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Water consumption & energy saving

100% Biodegradable water industrial filters

PLA fibers for the industrial filtering market

CETI CENTRE EUROPÉEN DES TEXTILES INNOVANTS

PROBLEMATIC

How does the Good Practice impact on the policy theme

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Unfortunately, water is strongly used and produced in large quantities of industries.

They should optimize its use in order to reduce the sampling, consumption and preserve its quality throughout their production chain and improve the wastewater treatment.

Wastewater : The water produced must be treated before being reused or released into the environment.

Reuse of water or release : The recycling of water production waste limits the consumption of the external water source.

In 2015, France has 21,079 wastewater treatment plants (STEU), representing an overall load of 78 million Equivalent-inhabitants for a purification capacity of all STEUs of 104 million Eh.

http://assainissement.developpement-durable.gouv.fr/

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100% Biodegradable water industrial filters

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As part of a private project, our customer expects the creation of an entirely biodegradable filter, for wat treatment within the Wastewater.

The aim of this project was to replace the filters usually produced from PET fibers with a new development nonwoven carded 100% PLA fibers for the filtering market. With the intention of decreasing the environment footprint in their process.

The client filter was elaborated in PET Polyethylene terephthalate which is a petrochemical fiber, a kind polyester material for fiber used for different applications like beverage, food and other liquid containers, as w as for some other thermoforming applications.

At the end of life, they are burned with filtered mud and significant carbon footprint

On the other hand, PLA Fiber Polylactide ou Polylactic Acid Fiber is an **organic origin product** which does not u oil or other fossil resources. It means that it can easily return to the natural environment after use.

With a PLA fiber the filter can be composted with sludge, no carbon footprint

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What's PLA ?

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PLA is an Ecological product, which contributes to protect the fossil resources and reduces carbon diox emissions. This fiber typically is made using lactic acid as the starting material for polymer manufacture. The lac acid comes from fermenting various sources of natural sugars. These sugars can come from annually renewa agricultural crops such as corn or sugar beets.

The life cycle assessment shows that PLA is considered a greener alternative to PET because its supply ch requires less transportation and thus contributes less CO2 to the atmosphere. This material joins perfectly in t current concerns regarding environment.

The fundamental polymer chemistry of PLA allows control of certain fiber properties and makes the fiber suita for a wide variety of technical textile fiber applications, mainly in the industrial applications but not only, as well apparel and performance apparel, interior design.

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Why is the ideal fiber

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Besides being a green fiber, it has all these characteristics:

- Low moisture absorption and high wicking, offering benefits for sports and performance apparel and products
- Low flammability and smoke generation
- High resistance to ultra violet (UV) light, a benefit for performance apparel as well as outdoor furniture and furnishings applications
- A low index of refraction, which provides excellent color characteristics
- Lower specific gravity, making PLA lighter in weight than other fibers
- In addition to coming from an annually renewable resource base PLA fibers are readily melt-spun, offering manufacturing advantages that result in greater consumer choice

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Biopolymer starts with plants

The bioplastic only need a sugar source. In the future this will include cellulosic raw materials, agricultural wastes and non-food plants

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PHOTOSYNTHESE S

way of Making Sugar

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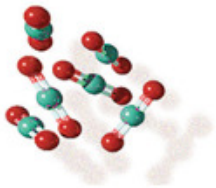

Carbon Dioxide
from the air is absorbed by the leaves of a plant.

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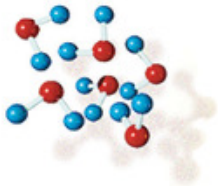

Water
is taken in from the soil by the roots.

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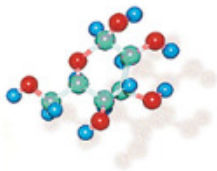
Sunlight
provides the energy needed to transform carbon dioxide and water into glucose and oxygen - a process called photosynthesis.

=

Glucose (Sugar)
is made by the plant and used as fuel. Any unused sugar is stored as starch and can be harvested to use for making Ingeo biopolymer.



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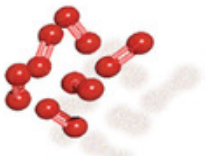
Oxygen
is released back into the atmosphere.



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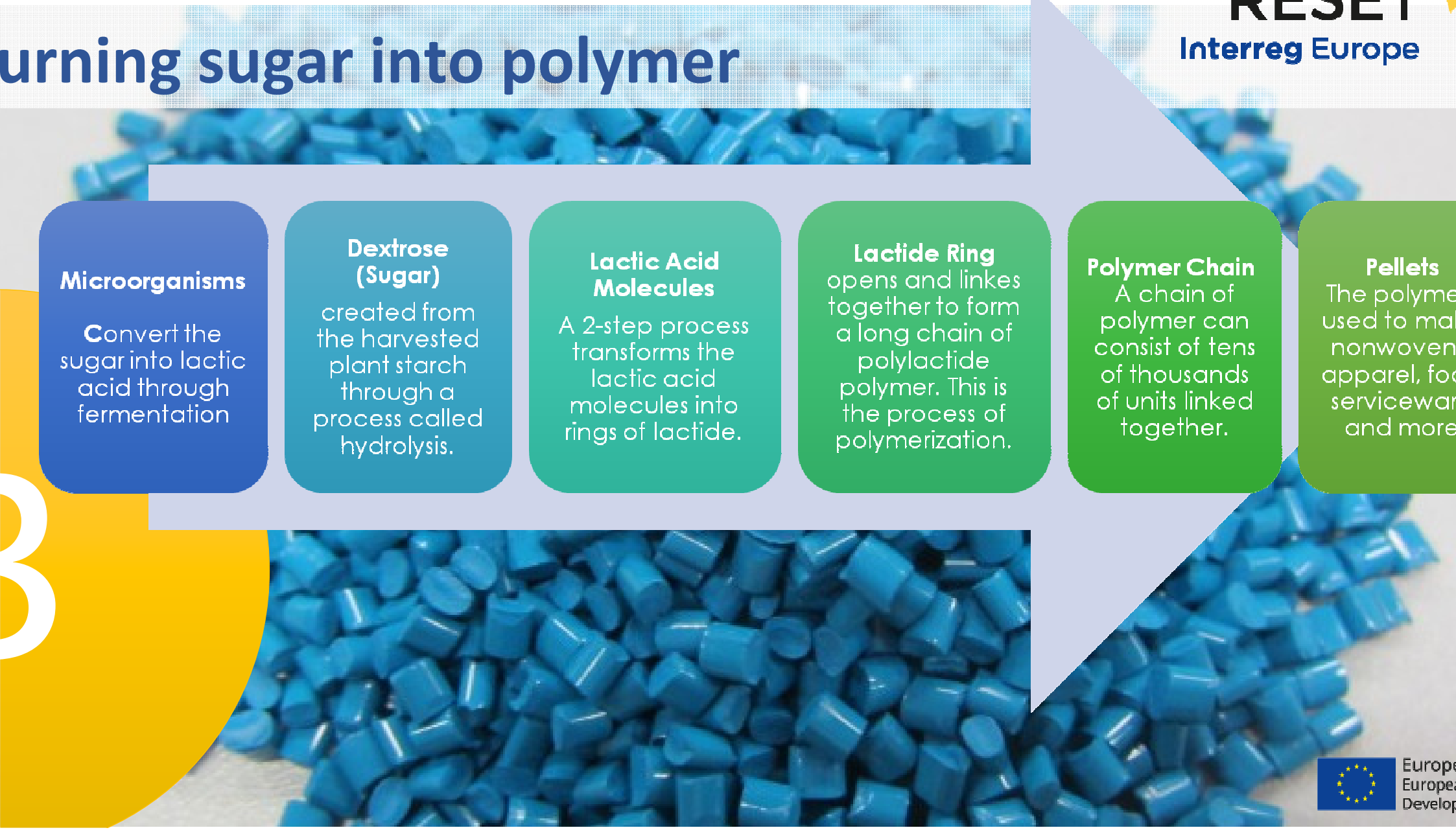
urning sugar into polymer



Microorganisms

Convert the sugar into lactic acid through fermentation

Dextrose (Sugar)

created from the harvested plant starch through a process called hydrolysis.

Lactic Acid Molecules

A 2-step process transforms the lactic acid molecules into rings of lactide.

Lactide Ring

opens and linkes together to form a long chain of polylactide polymer. This is the process of polymerization.

Polymer Chain

A chain of polymer can consist of tens of thousands of units linked together.

Pellets

The polyme
used to ma
nonwoven
apparel, foo
servicewar
and more

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Develop

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reate innovative products

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lore end-of-life options

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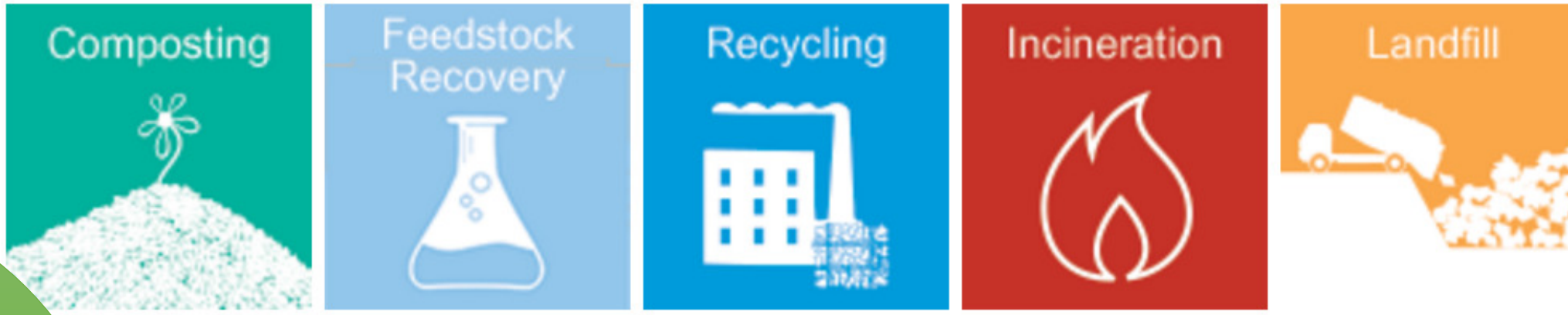

Composting = Not envoronmental footprint

Compatible with existing recycling systems, can be cleanly incinerated and are completely stable in landfill – still the unfortunate fate for most of today's plastics.

Eco-advantage starts at the beginning of the product development

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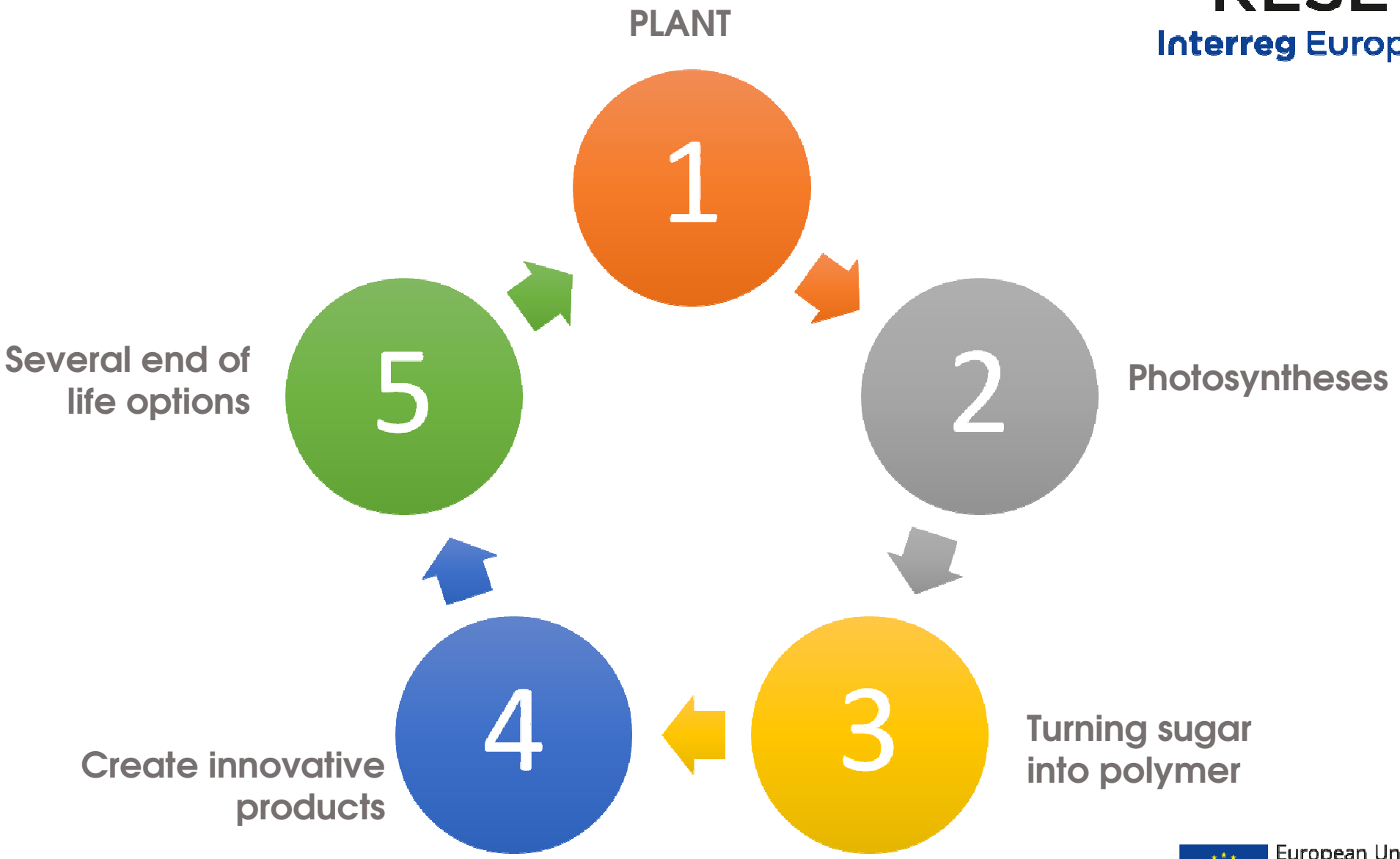

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The project aims

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The improvement wastewater process filtration

-Have an equivalent function to the material replaced. If one wants to replace a PET filter with a PLA filter, the technical performance of the PLA should be better or at least the same
-Be available at lower total cost and at a competitive price. More sustainable materials deliver additional value added benefits, including reduced total societal cost.
-Improve characteristics of current product

The use of PLA in the textile development

-Have a minimum environmental footprint for all processes involved

-Not have any negative impact on water.

-Be made from renewable resources.

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The project

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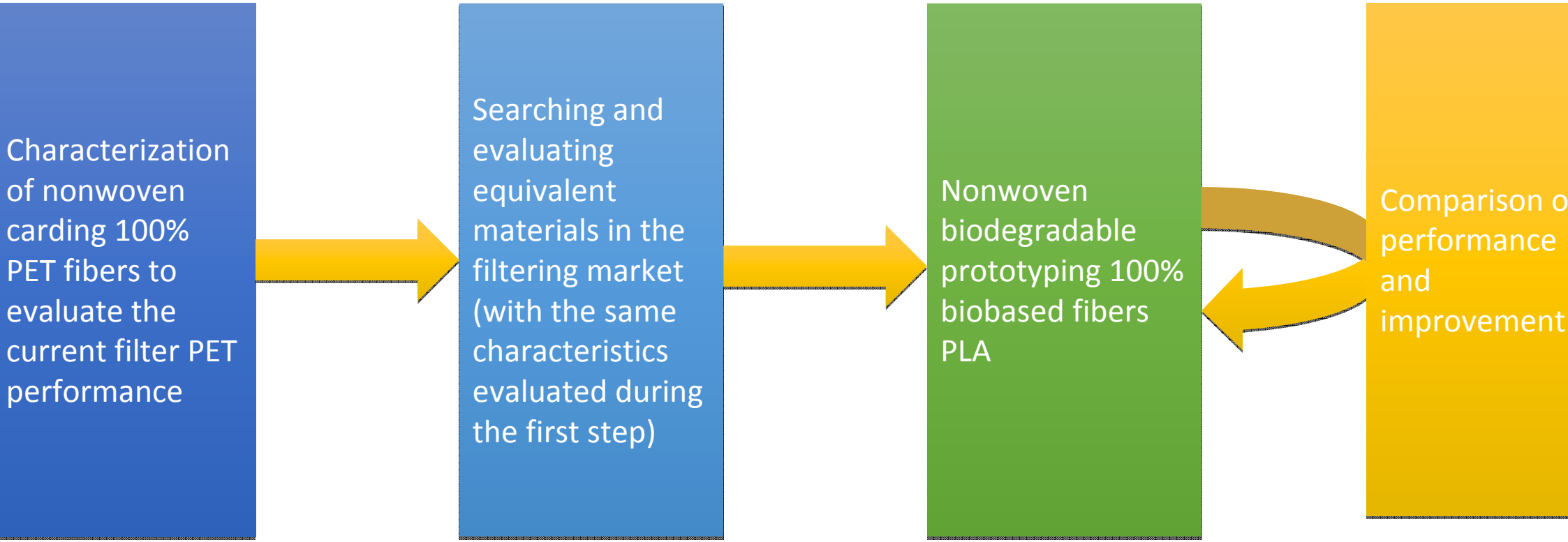
The development project proceeded as follows :



Ces mêmes filtres pourront être réalisés directement à partir de la technologie Spunbond en bi-composant (en utilisant une autre résine PLA à bas point de fusion)

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The project

From 2 to 1 STEP

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PLA Pellets → Spinning , crimping an d Cut to obtain a fiber → Carding / Needleloom

2 different PLA Pellets
With 2 different fussion points → Spunbound through by hot air flow

Energy saving on manufacturing and zero carbon footprint at the end of life

CONCLUSION

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Unfortunately, water is strongly used for several industrial treatments, the environmental impact is high; the process needs to be improved in order to decrease the environmental footprint at different levels:

- Improving the treatment of wastewater
- Improving the product life cycle managemen

- Evaluate the environmental footprint impact of current process
- Identify the part of process that could be improved
- Search different possibilities to improve the process
- Prototype your new product
- Compare the characteristics between current process and new process with your new product
- Set your product in your process

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