

# HO GENT

Faculty of Science and Technology

Dept. Fashion, Textile and Wood Technology

Buchtenstraat 11, 9051 Gent (Belgium)

Dries Vansteenkiste



## UNIVERSITY COLLEGE GHENT

3 FACULTIES | 1 SCHOOL OF ARTS | 24 DEPARTMENTS



**14,000**  
STUDENTS

**1800**  
STAFF MEMBERS



**1200**  
teaching

**€ 100 MILLION**  
BUDGET

**€ 7.5 million**  
research budget

€ 4.7 million applied research  
€ 2.8 million research in the arts



- ✓ Practice-oriented education (Bachelor)
- ✓ Applied research (national, regional, EU)
- ✓ Interaction with industry
- ✓ Strengthening of nexus Education / Research



# HO GENT

## 2014-now: Researcher / Lecturer

- Lecturer Professional Bachelor in Wood Technology
- Wood & Textile research
- Internationalization



## UGent WOODLAB

## 1994-1998 / 2003-2011: Project Researcher / Postdoc

- Wood quality
- Quantitative wood anatomy
- Image analysis



## GHENT UNIVERSITY

## 1988-1993: BSc and MSc Biosciences Engineering

Major in Forestry and Wood Sciences

MSc thesis at Woodlab on High-temperature drying of Poplar wood



## 1998-2002 PhD Forestry and Wood Sciences

ENGREF-INRA (LERFoB), Nancy, France



INNVENTIA STFI-PACKFORSK



## 1993-1994 STFI Stockholm, Sweden

EU COMETT traineeship



# HOGENT Professional Bachelor in Wood Technology: 3 year programme



*applied knowledge*

*industry-oriented*

**10 wood technology lecturers**

**330 students**

wood properties

finishing

quality

construction

automation

CAD

management



[Reinhilde.Vanlishout@hogent.be](mailto:Reinhilde.Vanlishout@hogent.be)

**bachelor programme co-ordinator**

**chairperson FSC Belgium**

# HOGENT Professional Bachelor in Wood Technology: 3 year programme

## Semester 1 : Product development & design

Furniture technology, CAD

## Semester 2 : Process & production engineering

Outdoor carpentry, finishing technology

## Semester 3 : Production management

Staircases, automation (CNC), Lean

## Semester 4 : Logistic management

Timber construction technology

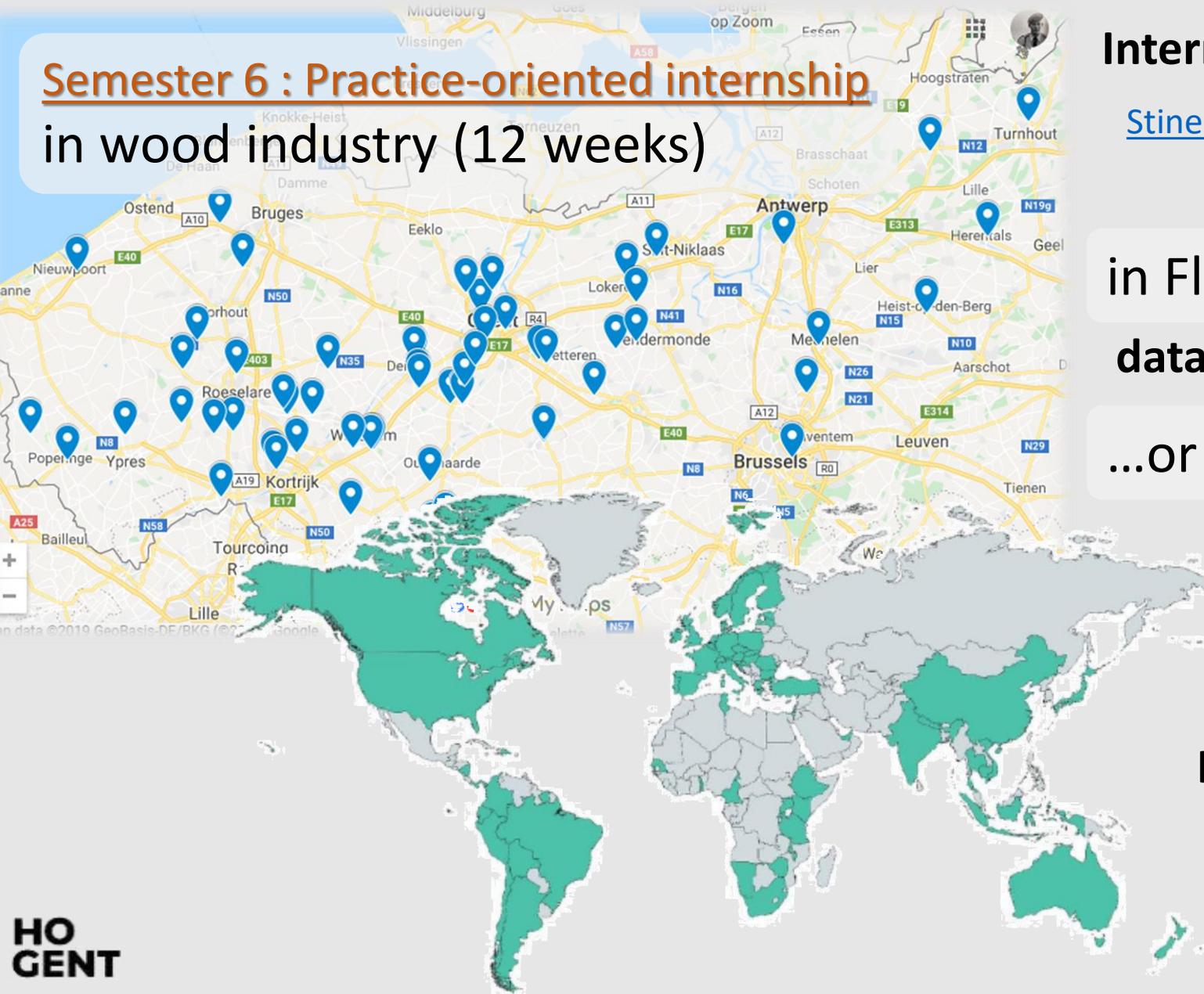
## Semester 5 : Quality management

Quality, Safety & Environment (testing)

| SEMESTER   | PROJECT                                      | VAKSPECIEK                                                                                                                                                                                       | BEDRIJF                                                                                        | ONDERSTEUNEND                                                                                       |
|------------|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| SEMESTER 1 | Product-ontwikkeling en design               | Meubeltechnologie<br>Verspaningstechnologie                                                                                                                                                      | Bedrijfs-organisatie                                                                           | Ondersteunend onderdeel 1<br>- Burotica<br>- CAD<br>Communicatievaardigheden<br>Toegepaste wiskunde |
| SEMESTER 2 | Proces-ontwikkeling en productie-engineering | Buitenschrijnwerk<br>Houttechnologie<br>- Chemie<br>- Houtleer<br>CNC                                                                                                                            | Arbeidsstudie                                                                                  | Ondersteunend onderdeel 2<br>- Toeg. statistiek<br>- Uitbr. buretica<br>- Uitbr. CAD                |
| SEMESTER 3 | Productiebeheer                              | Binnenschrijnwerk<br>Afwerkingstechnologie<br>- Toegepaste chemie<br>- Afwerkingsleer<br>- Afwerkingstechnieken<br>CAM<br>- CAM<br>- Optimaliseringssoftware                                     | Productie-planning                                                                             | Frans                                                                                               |
| SEMESTER 4 | Logistiek beheer                             | Materiaaltechnologie<br>Procesautomatisering<br>- Procestehnleken<br>- Procesinformatsering<br>- Basisautomatisering<br>Houtbouwtechnologie<br>- Stabiliteit en bouwphysica<br>- Bouwtechnologie | Voorraad-beheer                                                                                | Keuze                                                                                               |
| SEMESTER 5 | Kwaliteitsbeheer                             | Bedrijfsauto-matisering<br>- Bedrijfsinformatsering<br>- Uitbr. CNC & CAM<br>- Automatisering                                                                                                    | Bedrijfsbeheer<br>- Financieel beheer<br>- Juridisch beheer<br>Veiligheid, kwaliteit en milieu | Duits                                                                                               |

# HOGENT Professional Bachelor in Wood Technology: 3 year programme

**Semester 6 : Practice-oriented internship**  
**in wood industry (12 weeks)**



**Internship co-ordinator**

[Stine.VanEnde@hogent.be](mailto:Stine.VanEnde@hogent.be)



**in Flanders**

**database > 300 (Flemish) companies**

**...or abroad**

HOGENT 2017-2018

nearly 500 students in 75 countries

**International Office**

[incoming@hogent.be](mailto:incoming@hogent.be)

[outgoing@hogent.be](mailto:outgoing@hogent.be)



# Department of Fashion, Textile and Wood Technology



**WOOD**

**material/product**

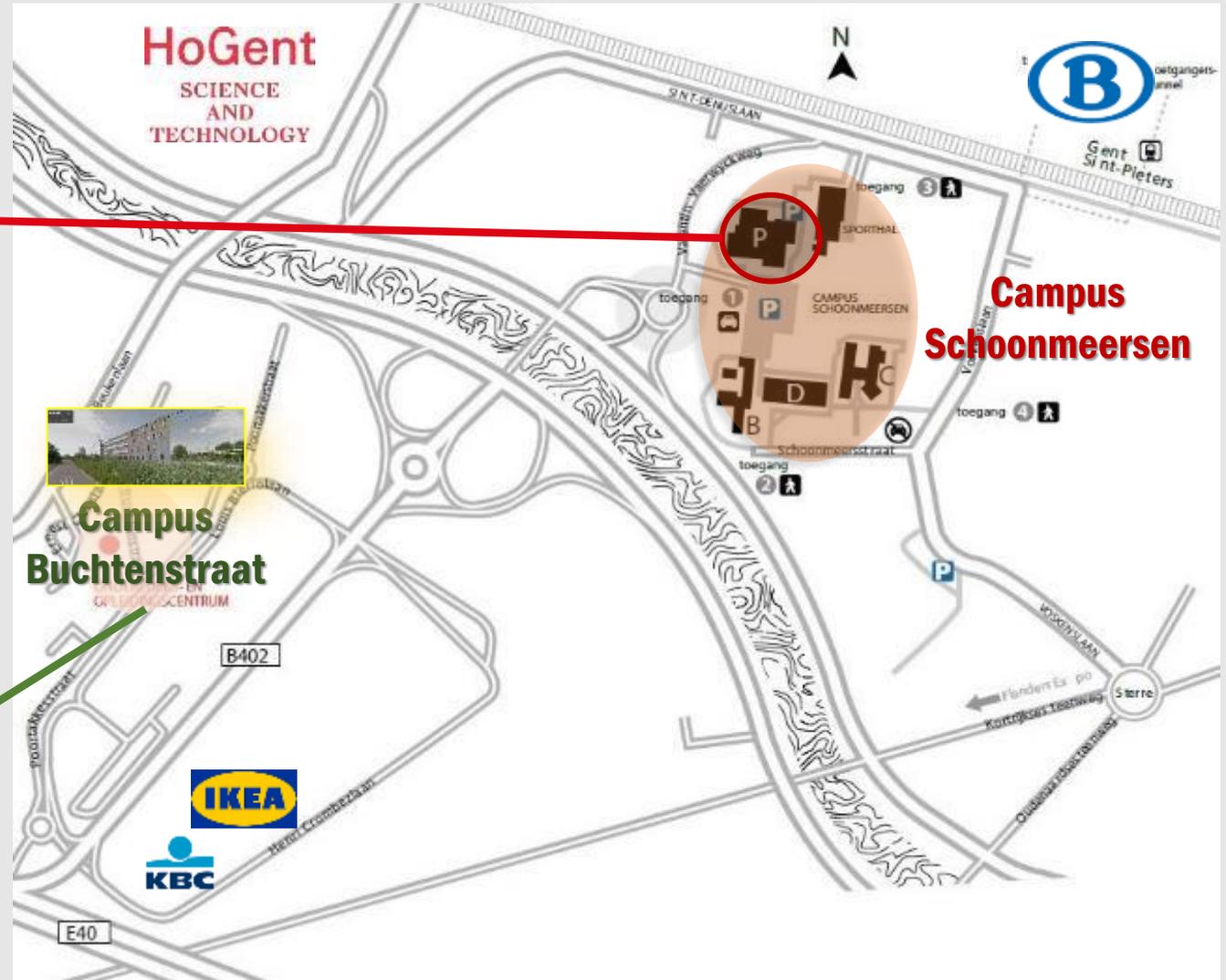
**design**

**processing**

**finishing**

**testing**

**TEXTILE**



FTI-lab recognized *Key Enabling Technology Centre* by European Commission



PWO-focusproject  
**FINPLASMA**

**PROMOTION OF WOOD VENEER APPLICATIONS  
VIA ATMOSPHERIC PLASMA TREATMENTS**

2015-2017  
HOGENT Research Fund

Tom Van Hove | Dries Vansteenkiste  
Alexandra De Raeve

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# atmospheric plasma platform

*activation  
deposition*



**AS Coating Star**



**GRINP unit**



**plasmatorch**



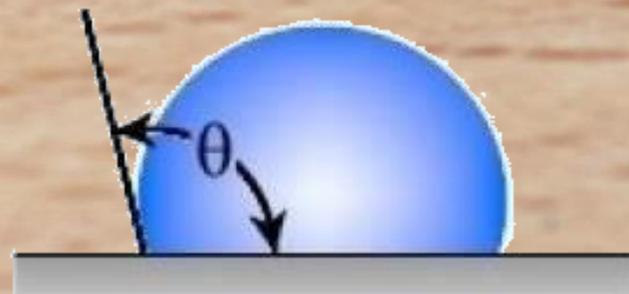
**wettable**  
**(hydrophile)**



$$\theta < 90^\circ$$

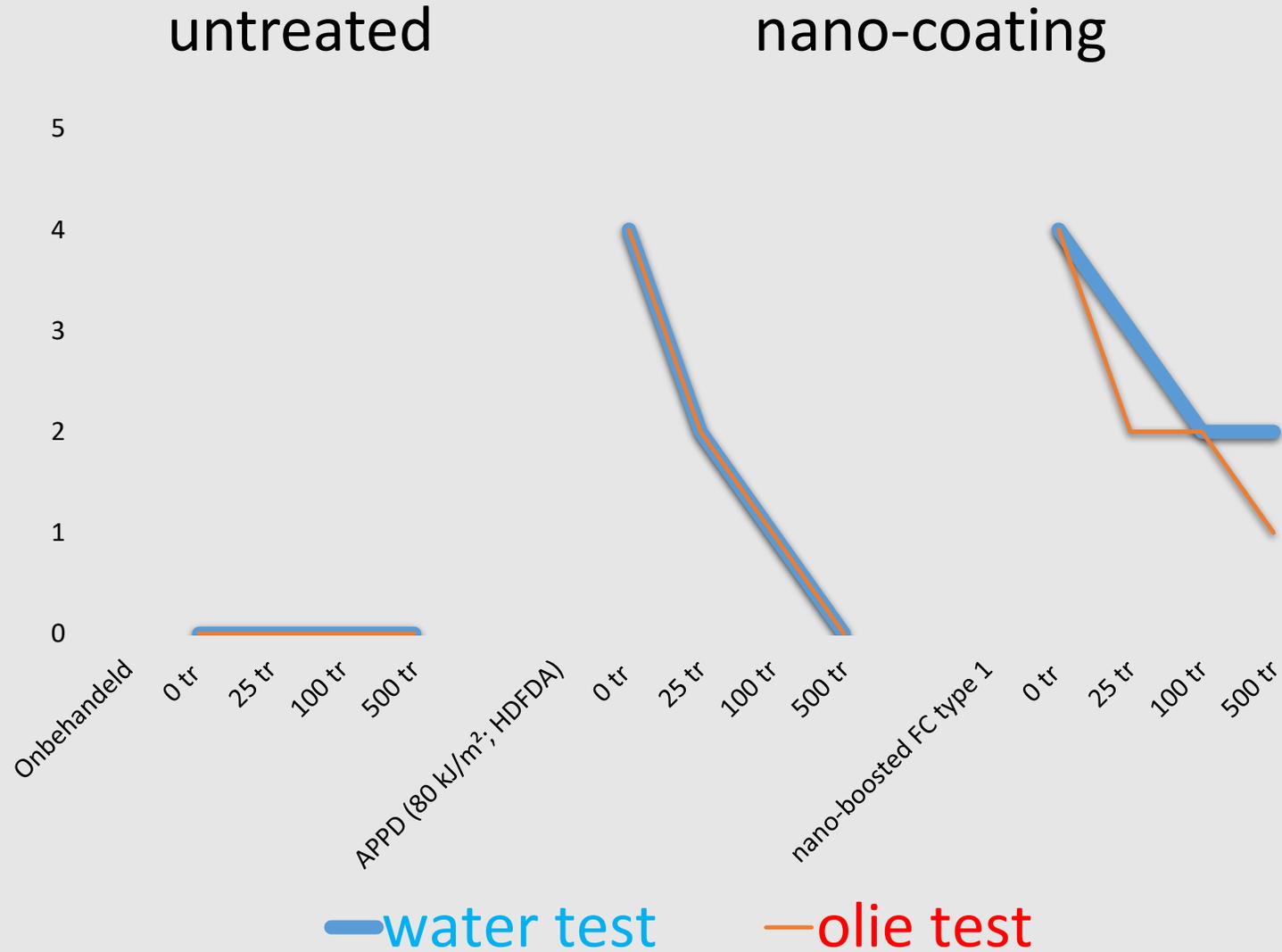


**repellant**  
**(hydrophobic)**



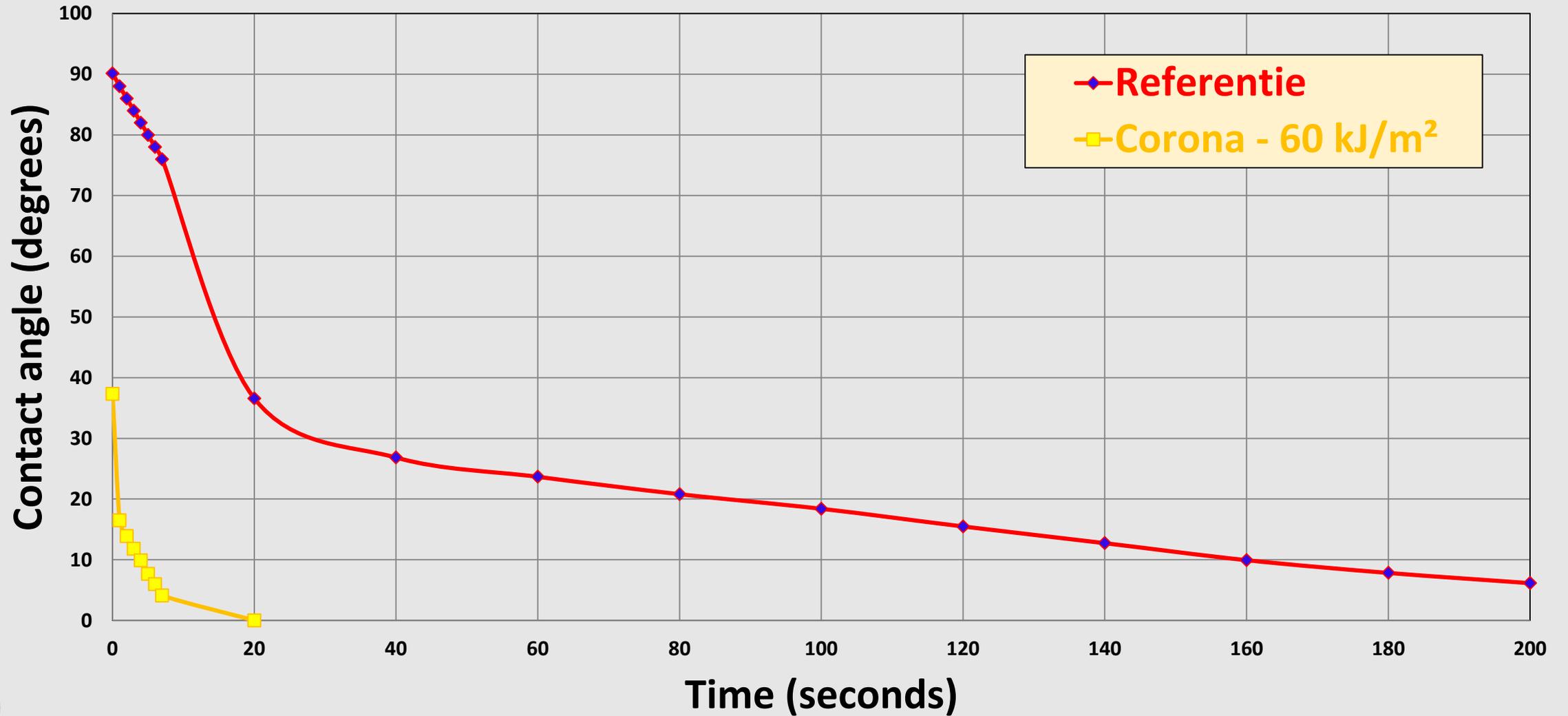
$$\theta > 90^\circ$$

# Rapid abrasion and loss of functionality of plasma-coating (Taber, oak veneer)



# enhanced wetting

dynamic contact angle: beech veneer - water



**HO  
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**BIOBASED MATERIALS  
VALORISATION of NATURAL FIBRES  
CIRCULAR ECONOMY  
ECODESIGN**

since 2015

**HOGENT Research Fund  
IWT TETRA  
EFRD (EU Interreg)  
UGent IOF**

# valorisation of roadside clippings

**Interreg**   
 2 Seas Mers Zeeën  
 GRASSIFICATION

European Regional Development Fund



Roadside grass clippings are seen as biomass waste. The GRASSIFICATION project demonstrates the added value of these grass clippings as a green and renewable resource for chemicals, materials and energy. As such GRASSIFICATION will initiate new and several value chains for the circular biobased economy.



[www.interreg2seas.eu/en/grassification](http://www.interreg2seas.eu/en/grassification)

Dust fraction (37%)

Middle fraction (26%)

Straw fraction (37%)



interreg  
 2 Seas Mers Zeeën  
 GRASSIFICATION

provincie  
 Oost-Vlaanderen

HO  
 GENT



Composite papier block



Photo: thermo-hemp\_Ecological Building Systems



Photo: Isohemp – "Hempcrete"



# biobased education without frontiers

**Interreg**   
 Vlaanderen-Nederland  **GRENZELOOS  
 BIOBASED  
 ONDERWIJS**  
 Europees Fonds voor Regionale Ontwikkeling

# valorisation of hemp fibres

**HoGent**  **PWO Eigen Kweek  
 Tetra Hemp4All**

# agro-food-bio waste valorization

  
 GHENT  
 UNIVERSITY

Industrial Research Fund (IOF)  
 Business Development Centre

**END-OF-WASTE**  
 Business platform

**HO  
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| WG Biomaterials & Eco-design                |                          |
|---------------------------------------------|--------------------------|
| Dries<br>Vansteenkiste<br>Natuur & Techniek | Jelle<br>Saldien<br>TW17 |
| HoGent                                      | Fac. Ir. Wet. & Arch.    |

**HO  
GENT**



- ✓ Research, education and technology transfer
- ✓ Internship placements (R&D, industry)
- ✓ Wood technology study programmes

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**Bachelors in Wood Technology**

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**Dept. Fashion, Textile and Wood Technology**

[Alexandra.DeRaeve@hogent.be](mailto:Alexandra.DeRaeve@hogent.be)



# 17 Sustainable Development Goals (SDG) of UN



*SDG 12: responsible production and consumption*

# FINPLASMA stakeholders

Decospan

Unilin  
Panels / Flooring

Triplaco  
Group Lefevere

Van Hoecke

Anonymous

Nanex  
Company

Hesse-Lignal  
Benelux

Basin  
Lava Lacke

Rectavit  
Soudal

VITO

Sinvacon

Plasmatreat  
(Rycobel)

Woodlab  
UGent

WOOD.BE  
(TCHN)

HoGent



# layered system interfaces



# Goal 1. Promote adhesion

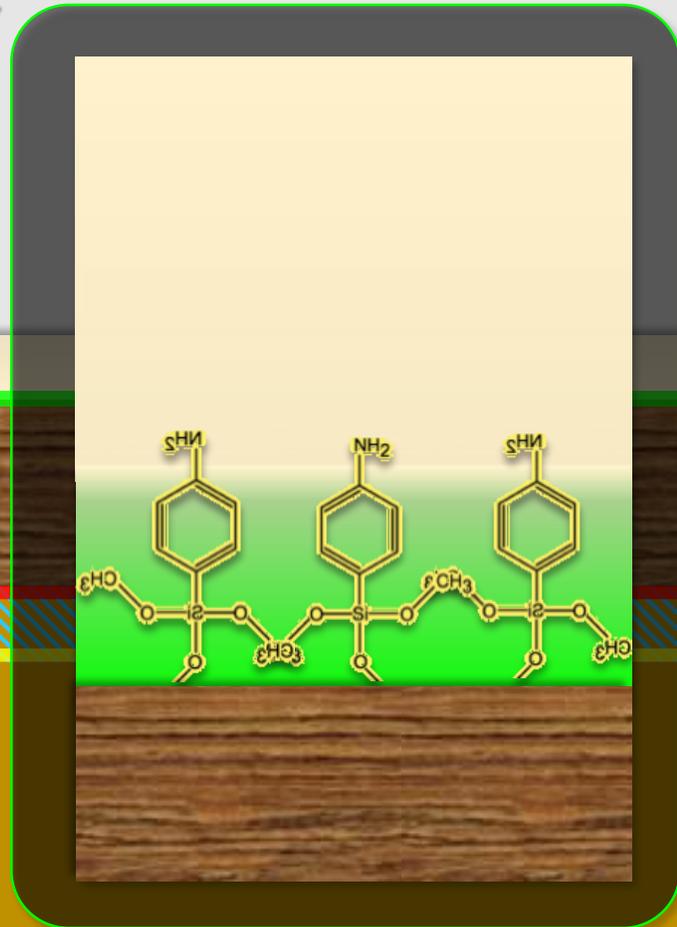
*activation / priming*

topcoating

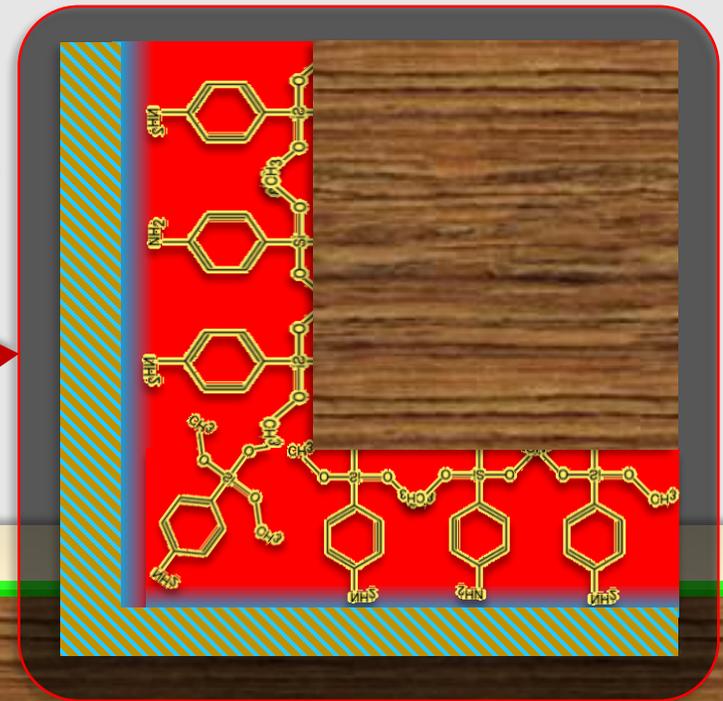
face veneer

glue

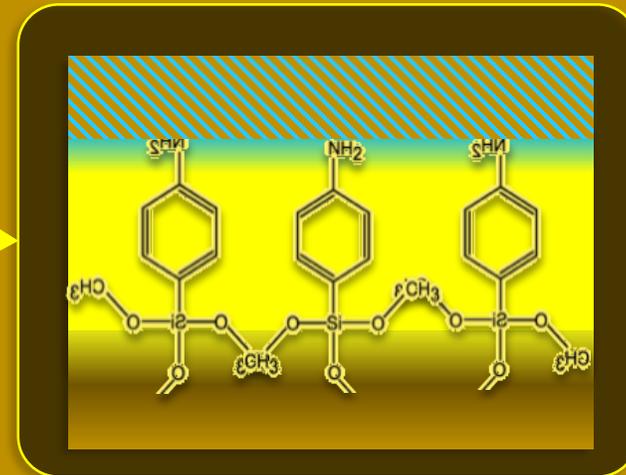
substrate  
(wood panel)



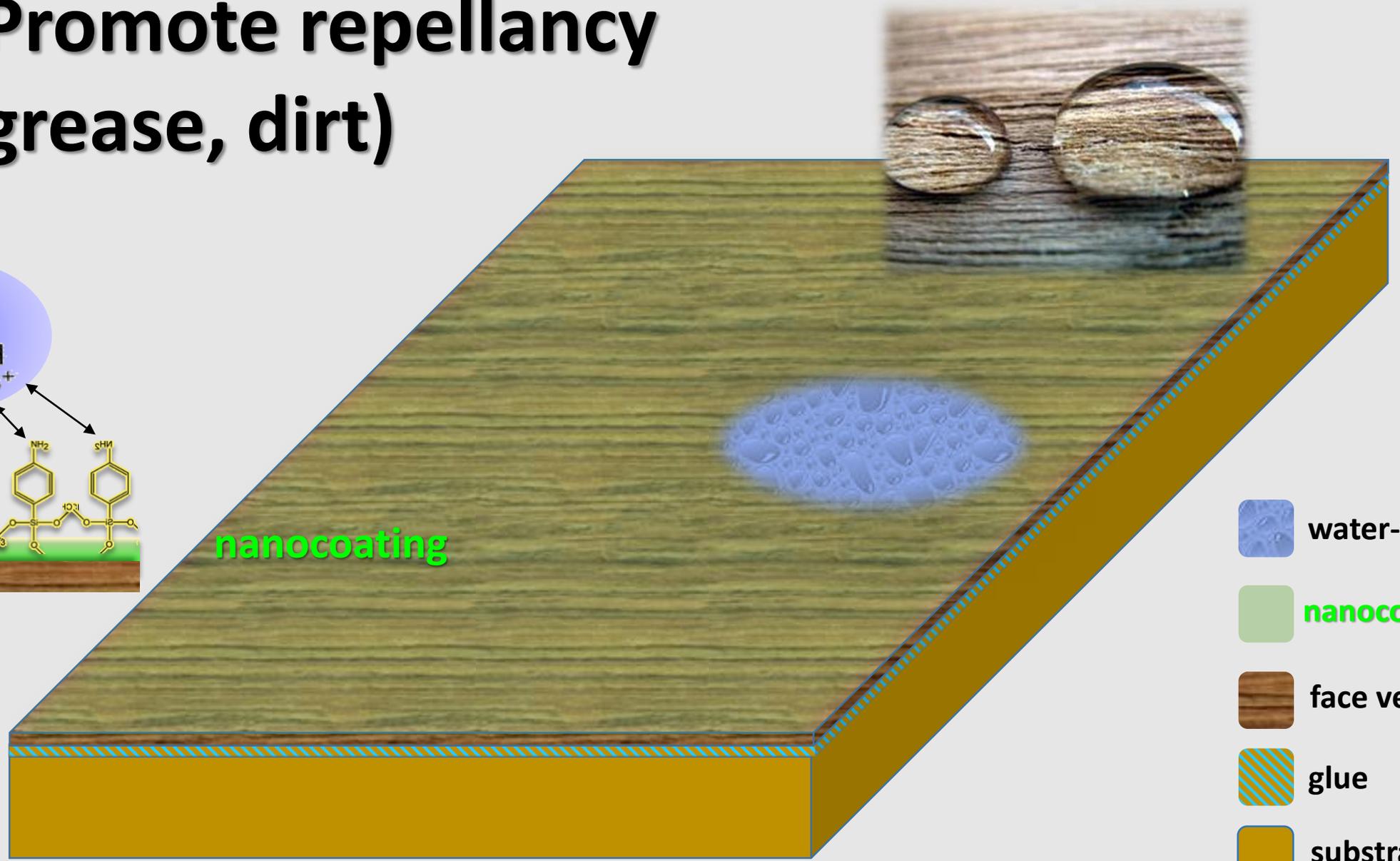
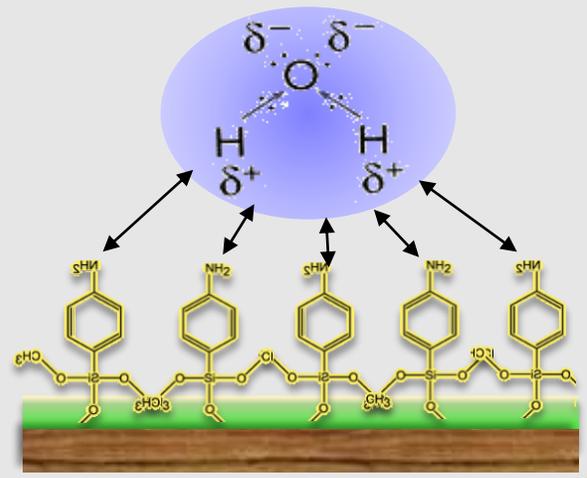
*activation / priming*



*activation / priming*



# Goal 2. Promote repellancy (water, grease, dirt)



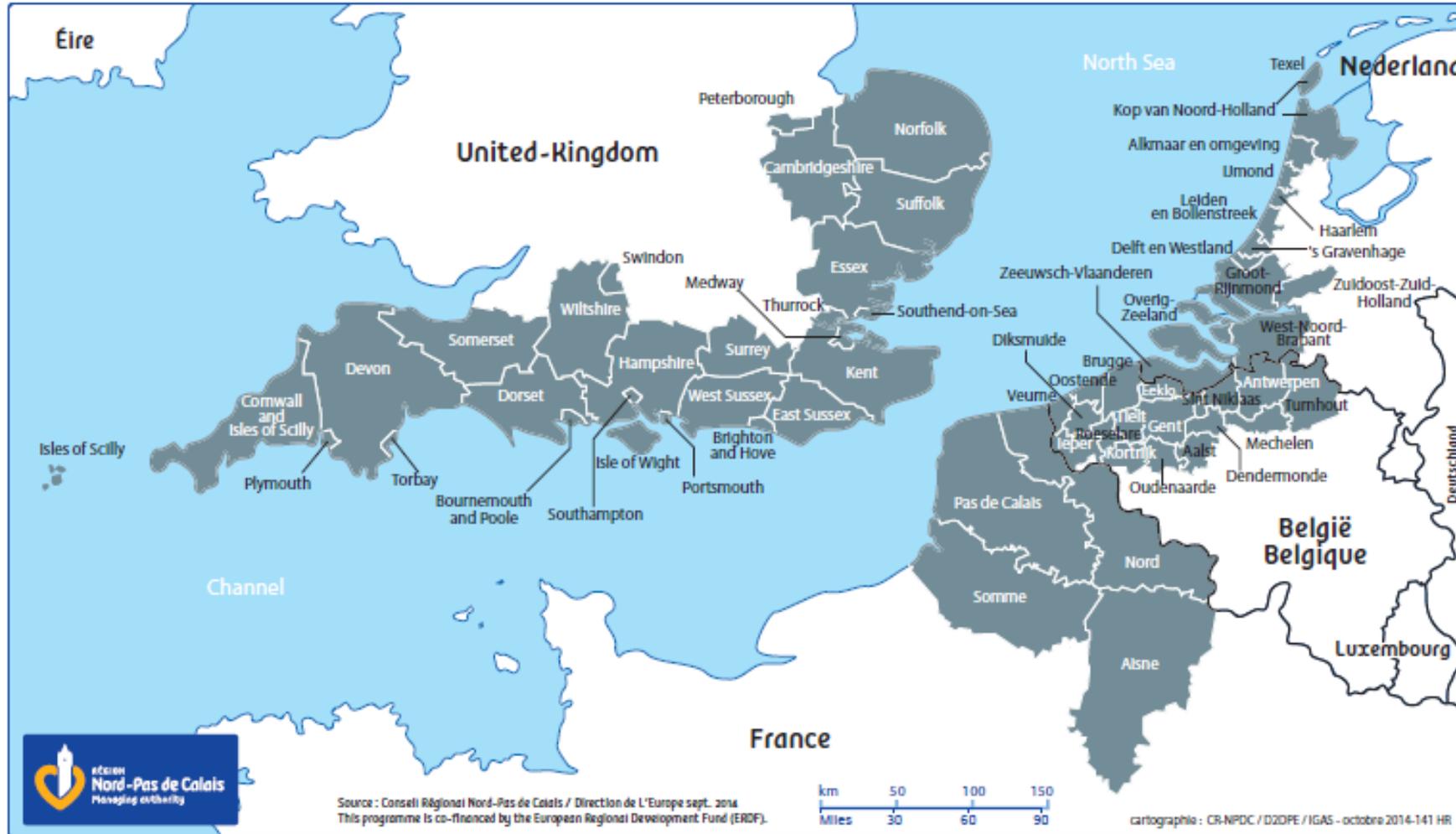
-  water-film
-  nanocoating
-  face veneer
-  glue
-  substrate

+ new functionalities ?

# program area 2 Seas

**Interreg**   
2 Seas Mers Zeeën

**2 Seas Crossborder Cooperation Programme**  
2014 - 2020



# Consortium (2018-2021)

| Country | Partner | Name                               |
|---------|---------|------------------------------------|
| BE      | PP1     | UGent                              |
| BE      | PP2     | Provincie West-Vlaanderen          |
| BE      | PP3     | ProNatura                          |
| BE      | PP4     | VITO                               |
| BE      | PP5     | Inagro                             |
| BE      | PP6     | HOGENT                             |
| BE      | PP7     | Vanheede Landfill Solutions        |
| UK      | PP8     | Kent Wildlife Trust                |
| NL      | PP9     | Millvision                         |
| NL      | PP10    | Delphy                             |
| NL      | PP11    | Stichting Avans                    |
| BE      | PP12    | Innec                              |
| UK      | PP13    | Canterbury Christchurch University |

+ 10 Observer Partners

# Grassification: grass fibre sources ?

1. Roadside clippings (air-dried) / “straw”
2. Solids from pressed fresh grass clippings / “press cake”
3. Solid residues from anaerobic digestion / “digestate, pulp”

small scale  
“wet” AD

large scale  
“dry” AD

5 topical workgroups  
32 research labs

| WG Value Chain Assessment         |                                | WG Biomaterials & Eco-design                           |                                 | WG Biochemicals Extraction & Use |                                  |
|-----------------------------------|--------------------------------|--------------------------------------------------------|---------------------------------|----------------------------------|----------------------------------|
| Xavier<br>Gellynck<br><i>BW01</i> | Erik<br>Paredis<br><i>PS03</i> | Dries<br>Vansteenkiste<br><i>Natuur &amp; Techniek</i> | Jelle<br>Saldien<br><i>TW17</i> | Tom<br>De Smet<br><i>BW06</i>    | Geert<br>Janssens<br><i>DI07</i> |
| Fac. Bio-ir. Wet.                 | Fac. Pol. & Soc.<br>Wet.       | HoGent                                                 | Fac. Ir. Wet. &<br>Arch.        | Fac. Bio-ir. Wet.                | Fac. Dier-<br>geneeskunde        |

| WG Nutrient & Energy Cycling      |                                   | WG Water Treatment & Recovery  |                                |
|-----------------------------------|-----------------------------------|--------------------------------|--------------------------------|
| Stefaan<br>De Neve<br><i>WE16</i> | Frederik<br>Ronsse<br><i>WE17</i> | Wim<br>Vyverman<br><i>WE11</i> | Imca<br>Sampers<br><i>BW16</i> |
| Fac. Bio-ir. Wet.                 | Fac. Bio-ir. Wet.                 | Fac. Wet.                      | Fac. Bio-ir. Wet.              |

**Interreg**   
EUROPEAN UNION

**2 Seas Mers Zeeën**

**GRASSIFICATION**

European Regional Development Fund

**2018-2021**

**HO  
GENT**

Dries Vansteenkiste | Laury Chaerle | Alexandra De Raeve

Project co-financed by  provincie  
**Oost-Vlaanderen**

# Reception & transfer Nov 2018



7 barrels of 120 L (ca. 20 kg)



55 boxes of ca. 2.5 kg

# Sieving of three fractions

Dust fraction (30%)

Middle fraction (30%)

Straw fraction (40%)



10 g



10 g



10 g

**O1.5 Showcasing products from fibres extracted from roadside clippings**



**Preprocessing**  
pressing (liquid / solids)  
drying  
retting, anaerobic digestion,  
milling, sieving, pelletising  
  
grinding, pressing, bonding,  
extruding, coating



*Photo: Waterschap Scheldestromen / Rudy Visser*

**biocomposites, biopolymers... for construction & landscaping**

beams, panels, packaging, insulation, geotextiles, etc

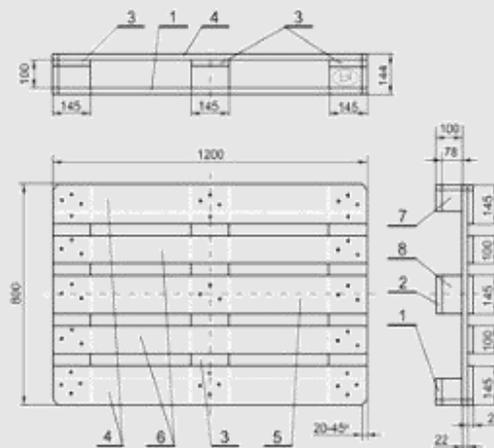
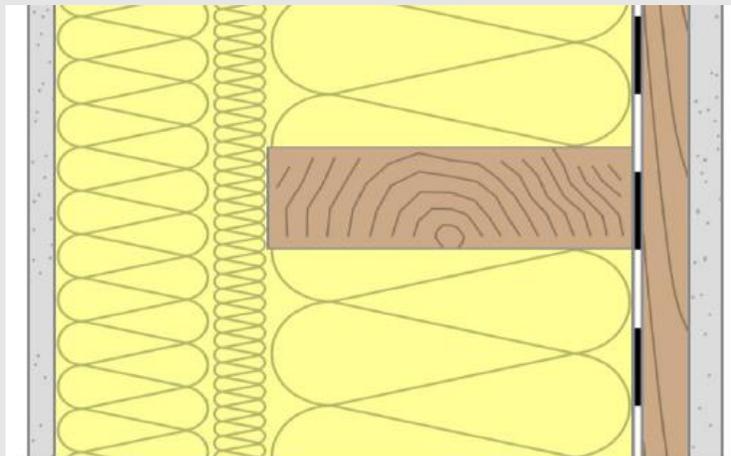


Photo: Isohemp – “Hempcrete”



Photo: thermo-hemp\_Ecological Building Systems



Composite pallet block