

RESYNTEX



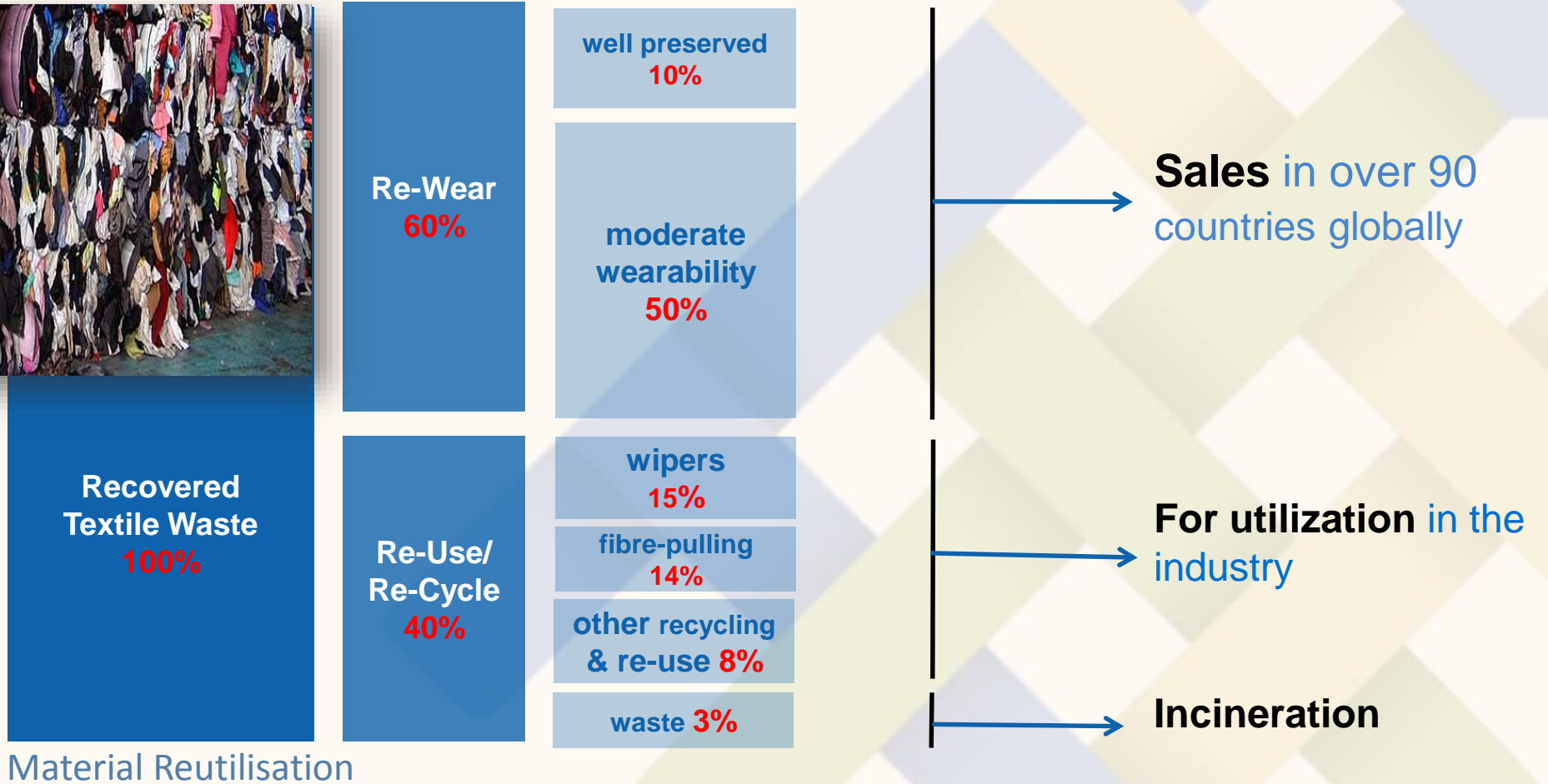
**A new circular economy concept
from textile waste towards
chemical and textile industries feedstock**

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Introduction



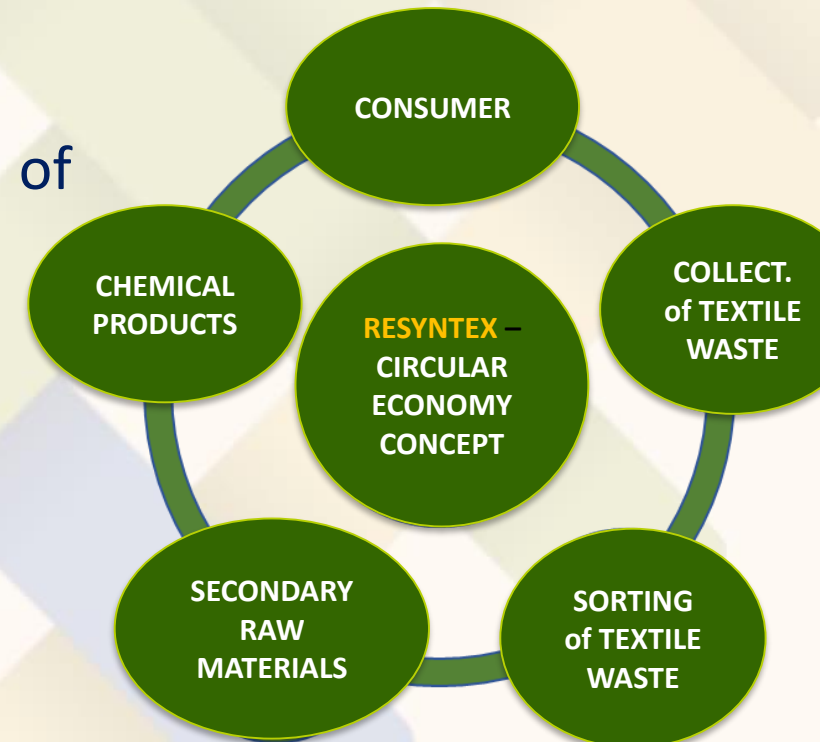
- 75 mio. tons of textile are used/produced worldwide
- a few % of the overall textile waste (low-valued) flow is recycled
- currently ~ 60 mio. tons/year of textiles - sent to landfills or burned



Project vision

A new value chain in the circular economy concept

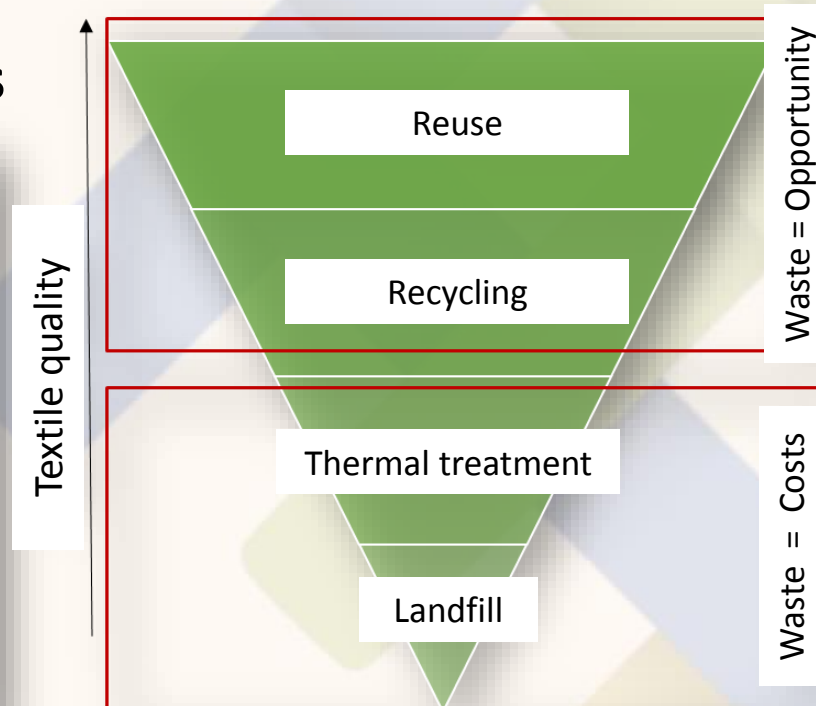
- ❑ Protecting the environment & raising social awareness and responsibility → introduction of **the circular economy concept** is an important decision at the EU level
- ❑ **Project goal** is to create the circular economy concept → symbiosis between the textile and chemical industry
- ❑ **Aim:** usage of the innovative recycling concept for production of secondary raw materials for the chemical industry
- ❑ Textile waste **becomes a source for the textile and chemical industries**



Process input

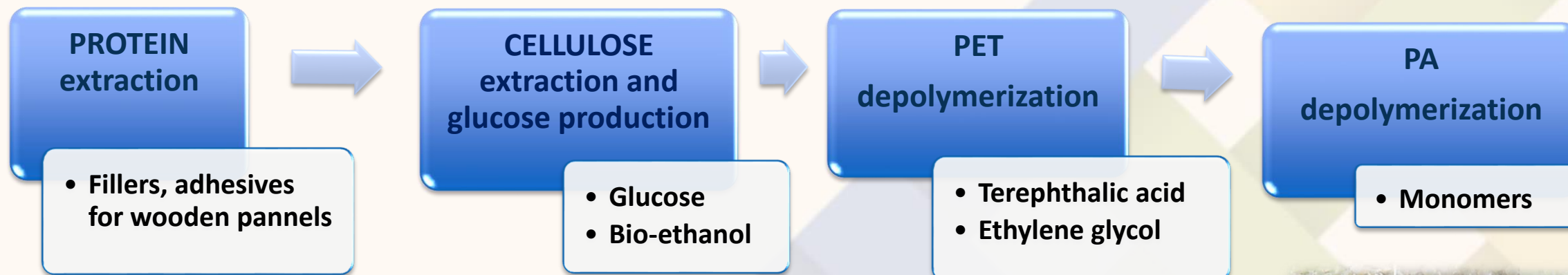
- ❑ **Waste textiles - raw material of low value** for recycling in existing recycling processes (disposal, incineration without energy recovery).
- ❑ **New concept - processing of raw textile wastes and mixtures** (Protein, CELL, PET in PA fibres) **into secondary raw materials for the chemical industry.**

❑ **95% of the weight of waste textiles**



Process outcomes

□ Secondary raw materials for the chemical industry



Organization of project work - Consortium

☐ 20 partners from 10 EU countries,
3 from Slovenia

☐ All segments of newly established
value chain:

- waste collectors;
- end-users of secondary raw materials;
- academic, expert and consulting organizations;
- stakeholders at the highest EU level.



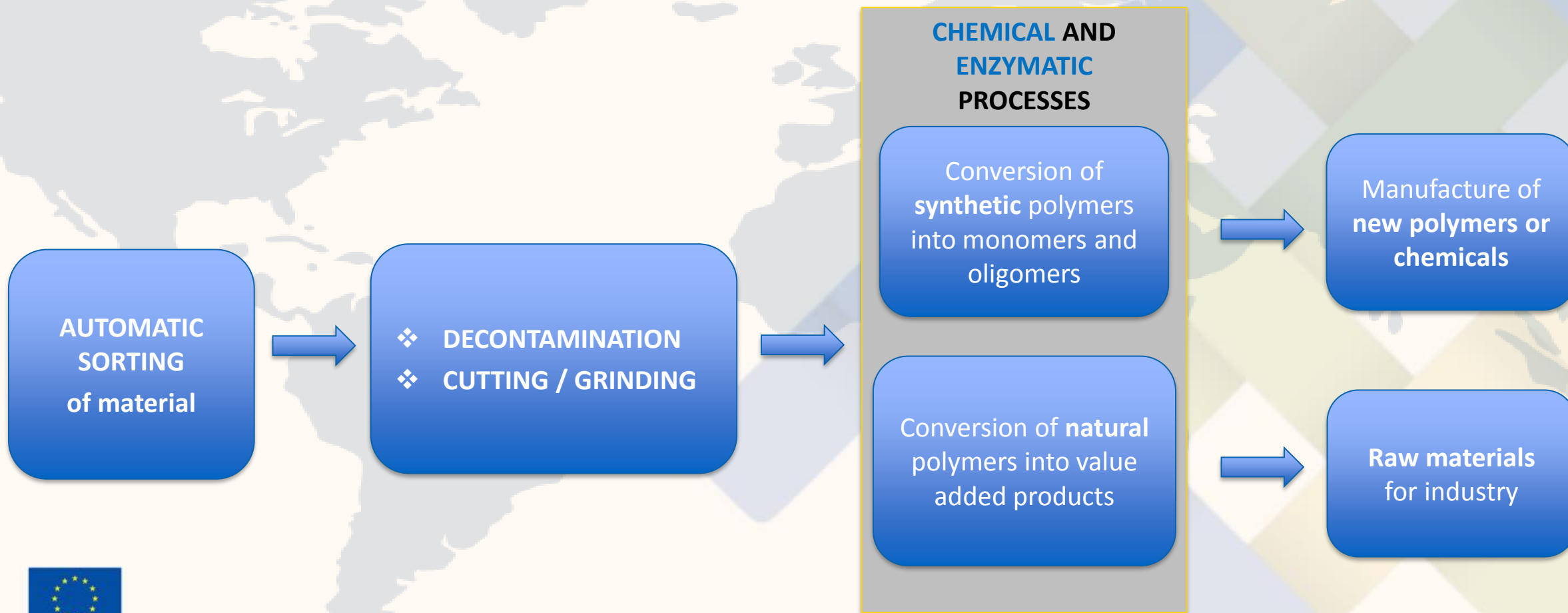
Organization of project work

Considering and demonstrating **the whole value chain** starting from :

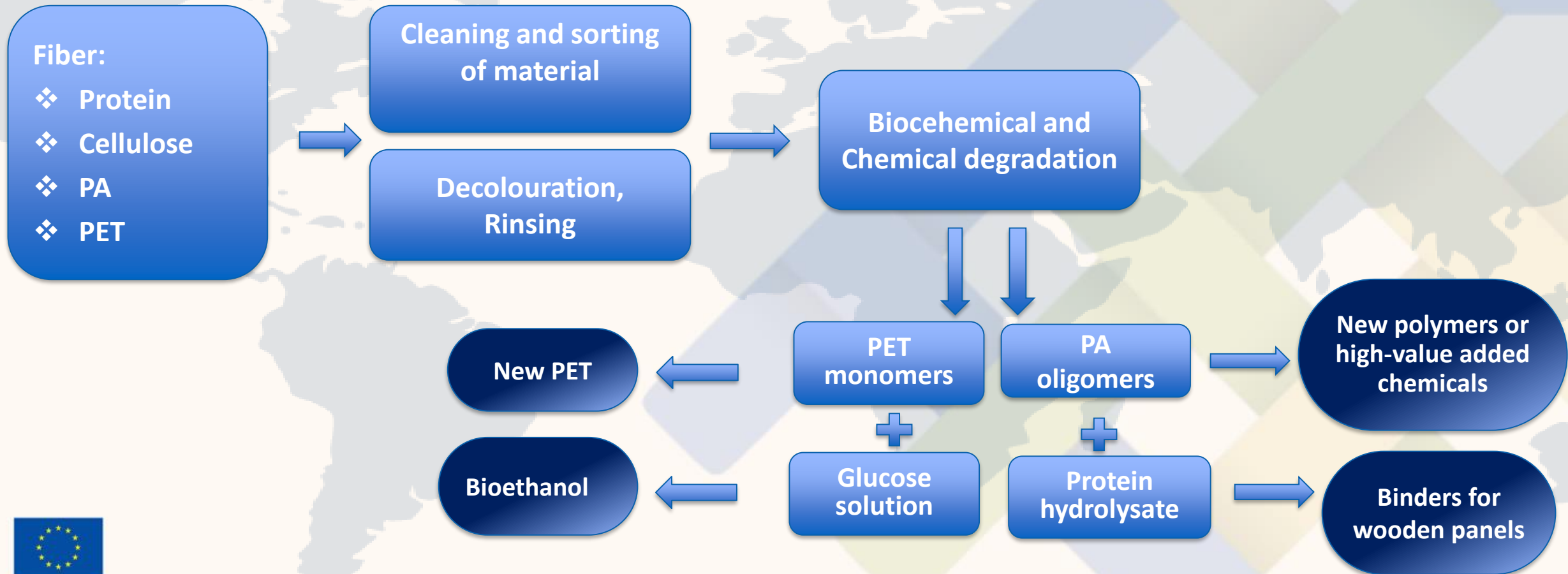
1. Preparation of **strategies and scenarios** for the economically successful synergy of the textile and chemical industries,
2. Renovation of the **concepts of collecting** textile waste (improving public awareness),
3. Improving the **sorting and pre-treatment** of textile waste,
4. Development and optimization of the **chemical and biotechnological transformation** process of **natural** and **synthetic** textile **fibres** into intermediates of raw materials for the chemical industry as well as handling of **liquid and solid residues** of the process,
5. Development of **industrial applications** using raw materials from textile waste,
6. **Process planning** and techno-economic **analysis**,
7. **Demonstration** of a comprehensive concept at industrial scale,
8. Environmental and economic assessment of scenarios and verification of the **business model**,
9. Exploitation, dissemination, communication, standardization and training.



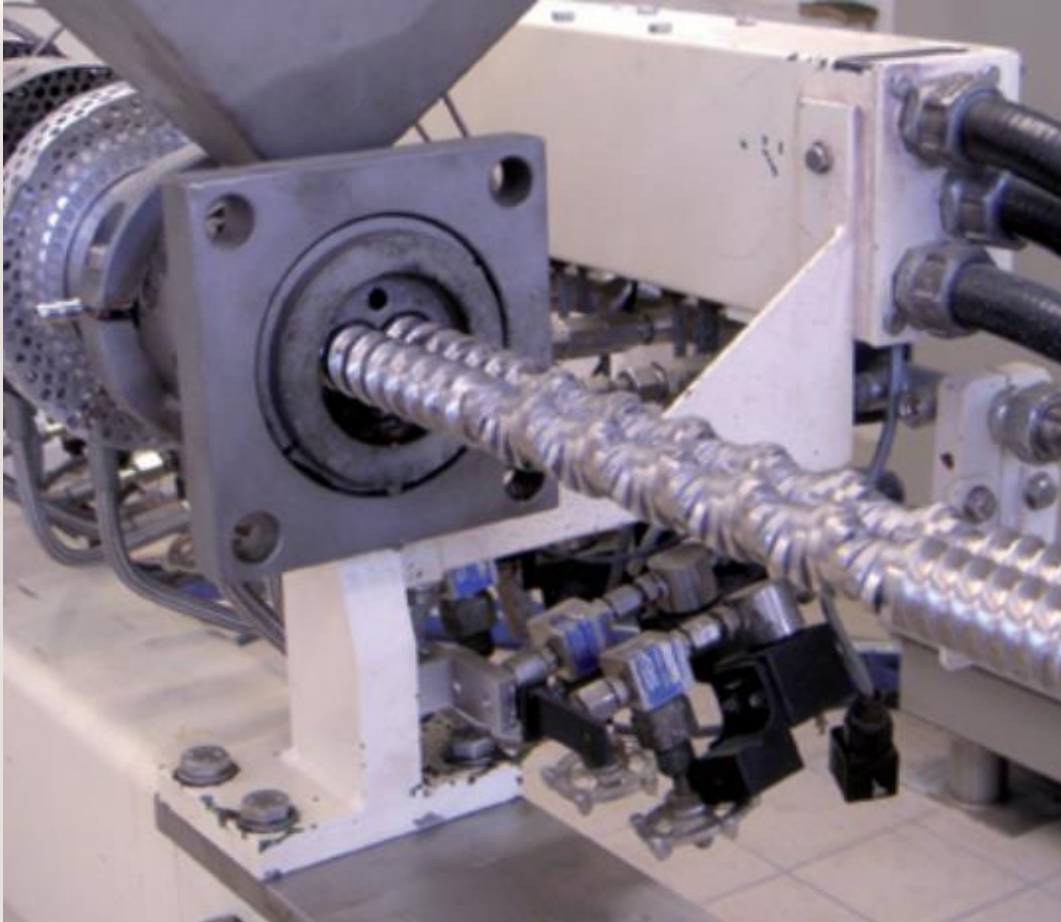
Recycling processes: mechanical, enzymatic, chemical



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Material pretreatment



Two-screw extruder



Material after extrusion



Decolourization



PET (sCO₂)



CELL



PA



PA



DENIM



PET



Proces demonstration – pilot plants



Pilot plant (30 t/year) for cellulose and protein fibres, installed in France



Protein fibers



Solubilized protein fibers



Precipitating protein fibers



Precipitated proteins



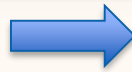
Cellulosic fibres



Bioreactors for enzymatic degradation



Cellulosic fibers



Without pre-decolourization



Pre-decolourized waste

Textile waste - Cellulose





PET waste



TA monomer



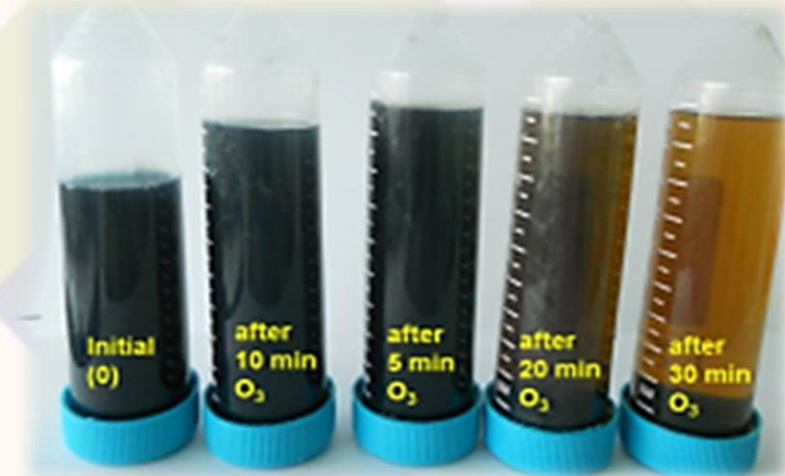
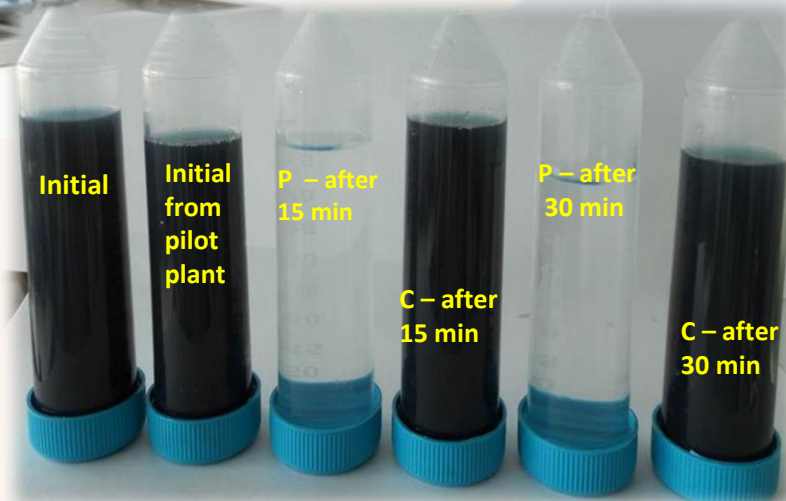
Waste streams - Liquid



Membrane filtration plant



AOP pilot plant



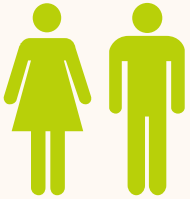
Waste streams - Solids



Benefits from RESYNTEX:



- **Non-wearable textile waste** can become a valuable source for **new chemical feedstock**
- Reducing **environmental impact**



- Improve **collection approaches & increase public awareness &** improve social involvement with the issue of textile waste



- **Improving standards** for efficient industrial symbioses with **new business models** in circular economy



Benefits from RESYNTEX:



- It integrates various stakeholders into circular economy
- demonstration of an ambitious theoretic concept in reality (30 t/y pilot plant)



- Uses innovative recycling & industrial symbiosis



- Complete value chains from textile wastes & chemical feedstocks



- Global benefits beyond EU





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