



**A Process for
Biomasses
Recovery and
Extraction**



**Manufacturing competitive
tree-free cellulose
in an eco-sustainable way**



**Cellulose is now
manufactured from trees**

300 mln tons

Canada
12 mln tons

Sweden
11 mln tons

Finland
11 mln tons

Germany
23 mln tons

China
99 mln tons

USA
75 mln tons

South Korea
11 mln tons

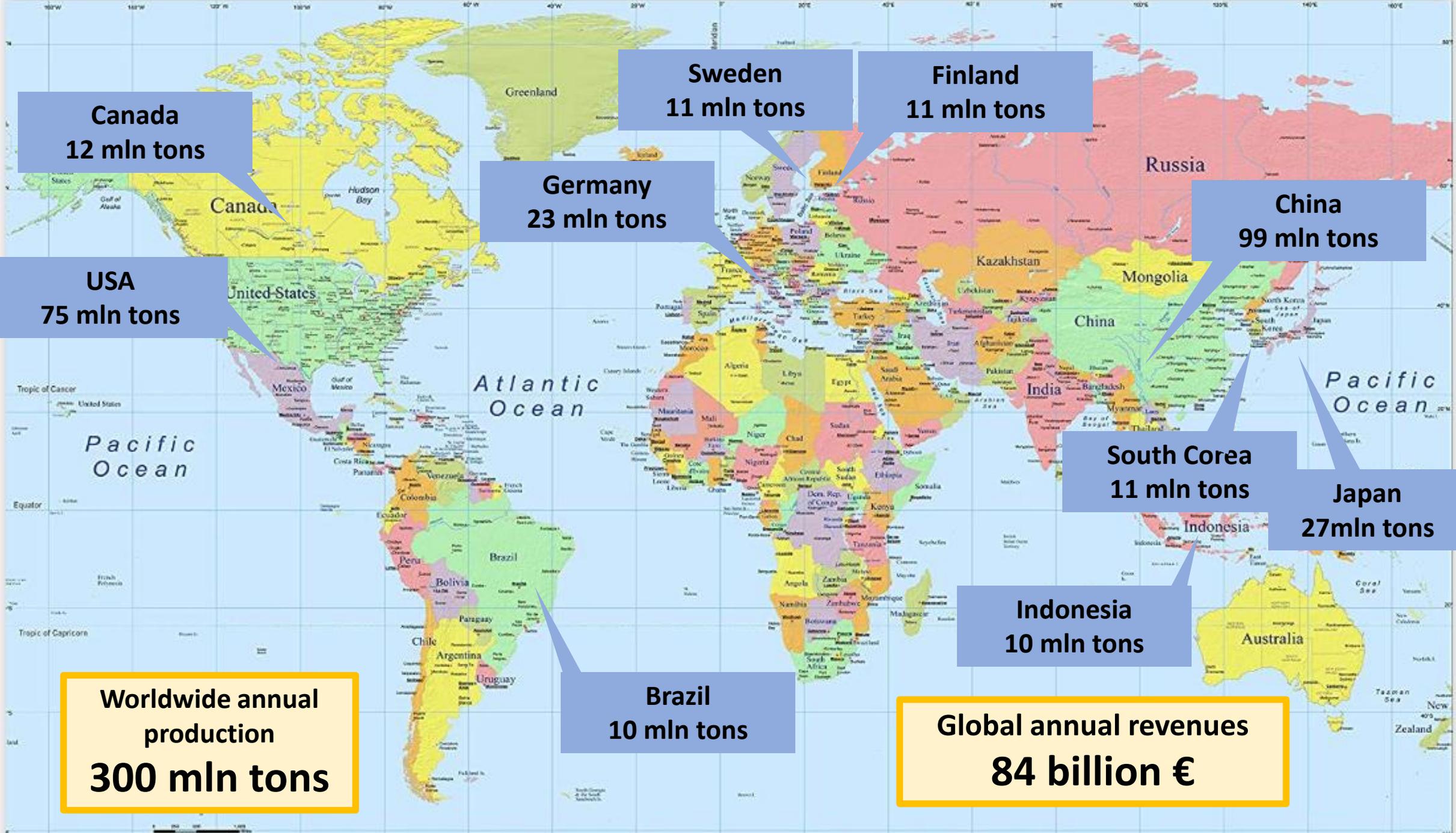
Japan
27 mln tons

Indonesia
10 mln tons

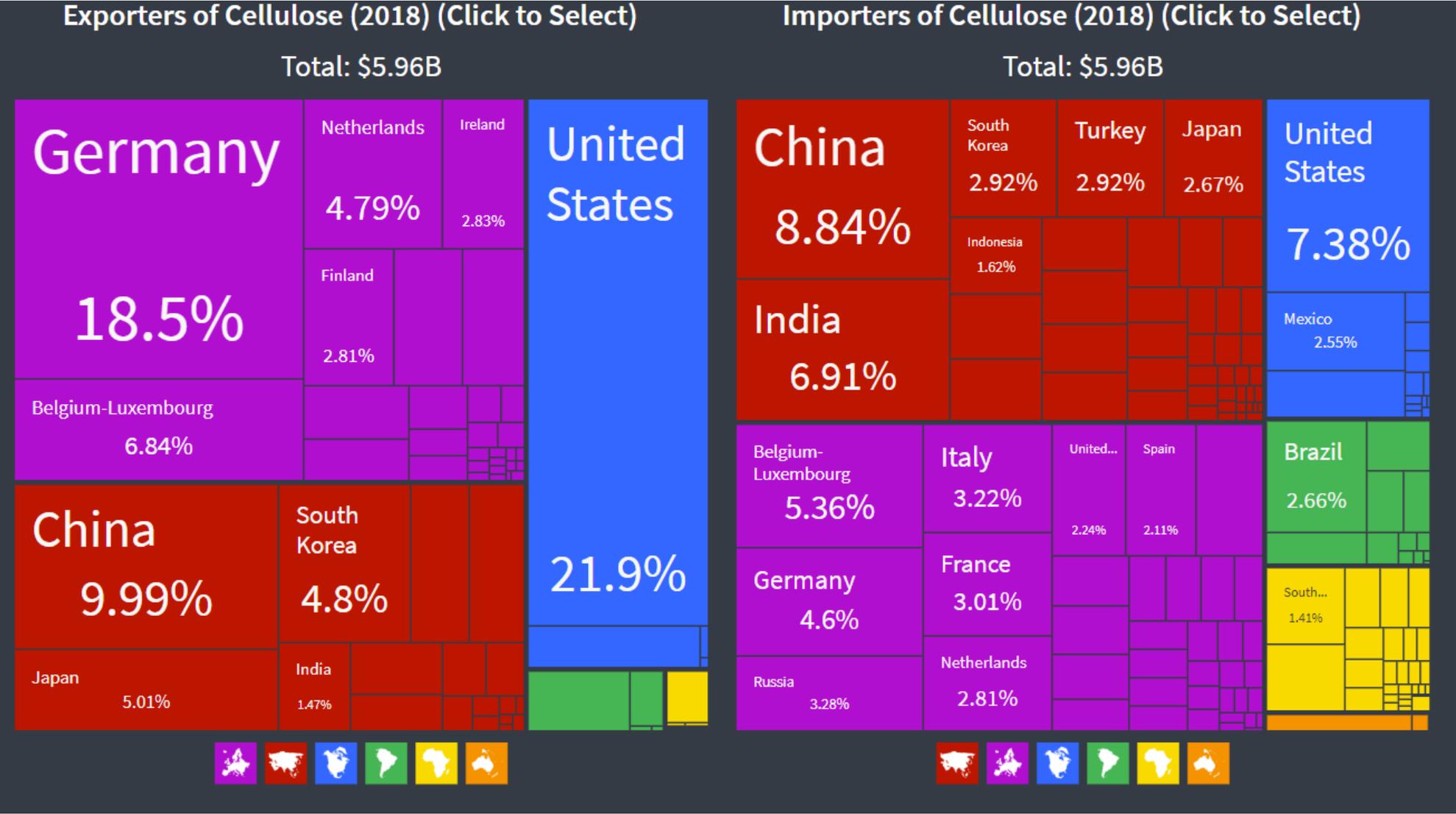
Brazil
10 mln tons

Worldwide annual production
300 mln tons

Global annual revenues
84 billion €



Europe plays a pivotal role in the cellulose global trade



Source: <https://oec.world/en/profile/hs92/73912/>

Applications

200 B€

Paper board
and packaging



Textile



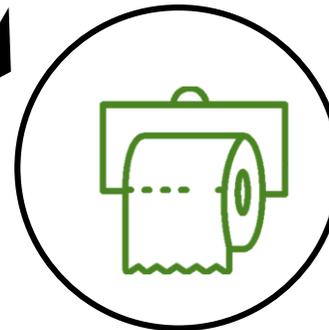
Disposable containers,
food packaging, diapers



Fine paper
and
magazine



Tissue paper



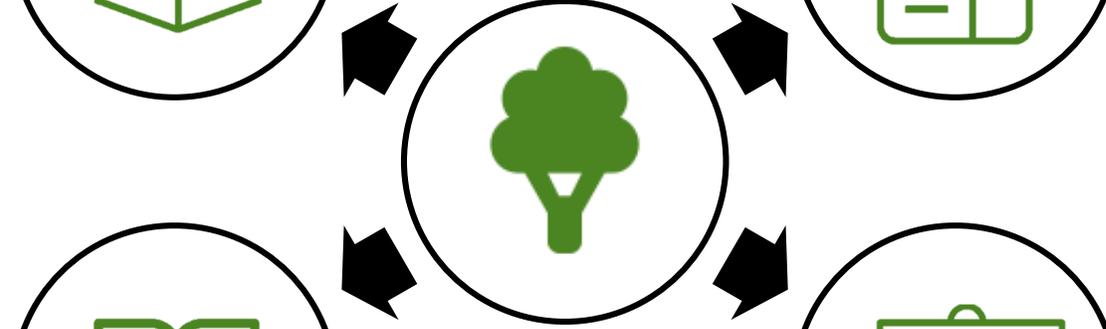
Microcrystalline cellulose



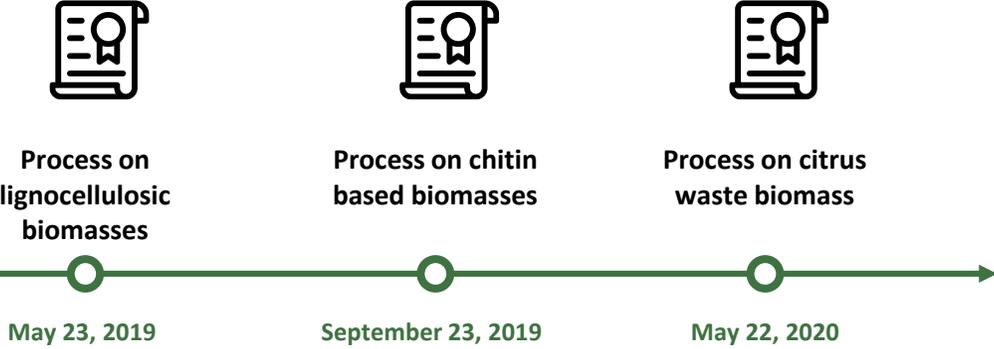
Nitrocellulose

Cellulose acetate

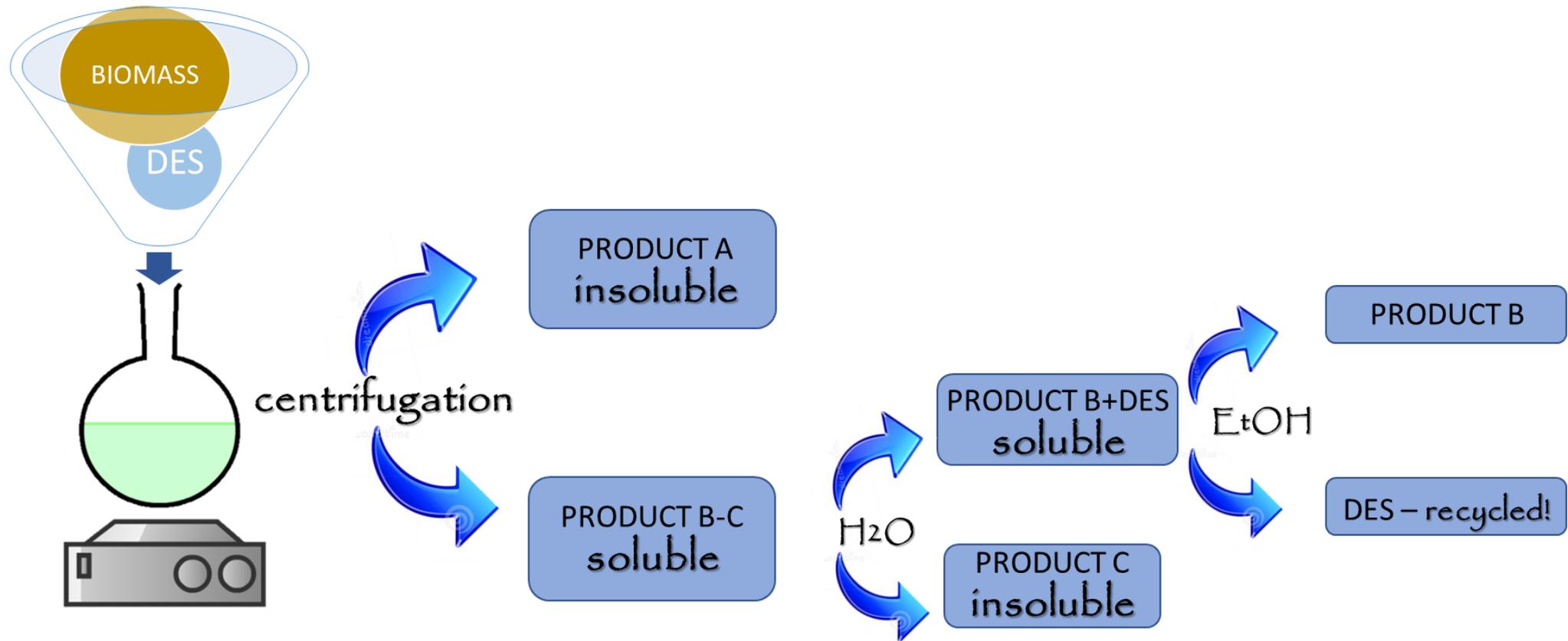
Viscose



Bi-Rex aims at manufacturing cellulose using spent agrifood biomasses by using re-usable eco-sustainable solvents called DES – Deep Eutectic Solvents



Bi-Rex solvent extraction is simple



Bi-rex already validated by several entities as potential high-value project



Grant 30k €
Acceleration Program



Special Mention
«Circular Economy» section



POC Investment 160k €



Selected project investment ideas
S3 Platform

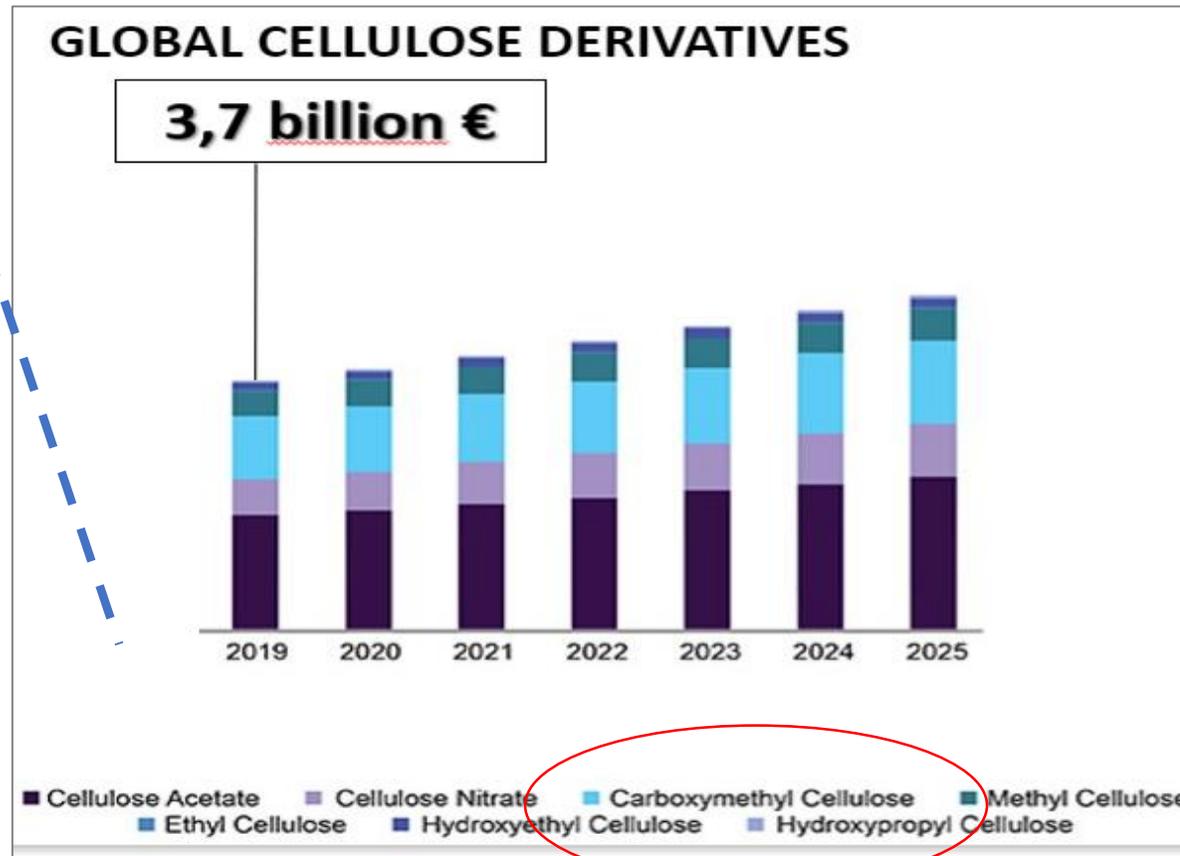
Initial Target Markets

CELLULOSE DERIVATIVES

3.7 B€

TISSUE PAPER

60 B€



EXAMPLE
 Carboxymethyl cellulose (used for sanitizers) has been in short supply in Europe during the COVID crisis and been imported from China with price increases up to 500%



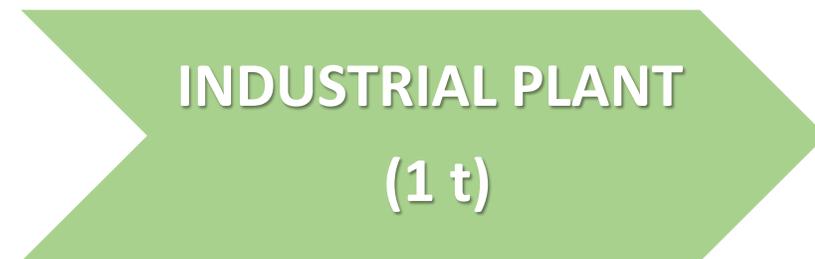
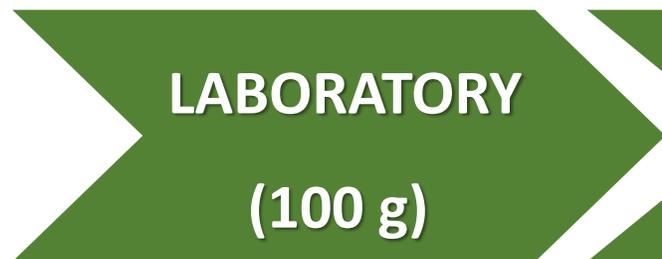
Roadmap

2022

TODAY

2021

3 YEARS



- Process validation
- Economic sustainability
- Quality check

- Process validation
- Plan set up
- Quality check

160.000 €

POC

SEED/POST SEED

>1 mln €

Example: Brewer's Spent Grain (BSG)

		Scenario			
		A	B	D	E
KPIs					
Number of possible solvent cycles		25	50	75	100
Unit cost of solvent	EUR/kg	€ 10,00	€ 8,00	€ 6,00	€ 4,00
Inputs					
Mass					
Biomass	kg	1,0	1,0	1,0	1,0
Biomass/solvent ratio		10,0	10,0	10,0	10,0
Solvent	kg	10,0	10,0	10,0	10,0
Total mass	kg	11,0	11,0	11,0	11,0
Cost					
Solvent - unit cost	EUR/kg	€ 10,00	€ 8,00	€ 6,00	€ 4,00
Biomass - unit cost	EUR/kg	€ -	€ -	€ -	€ -
Total cost of input	EUR	100,00 €	80,00 €	60,00 €	40,00 €
Outputs					
High-value products	kg	15,0	30,0	45,0	60,0
Hemicellulose	kg	5,0	10,0	15,0	20,0
Lignin	kg	5,0	10,0	15,0	20,0
Cellulose	kg	5,0	10,0	15,0	20,0
Other (contaminants)	kg	10,0	20,0	30,0	40,0
Unit value of outputs					
Hemicellulose	EUR/kg	€ 10,00	€ 10,00	€ 10,00	€ 10,00
Lignin	EUR/kg	€ 2,00	€ 2,00	€ 2,00	€ 2,00
Cellulose	EUR/kg	€ 0,40	€ 0,40	€ 0,40	€ 0,40
Total value of output	EUR	€ 62,00	€ 124,00	€ 186,00	€ 248,00
Process Value-Added	%	-61%	35%	68%	84%

Bi-rrex process potentially highly profitable if certain KPIs are satisfied (e.g.: n=number of solvent cycles, price of solvent, ...)

Possible partnerships



Bi-Rex is seeking partnerships within the European Chemicals Regions Network.

Ideally, partners should be:

- projects aimed at **collecting, stabilizing and pre-treating agri-food waste**
- projects aimed at **manufacturing new classes of cellulose derivatives** or at **developing new applications for cellulose derivatives**

It is also important for partner projects be at least at the post-seed stage and **ideally already incubated in one of Europe's startup accelerators** that could partner with PoliHub (the Innovation District and Startup accelerator of Politecnico di Milano)