

**pro | natura**



**Werk maken van Natuur!**

**From local green waste to local green resource  
and/or product**

**Tom Anthonis**

**Le RwDR  
17 May 2018**

**Fostering innovation - Meet the challenges of rurality**

# Pro Natura

- 🐜 Social employment company since 1993
- 🐜 155 employees
- 🐜 3 locations in Belgium (Eeklo, Vilvoorde, Pamel )
- 🐜 Main activities:
  - 🐜 Landscape maintenance and design
  - 🐜 natural & ecologic designs & methods
  - 🐜 Workshops & team buildings in nature







wadi









VOOR



NA









**FUTURE AMBITION?**

# Diversification

Landscape services

Handling/manufacturing



# Valorisation of green resource !



waste no more

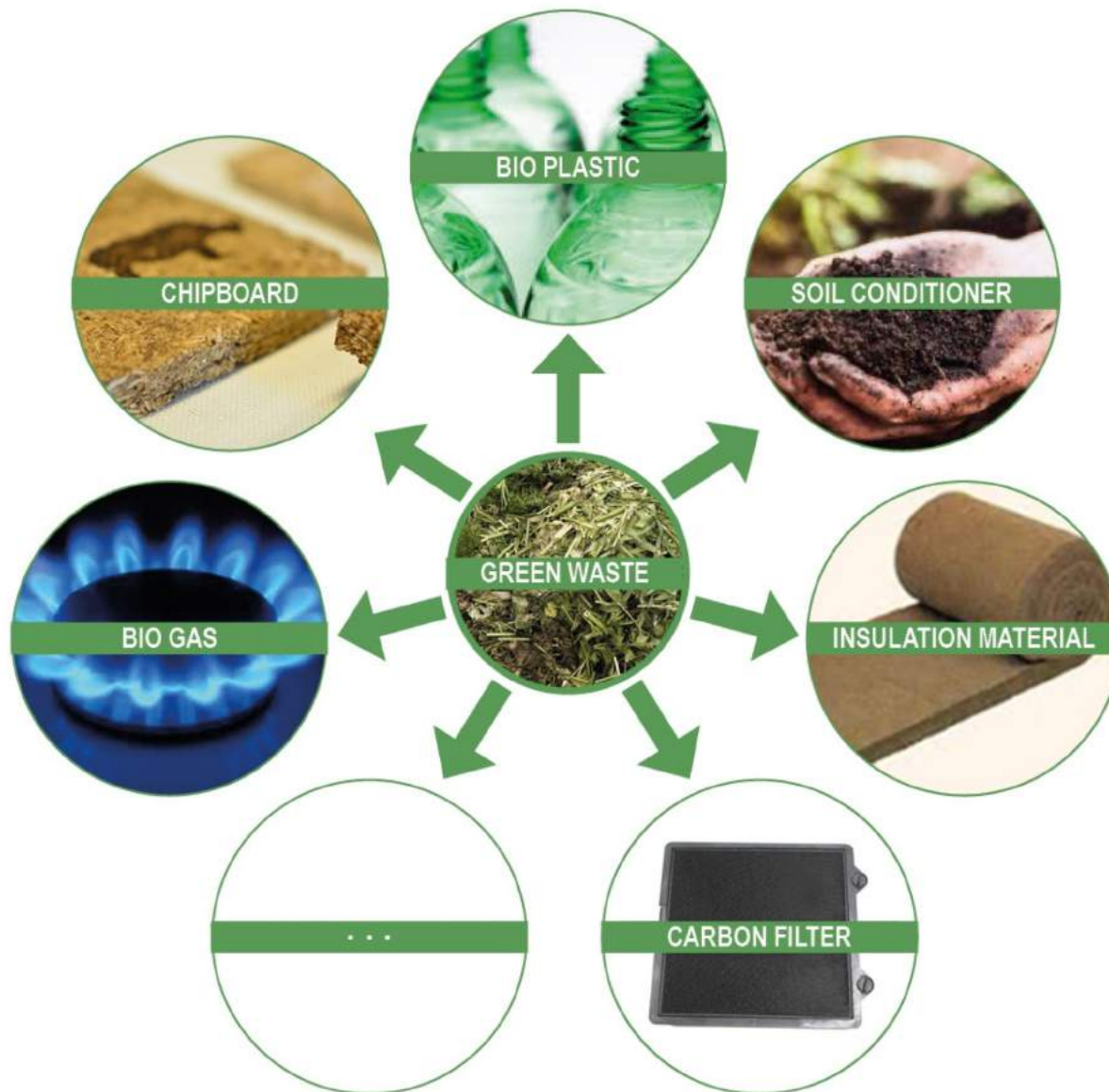
pro | natura   
werk maken van natuur!



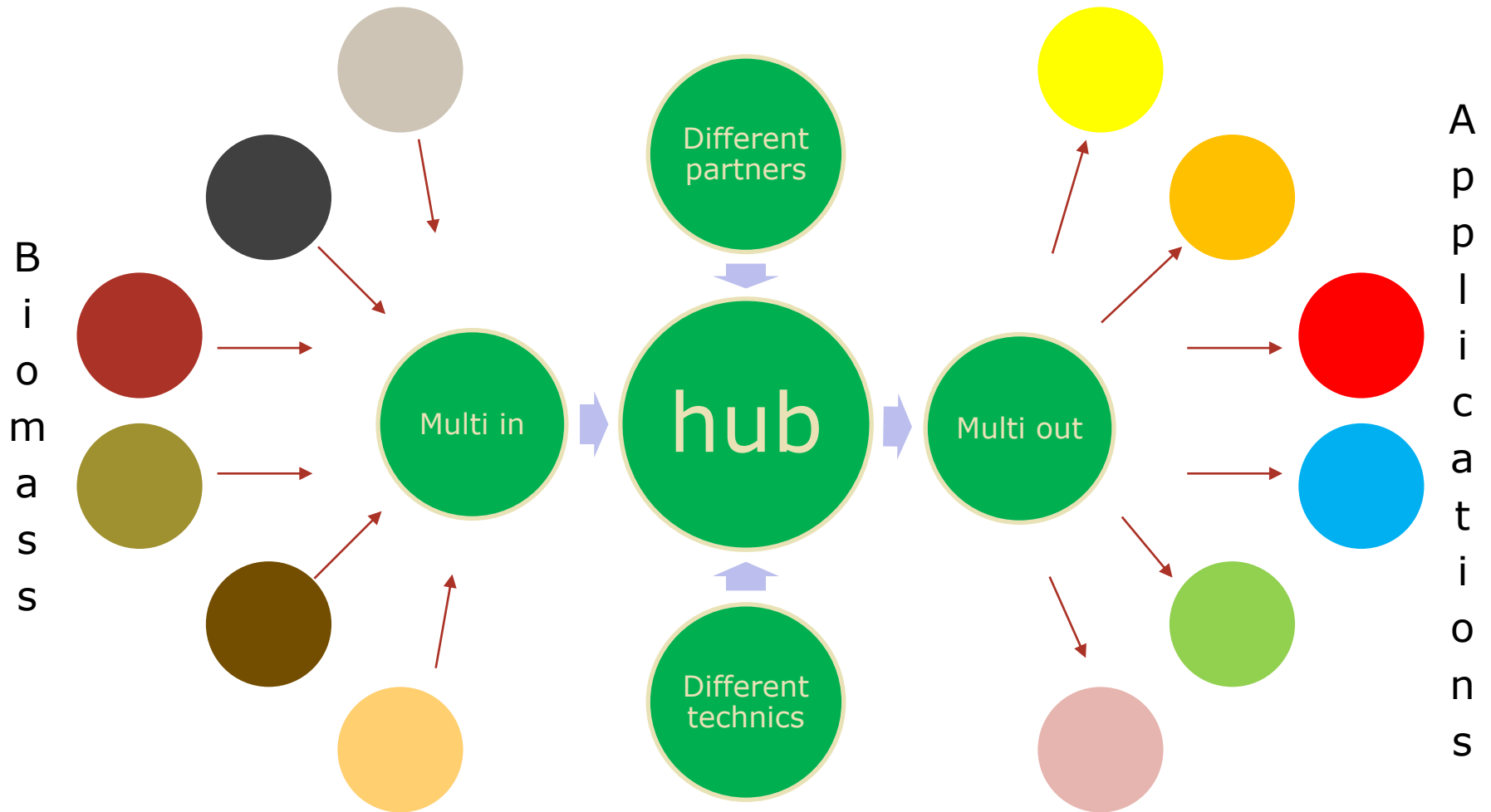
# Key factors for circular bio-industry

- 🐜 Optimal use → 100% → waste=resource
- 🐜 Cooperation in biomass clusters
- 🐜 Focus on high value end products
- 🐜 Involve social economy





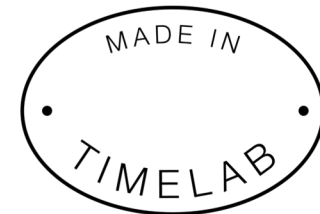
# Multi in-out Model



# R&D financed by



# Partners





# Re-Direct

 **REgional Development and Integration of unused biomass wastes as REsources for Circular products and economic Transformation (RE-DIRECT)**

**Interreg**   
EUROPEAN UNION  
**North-West Europe**  
**RE-DIRECT**

European Regional Development Fund



# Re-Direct

- 5 countries
- Germany
- France
- Wales (UK)
- Ireland
- Vlaanderen (Belgium)



# Re-Direct

- ❗ Increase the resource efficiency by transforming residual biomass into a high-quality product
- ❗ Develop regional-specific biomass portfolios and integrated biomass concepts (IBC)
- ❗ Establish a circular approach installing a local IFBB plant including a pyrolysis and activation unit to produce biochar & activated carbon to be used local
- ❗ Applying the technology decentrally in rural areas
- ❗ Including the social economy to explore the effects on disadvantaged areas in terms of creating new green jobs for persons with a distance to the labor market .



# Pro Natura biomass

**Japanese knotweed**



**Raspberry prunings**



**Roadside verges**



# Japanese Knotweed



**Interreg**   
North-West Europe  
RE-DIRECT



# J. Knotweed harvest summer



# J. Knotweed harvest winter



**Interreg**   
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RE-DIRECT



# J. Knotweed shredding





# J. Knotweed samples



# Raspberry prunnings



# Raspberry prunnings



# Raspberry prunnings



# Roadside verges



**Interreg**   
EUROPEAN UNION  
North-West Europe  
RE-DIRECT



# Transformation

## IFBB

- IFBB= Integrated Generation of Solid Fuel and Biogas from Biomass
- IFBB divides biomass into a fiber-rich press cake and a highly digestible press fluid by mashing with subsequent pressing

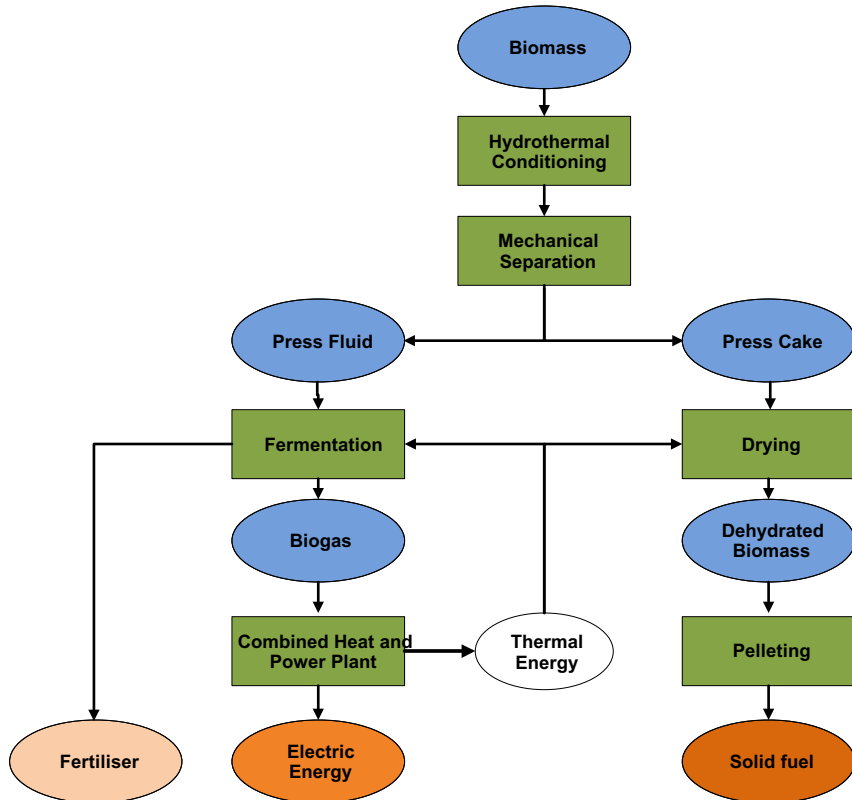
## Pyrolyse - Pyreg

- carbonization of biomass to biochar and activated carbon
- designed to enable any type of biomass to be processed efficiently and totally, on site and without complicated logistics

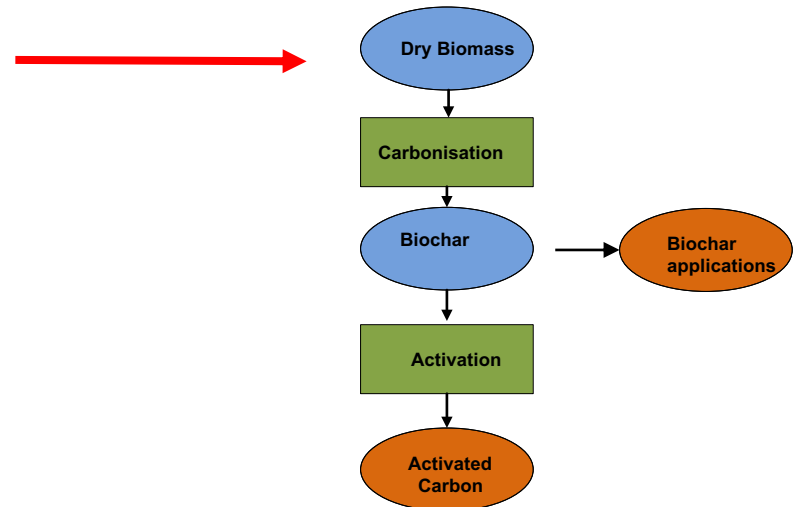


# Transformation

## IFBB



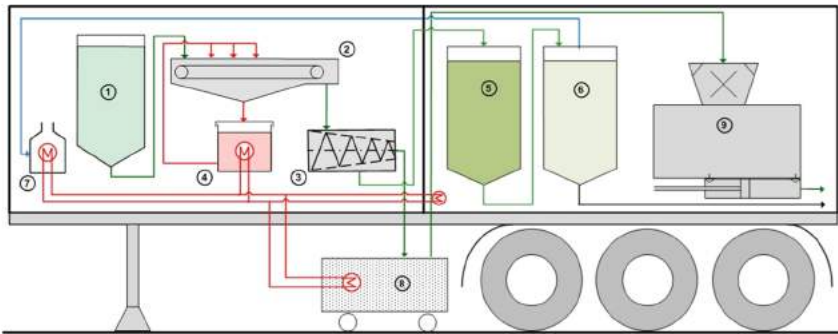
## Pyrolyse - Pyreg



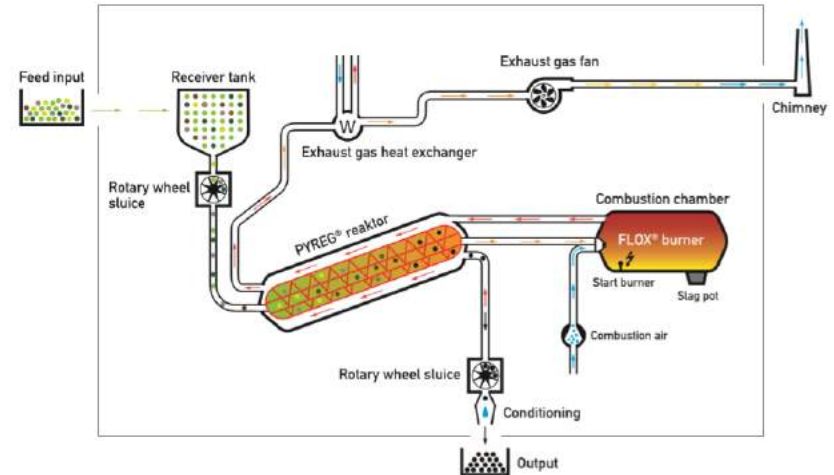
# Transformation

**IFBB**

**Pyrolyse - Pyreg**



- |                        |                             |   |
|------------------------|-----------------------------|---|
| ① Biomass storage tank | ② Hydrothermal conditioning | ③ Screw press for mechanical separation |
| ④ Mash water tank      | ⑤ Press fluid storage tank  | ⑥ Digester                              |
| ⑦ Biogas burner        | ⑧ Press cake dryer          | ⑨ Briquette press                       |





# Transformation

**IFBB**

**Pyrolyse - Pyreg**



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North-West Europe  
RE-DIRECT



# Transformation

## IFBB

- 🐜 Liquid → biogas, recovery minerals, proteins...
- 🐜 solid biomass fibres



## Pyrolyse - Pyreg

- 🐜 biochar
- 🐜 activated carbon



# Transformation

## IFBB

## Pyrolyse - Pyreg

### Profile IFBB-Plant (Basic Version)

■ Calculated life span	20 Years
■ Thermal performance:	0,8 MW <sub>therm</sub>
■ Electrical performance:	50 kW <sub>el</sub>
■ Grassland requirements	approx. 500 ha (assuming 3,8 t DM/ha)
■ Pellet-production:	1.500 t/year
■ Investment costs:	approx 1,5 Mio. € (Add-on: 0,86 Mio. €)
■ Return on Total Assets:	7,71 % (Add-on: 22,75 %)
■ Positive cash flow from:	Year 1
■ Start of dividend payout:	Year 1

🐜 input 1400 T/y with  
10MJ/kg green  
residual biomass  
<3cm particals

🐜 output 300 T/y  
biochar

🐜 output heat ~  
150kW<sub>th</sub>



# Applications

## Pyreg Biochar & Activated carbon

- ❗ Pathogens, germs and potentially harmful pollutants are neutralized
- ❗ formation of polycyclic aromatic hydrocarbons and dioxins is prevented
- ❗ preserving carbon and nutrients
- ❗ high porosity and a large internal surface
- ❗ excellent storage stability



# Applications

## Pyreg Biochar & Activated carbon

- ❧ Soil improvement
- ❧ Additive for animal feed
- ❧ Bedding in stables
- ❧ Support in composting process
- ❧ Catalyzer for biogas
- ❧ Activated carbon → Filtering medium, additive for cosmetics, pharmaceuticals
- ❧ AC → Carbon sequestration



# Applications

## Biochar & Activated carbon

- 🐜 Biochar ~ 600€/t
- 🐜 Feeding char ~1000 €/t
- 🐜 Activated carbon ~1500 €/t



# Transformation

## IFBB

- 🐜 Semi commercial
- 🐜 Baden-Baden
- 🐜 Schotland - Wales

## Pyrolyse - Pyreg

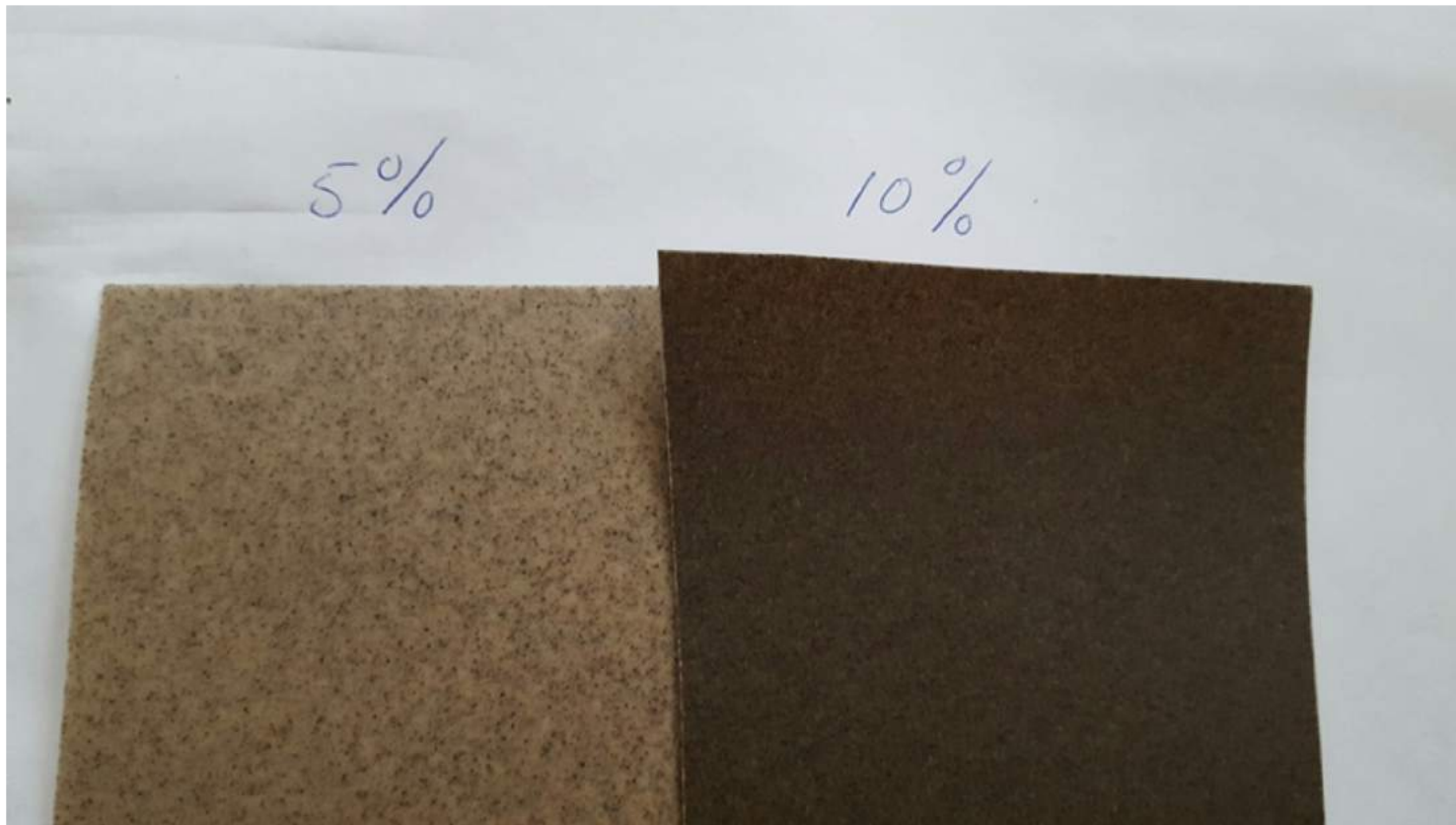
- 🐜 Commercial
- 🐜 Already 25 working worldwide
- 🐜 1 Belgium (Wagnelée)

- 
- 🐜 Synergie IFBB + Pyreg
  - 🐜 Test model in Baden-Baden and Wales



# Applications

## Raspberry mix bio polymer solanyl





# Applications

## Raspberry packaging



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# Applications

## Raspberry packaging



# Applications

## Timelab : Jap Knotweed - Knotplex

KNOTPLEX = Jap knotweed + caseïne (milk protein)



# Applications

## Timelab : Jap Knotweed - Knotplex



# Applications

## Glimps (Magna Nova) : substrate mycelium



Web : [glimpse.bio](http://glimpse.bio)



# Future challenges

- 🐜 Develop a local circular model = IBC
- 🐜 Local input, local use, local re-use
- 🐜 Our multi in-out model involves cooperation between many different partners
- 🐜 Corporate social responsible model
  - 🐜 Inclusion of SOCIAL economy + Free market
  - 🐜 Pro Natura : 1000 – 3000 t/y biomass and 155 employee
  - 🐜 Renewi : +150 000 t/y biomass and + 1000 employee



# Policy recommendation



- Priority for extra social economy (subsidised) work places should go to circular economy based on corporate social responsible business model



# Contact

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