

# Bi·rex

A World where PAPER IS NOT MADE OUT OF TREES  
and PLASTIC IS FULLY BIODEGRADABLE



Bi·rex



**310+M tons**  
produced in 2020  
(vs 15M tons in 1964)

in 2025 there will be  
**1 ton** of plastic every  
**3 tons** of fishes

**+150 M tons**  
of plastic in the oceans

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**It's crucial** to find  
**an alternative**  
material to plastic!

The background of the slide is split into two main sections. On the left, there is a close-up photograph of a large pile of cooked, orange-colored shrimp. On the right, there is a close-up photograph of a large pile of white, fibrous, and somewhat translucent chitin, which is the exoskeleton of the shrimp. The background also features a faint, repeating pattern of green leaves.

**Cellulose and Chitin are natural biopolymers**



# CELLULOSE IS CURRENTLY MANUFACTURED FROM TREES

**300 Mio tonnes** annually  
Worldwide



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## **CHITIN IS MOSTLY MANUFACTURED FROM SHRIMPS AND CRABS**

**6-8 Mio tonnes** of crustaceans  
farmed annually Worldwide



**BUT...**

# Biopolymers production

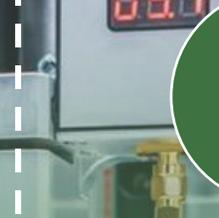
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Trees



Bleached  
cellulose



Shrimp  
shells



Chitin

## DRAWBACKS



Deforestation



Energy-intensive



Pollution



High plant cost



Low yield

# Europe's strategic challenges – Bi-rex part of the solution

## Cellulose



Europe is a key player in the cellulose market, but ...

- Worldwide demand is steadily growing
- Supply is inherently land-limited
- Lack of raw materials and steep price increases cannot be excluded in the future



Bi-rex can unlock an **alternative feedstock** for cellulose with the potential of **substituting up to 20% of tree-sourced cellulose**, with tree-free cellulose using local EU agri-food biomasses

# Europe's strategic challenges – Bi-rex part of the solution

## Chitin

Chitin and chitosan are among the most interestingly biopolymers with a host of sustainable applications ranging from agriculture, food processing, water treatment, bioplastics.

Europe is way behind Asia (and even North America) in the production of chitin. The reason is that current manufacturing processes would not be considered acceptable for environmental and social reasons.

Future EU imports of chitin/chitosan from Asia are estimated in the billions Euros.



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**Bi-rex**, allowing for **sustainable large-scale extraction of chitin**, can unlock the possibility of making **EU independent from Asian imports**, sourcing basic raw materials from the **local EU nascent industries** (e.s. closed-loop shrimp farming in Germany and Spain, insect farming in France and other countries).



**Any  
alternative?**

# AGRI-FOOD BIOMASSES

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Food industry



Biomass/Waste



Incinerator

## DRAWBACKS



Not used source



Agri-Food industries pay to dispose of waste



Polluting

*A Process for*  
**Biomasses  
Recovery**



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# Innovative technology: Bi·rex process



Starting  
material



Product



Biomass



HIGH VALUE  
products



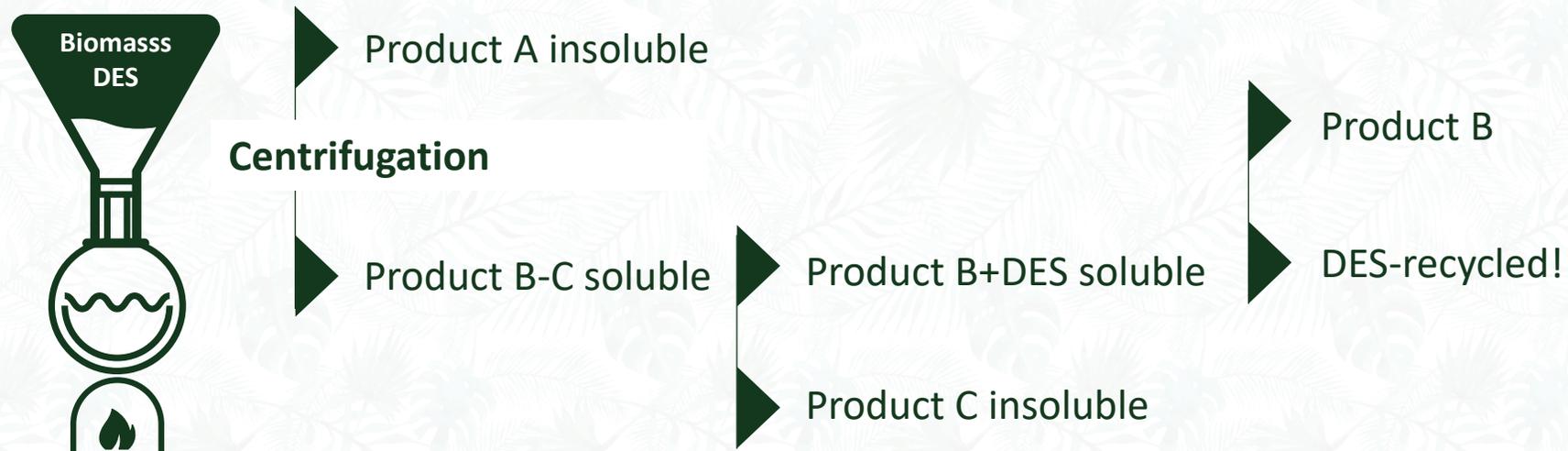
# WHAT OUR RESEARCH HAS ACHIEVED



A process to obtain cellulose and chitin that is **simple, scalable, sustainable,** and **promisingly cost-effective.**

We have designed a class of deep eutectic solvents (DESs) with the capability to dissolve agri-food biomasses to selectively extract cellulose and chitin.

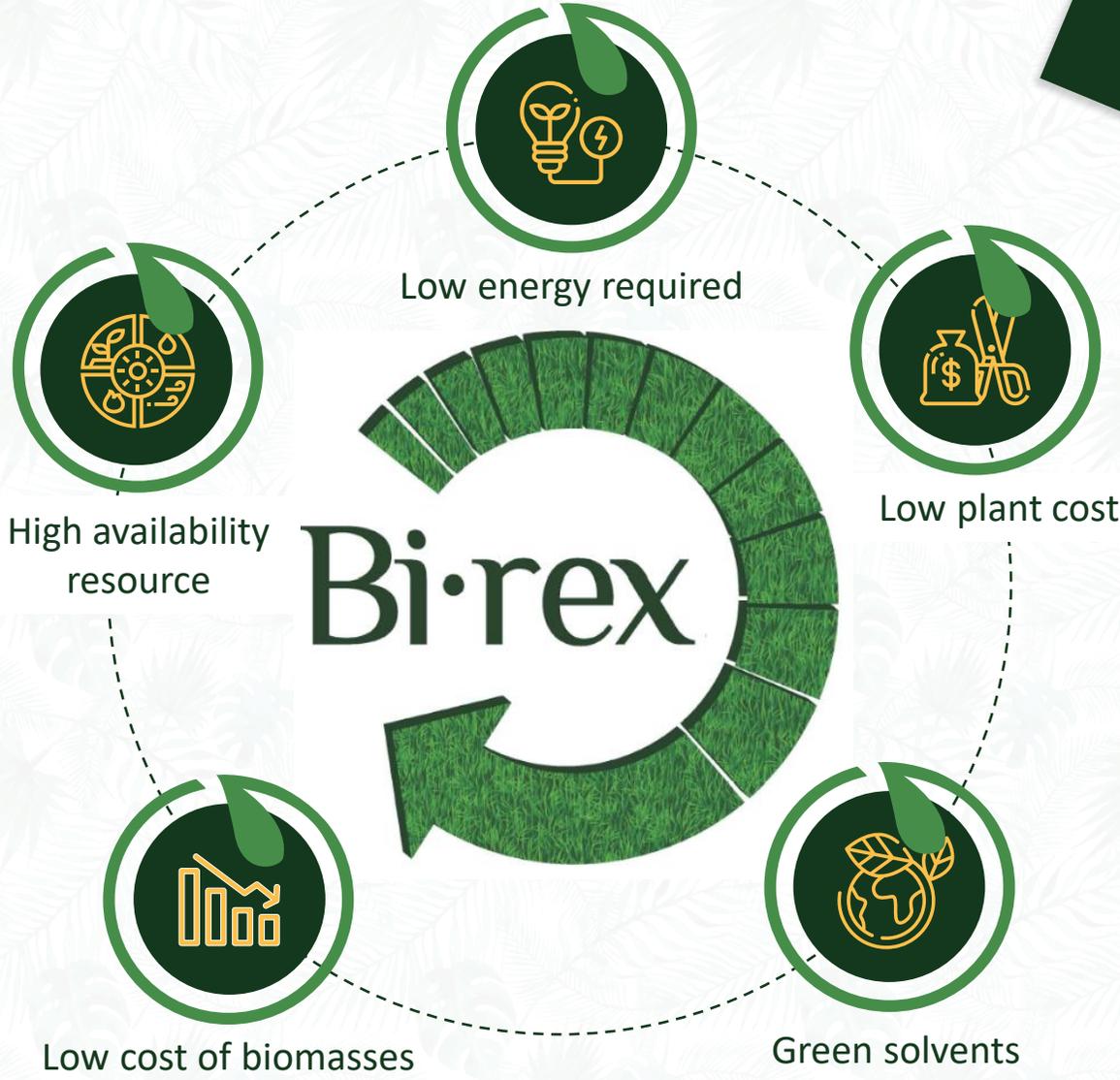
*The solvents themselves are non-toxic and can be reused several times for the subsequent extraction process*



# TRADITIONAL VS BI-REX



Traditional process



# OUR CHALLENGE



**Cellulose** tree-free  
*Tissue paper*  
*Packaging*

**150 B€**



**Green Chitin**  
*Organic Agriculture*

**194 Mn€**



**Green Chitin**  
*Water/  
waste treatment*

**251 Mn€**



**Green Chitin**  
*Bio - plastic*

**TBD**



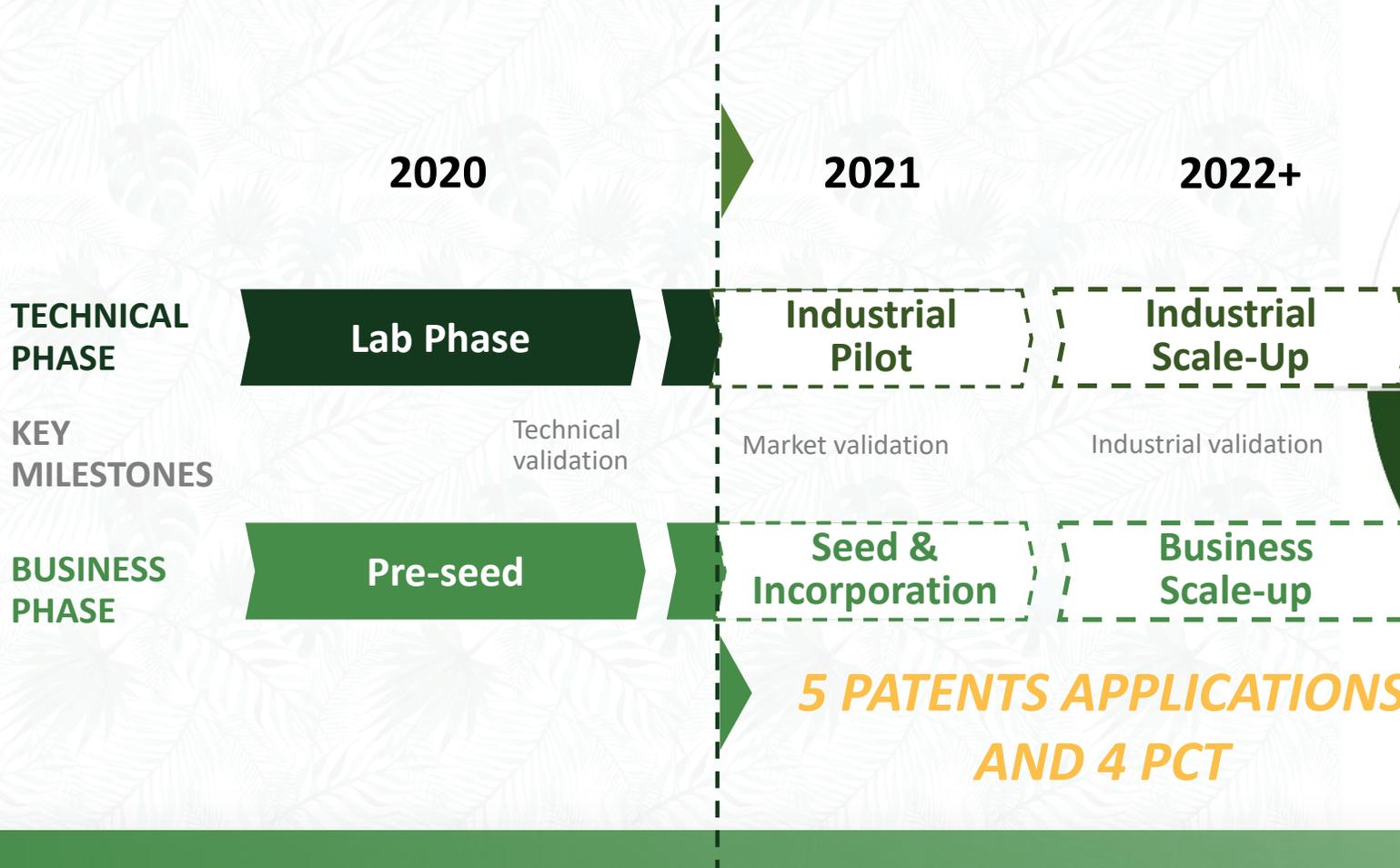
# BUSINESS MODEL B2B

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Agro and water treatment industry

# TRACTION



**We have just completed the first phase** (lab/pre-seed) of our development and moving into the next one (industrial pilot, seed&incorporation)



# BI-REX ALREADY VALIDATED BY SEVERAL ENTITIES AS POTENTIAL HIGH-VALUE PROJECT



Acceleration  
Grant 30k€



Fondazione  
Deutsche Bank Italia

Acceleration  
Grant 15k€



Special Mention  
«Cleantech & Energy» section



Pre-seed Investment 160k €  
Committed Seed Investor and  
scale-up partner



Special Mention  
«Circular Economy» section



Acceleration Grant  
15k€



Grant 5k €



Grant 2.5k€



Selected for EU TAF support



# Roadmap and financing



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