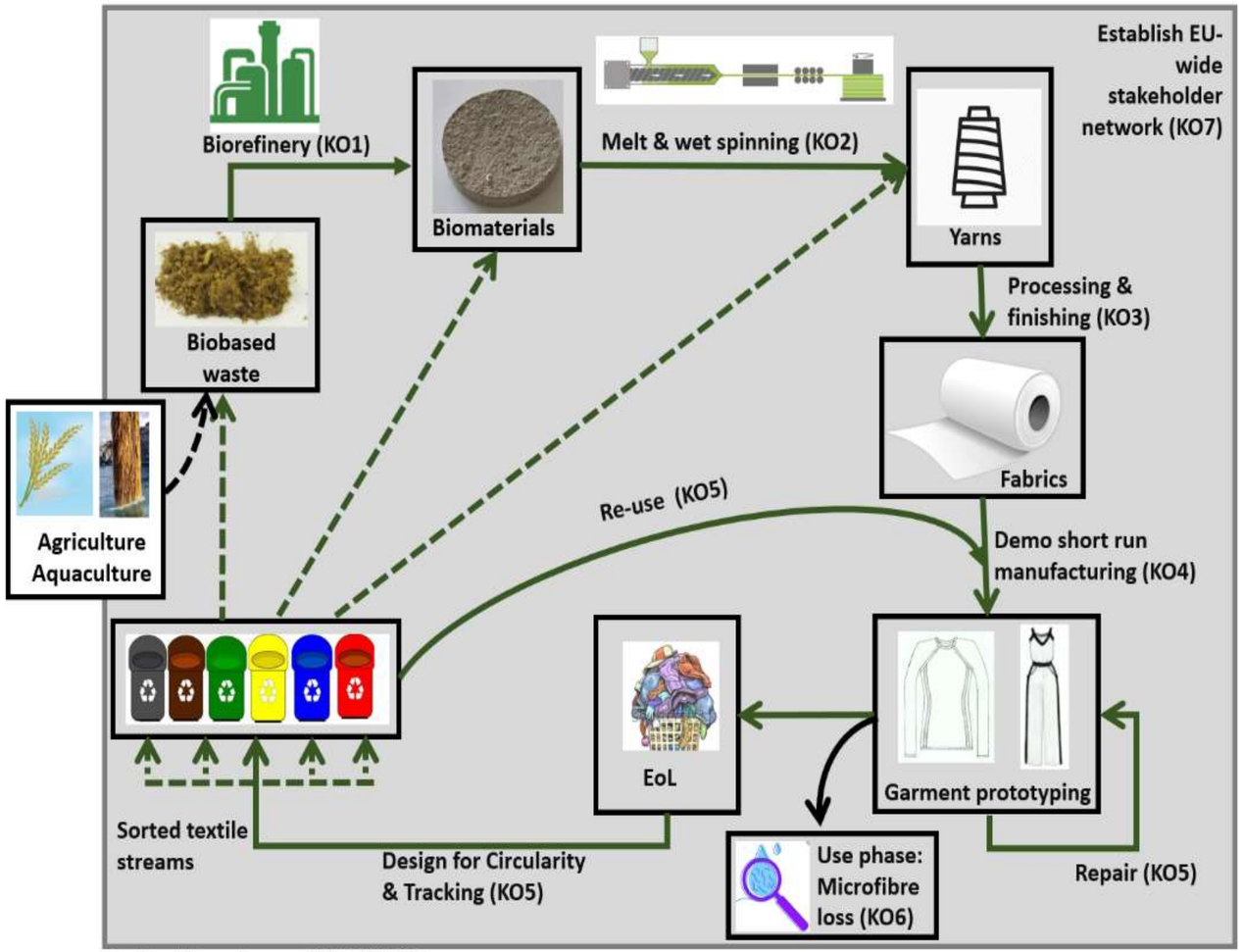

Presentation Title
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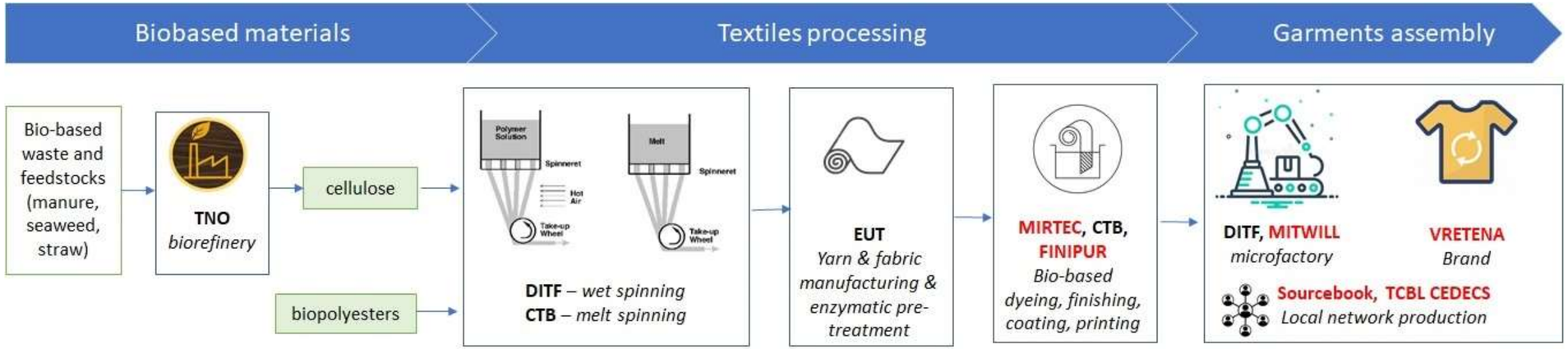
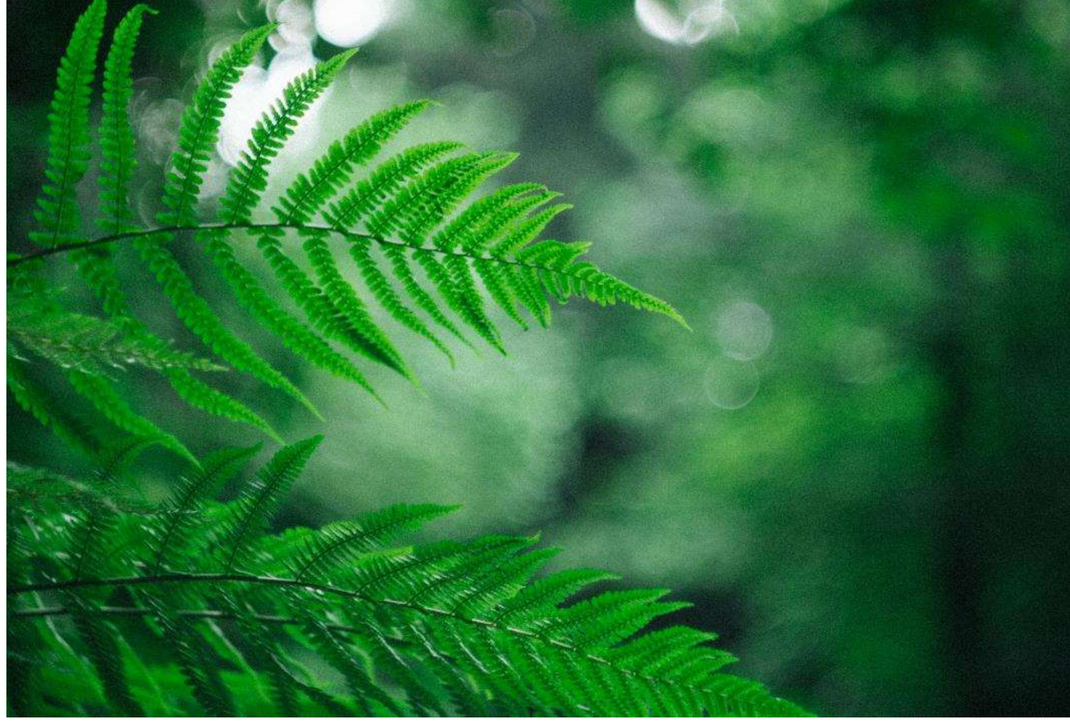
CONSORTIUM:



Lichtkogel
Jaap van Hal, TNO
11-03-2021

PROJECT DATA & ACKNOWLEDGEMENT

- Call: FNR-14-2020
- Type of action: IA - Innovation action
- Grant Agreement: 101000632
- Total budget: € 6.96 mio
- EC funding: € 6.16 mio
- Starting date: October 1 2020
- Duration: 48 months
- Coordinator: Centexbel
- Website https://herewear.eu/



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000632.

Zcore:
Seaweed Residues for Superior Bio-Coatings

Jaap W. van Hal, Ph.D.
TNO Energy Transition
Lichtkogel Experience
2021-03-11

The ZCORE project is made possible by the European Regional Development Fund and the provinces of Noord-Brabant, Zeeland, and Limburg in the context of OPZuid.

European Union
European Regional Development Fund

OPZuid
European Innovation Programme South Netherlands

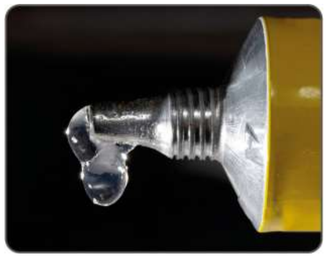
Provincie Zeeland

Provincie Noord-Brabant

provincie limburg

The profitable way to bio-aromatics

Biorizon



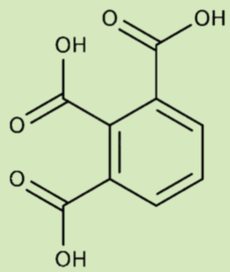
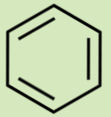
Biomass residues & recycle streams

Effective conversion to biobased aromatics

Highly functional, renewable building blocks


FEEDSTOCK PROVIDERS
TECHNOLOGY PROVIDERS
Biorizon
The way to aromatics
CHEMICAL INDUSTRY
BRAND OWNERS
PROCESS OPERATORS
Biorizon
The way to aromatics

How we make bio-aromatics

Horizons	Feedstock	Conversion Technology	Bio-Aromatics	Applications
Sugar to Bio-Aromatics	 C5 Sugars/ Furfural	Diels-Alder	 Specialty €€€	       
Lignin to Bio-Aromatics	 Lignin	Catalytic Depolymerization		
Thermochemical Conversion of Biomass to Bio-Aromatics	  Biomass residues & Recycle streams	Pyrolysis Gasification	 Bulk €	


Biorizon
3-Methyl
Phthalic
Anhydride
Biorizon
Hemimellitic
Acid
Biorizon
3,6-Dimethyl
Phthalic
Anhydride
Biorizon
Oxa-Hexahydro-
Phthalic
Anhydride
Biorizon
Oxa-3-
Methylhexa-
Hydro Phthalic
Anhydride
Biorizon
Oxa-3,6-
Dimethylhexa-
Hydro Phthalic
Anhydride

Zcore video:

https://youtu.be/C-NDuMMAVqM

Thank for your attention!

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