



1st External Workshop on Bio-plastic Innovations

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Marco Scatto
MIXCYCLING srl



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UK Research
and Innovation

Innovative Bio-Plastic Formulations

Today, there is a bioplastic alternative for almost every conventional plastic material and corresponding application. Bioplastics are plastics that are biobased, biodegradable, or both have the same properties as conventional plastics and, in many cases, even offer additional advantages. This includes a reduced carbon footprint or additional waste management options, such as composting. Bioplastics are an essential part of the bioeconomy and a fast-growing, innovative industry that has the potential to decouple economic growth from resource depletion and environmental impact. Bioplastics are a diverse family of materials with differing properties. There are three main groups:

- Biobased or partially biobased non-biodegradable plastics, such as biobased PE, PP, or PET (so-called drop-ins) and biobased technical performance polymers, such as PTT;
- Plastics that are both biobased and biodegradable, such as PLA and PHA or PBS;
- Plastics that are based on fossil resources and are biodegradable, such as PBAT, PCL.



Fossil based polymer are polymers entirely based in fossil sources, **NOT renewable**

Bio-based materials is focused on non food and feed renewable resources and waste resources such as ligno-cellulosic resources, agricultural waste, food waste, etc.

From European Bioplastics Association:

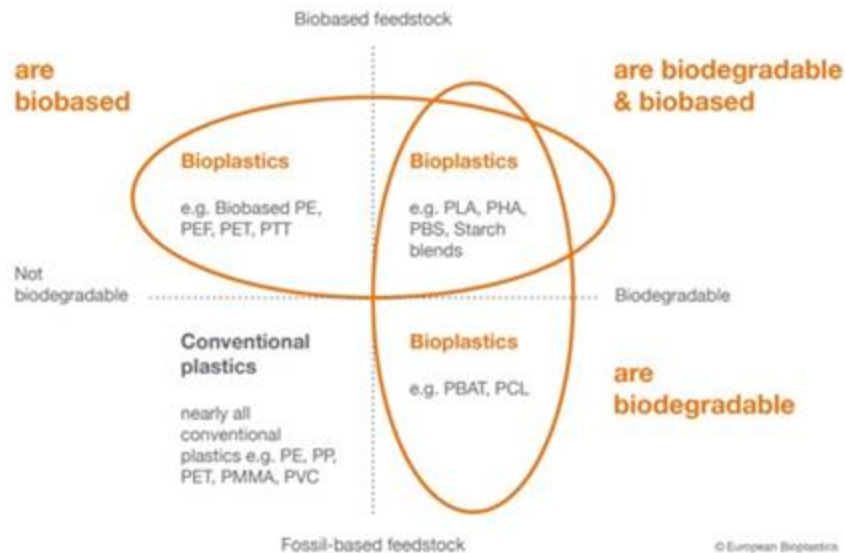
Biodegradable polymer certified for industrial compostability following EN 13432, can be from renewable resource or from fossil resource.

Biobased polymer from renewable resource can be biodegradable or not biodegradable



Material coordinate system for bioplastics

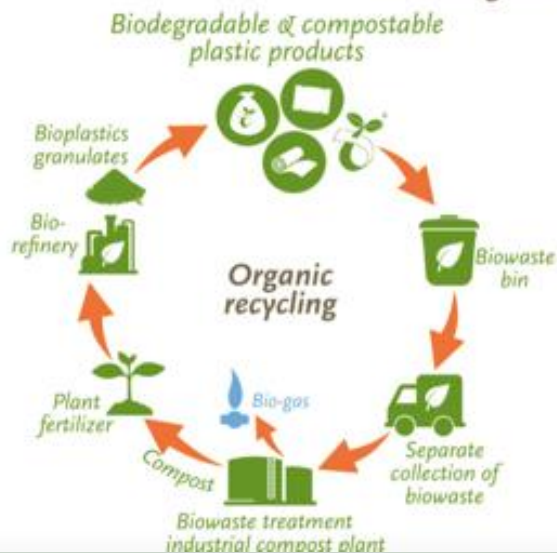
Bioplastics are biobased, biodegradable, or both.



Source: Institute for Bioplastics and Biocomposites (IBB) and European Bioplastics (EUBP)

End-of-life options for **BIOPLASTICS**

– Closing the loop –



- 1 star: 20 – 40 % BCC
- 2 star: 40 – 60 % BCC
- 3 star: 60 – 80 % BCC
- 4 star: > 80 % BCC



Sustainability and Circularity in Bio-Plastic Manufacturing



Biodegradable polymer jar



Biobased polymer jar



Biobased polymer closure



Biobased – Biodegradable compostable polymer jar



Biobased PET jar



Biobased cosmetic make up packaging

Use of vegetable wastes micronized as filler in biobased polymer

Application in rigid packaging: jar and cap where biopolymer is mixed with waste from cork processing or rice husk



MIXCYCLING APPROACH



Sustainability and Circularity in Bio-Plastic Manufacturing

SCRAPS FROM CORK PROCESSING

Cork scraps have various applications, mainly as an insulator or as biomass.
At Mixcycling, these scraps are **recovered and sterilised, processed into microgranules and sanitised** in order to make SUCHERA.
Thanks to the sanitation and activation process, the fibre is free from heavy metals and bacteria, 100% suitable for food contact.

WHERE?



HOW?



Cork is obtained from the bark of a specific type of evergreen oak without killing the tree in the process.



It is considered a fully recyclable fibre because it can be recovered while maintaining intact its mechanical properties.



Opportunely milled and processed, the fibre is recovered to enter new and different production cycles.

SCRAPS FROM RICE PROCESSING

Rice husk has various applications, mainly as litter or as mulch.
At Mixcycling, these scraps are **recovered and sterilised, processed into microgranules and sanitised** in order to make LÖLLA.
Thanks to the sanitation and activation process, the fibre is free from heavy metals and bacteria.

WHERE?



HOW?



Rice husk is obtained from local rice production processes, which makes it a km0 resource.



Over 280.000 tons of rice husk are produced in Italy every year; this means that rice husk is an abundant resource the recovery of which contributes to waste reduction.

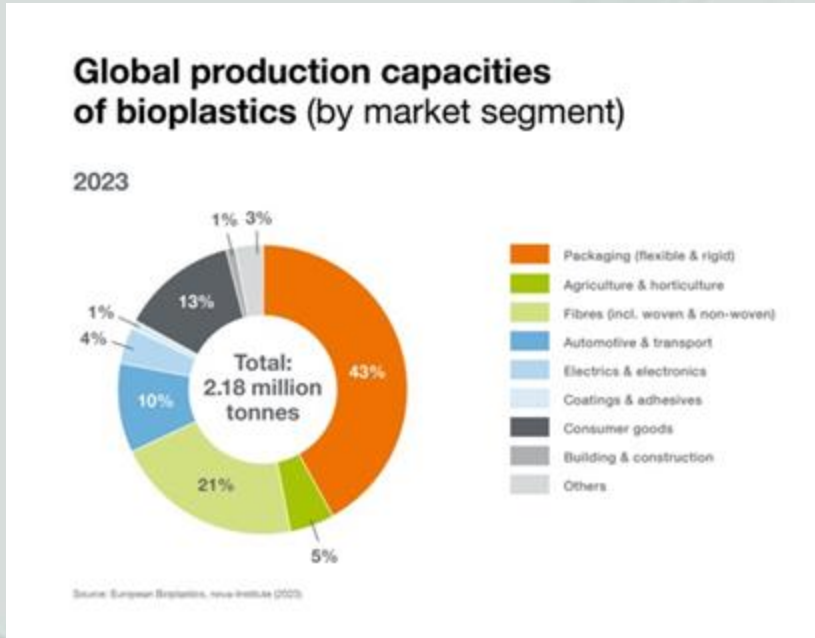


Opportunely milled and processed, the fibre is recovered to enter new and different production cycles.

Sustainability and Circularity in Bio-Plastic Manufacturing

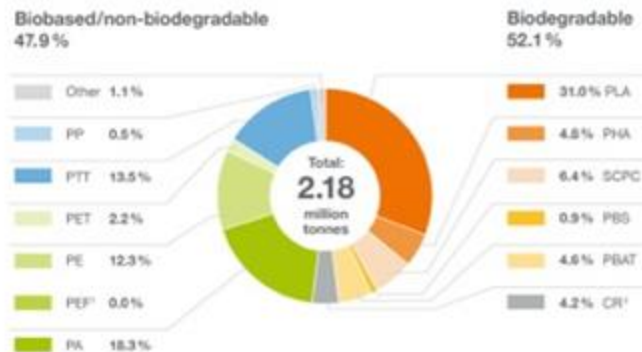


Applications and Market Trends for Bio-Plastics



Applications and Market Trends for Bio-Plastics

Global production capacities of bioplastics 2023



* PEP is currently in development and predicted to be available in commercial scale in 2025. * regenerated cellulose fibre. Source: European Bioplastics, Nova Institute (2023)

Applications and Market Trends for Bio-Plastics

A Kiss
To
The Sea

SHISEIDO
AquaGel Lip Palette

SBAS SUSTAINABLE BEAUTY ACTIONS

SHISEIDO
GINZA TOKYO

The advertisement features a serene beach scene on the left with a woman in a red dress walking along the shore. On the right, the Shiseido AquaGel Lip Palette is displayed, showing its packaging and the product itself with three shades of lipstick. The text 'A Kiss To The Sea' is overlaid on the beach image. At the bottom, the SBAS logo and Shiseido logo are present.

Biobased Polymer in Cosmetics

In packaging design, aspects of sustainability, such as recyclability or resource efficiency are becoming increasingly important.

A Bottle made in bioplastics consists of renewable raw materials and secondly it can be recycled using existing recycling systems. (**BioPET and Green PE**)

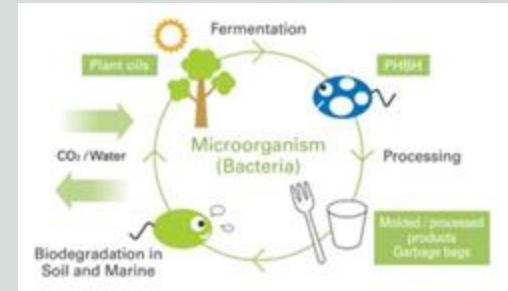


PHACT™ Marine Biodegradable Polymers:

CJ BIO, a division of South Korea-based CJ CheilJedang, has introduced PHACT® Marine Biodegradable Polymers based on its proprietary polyhydroxyalkanoate (PHA) technology. Being a part of the solution to change the trajectory of the plastic pollution challenge and preserving the planet is the essence of the PHACT brand. PHACT means PHA + Act and CJ Bio is committed to impactful action delivering eco-friendly solutions with their extensive PHA technology platform. The first product of the new line – PHACT A1000P – is an amorphous PHA being produced at CJ BIO’s newly commissioned Pasuruan, Indonesia facility.

Kaneka Green Planet™ PHBH Marine Biodegradable Polymers

Green Planet™ is a brand name of PHBH (Poly(3-hydroxybutyrate-co-3-hydroxyhexanoate)) developed by Kaneka with similar properties of PP and PE. With two grades 151C (flexible) and X131A (rigid) shows gas barrier properties of PLA, PBS and PBAT.



THE ESSENTIAL ROLE OF BIOPLASTIC IN NEW PACKAGING AND PACKAGING WASTE REGULATION

Both, **biobased and recycled content help to reduce the environmental impact of plastics and packaging by significantly reducing GHG emissions.** Biobased plastics can feature overall significantly lower carbon footprint during their entire life cycle, and many of them **can be recycled as well, even further lowering GHG emissions.** The Commission's own Communication on 'Sustainable Carbon Cycles' sets out the aspirational objective that at least 20% of the carbon used in chemical and plastic products should be from sustainable non-fossil resources to help reaching climate neutrality.

Not all plastic products and packaging applications can be made from recycled materials, especially when **strict requirements on food safety and consumer health must be met.** Biobased materials are eligible for contact sensitive applications and must comply with all the strict regulations and tests when used as FCM and are a safe and sustainable solution when reuse or recycling are not an option.



MIXCYCLING IS...



AN INNOVATIVE START UP

Mixcycling® is an **innovative start up** researching and developing **sustainable materials**, by exploiting the properties of organic fiber generated from production scraps.



BENEFIT CORPORATION

a denomination which reflects the company mission to pursue **sustainability through innovation**.



A CONCEPT

inspired by **bio & circular economy** principles which strives **nobilitate organic scraps** and give new life to plastic.



A SCIENTIFIC PROJECT

managed according to open innovation principles which aims to **develop new high performance, low-impact biopolymers**.



OUR OBJECTIVE

SUSTAINABILITY AND THE ENVIRONMENT

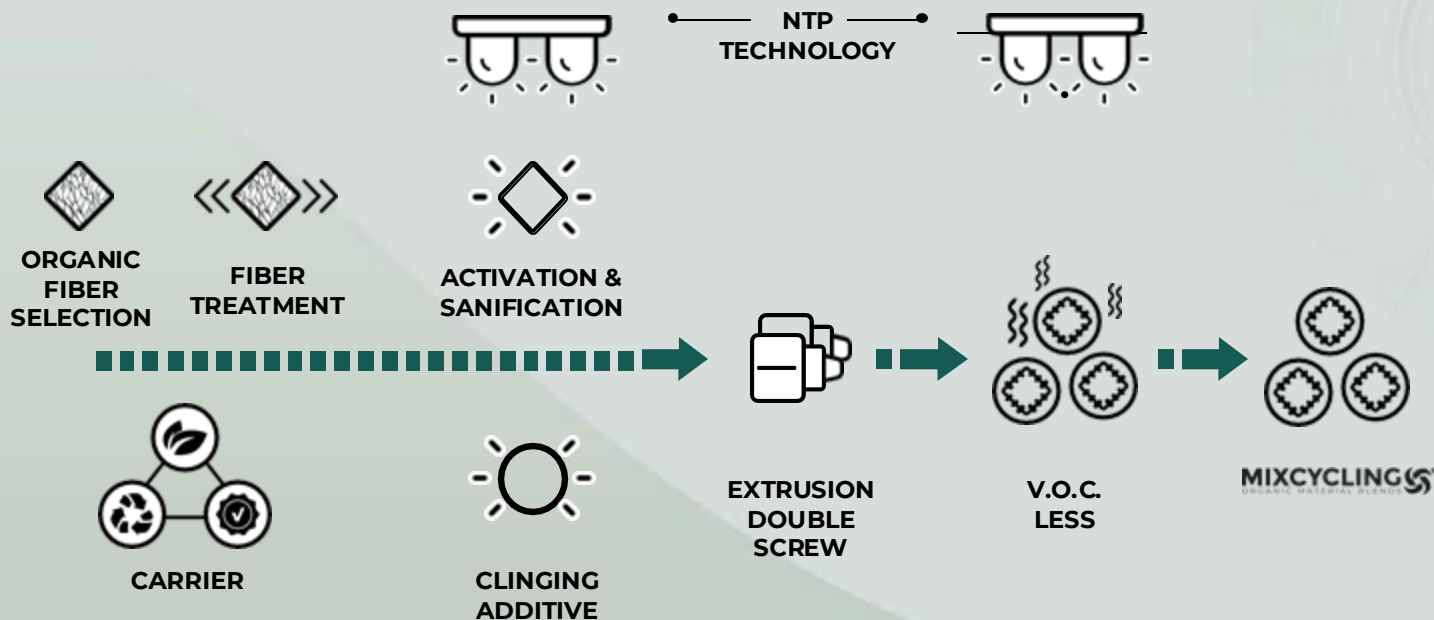
Mixcycling's objective is to give a second life to scraps by **recovering organic scraps from agro-industrial processes**, in order to create alternatives to traditional plastics.

We are driven by our desire to lead the transition from fossil-based materials towards bio-based ones and to nobilitate organic scraps.



TECHNOLOGY

OUR PATENTED PROCESS



BIOCOMPOSITES

CARRIER



VIRGIN



BIOBASED



RECYCLED



BIODEGRADABLE



RECYCLED
*FOOD CONTACT



BIODEGRADABLE
COMPOSTABLE



FIBER



SILVERSKIN



WOOD



RICE HUSKS



CORK



BLEND

MIXCYCLING
ORGANIC MATERIAL BLENDS



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SOME APPLICATIONS



FOOD PACKAGING



COSMETIC PACKAGING



HOUSEHOLD PRODUCTS



DISPOSABLE



PET TOYS



FURNITURE



INDUSTRIAL



AUTOMOTIVE

GREENLOOP

FOLLOW
US!



<https://www.linkedin.com/company/horizon-eu-green-loop>



<https://www.facebook.com/heu.greenloop>



<https://twitter.com/HEUGreenLoop>



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