

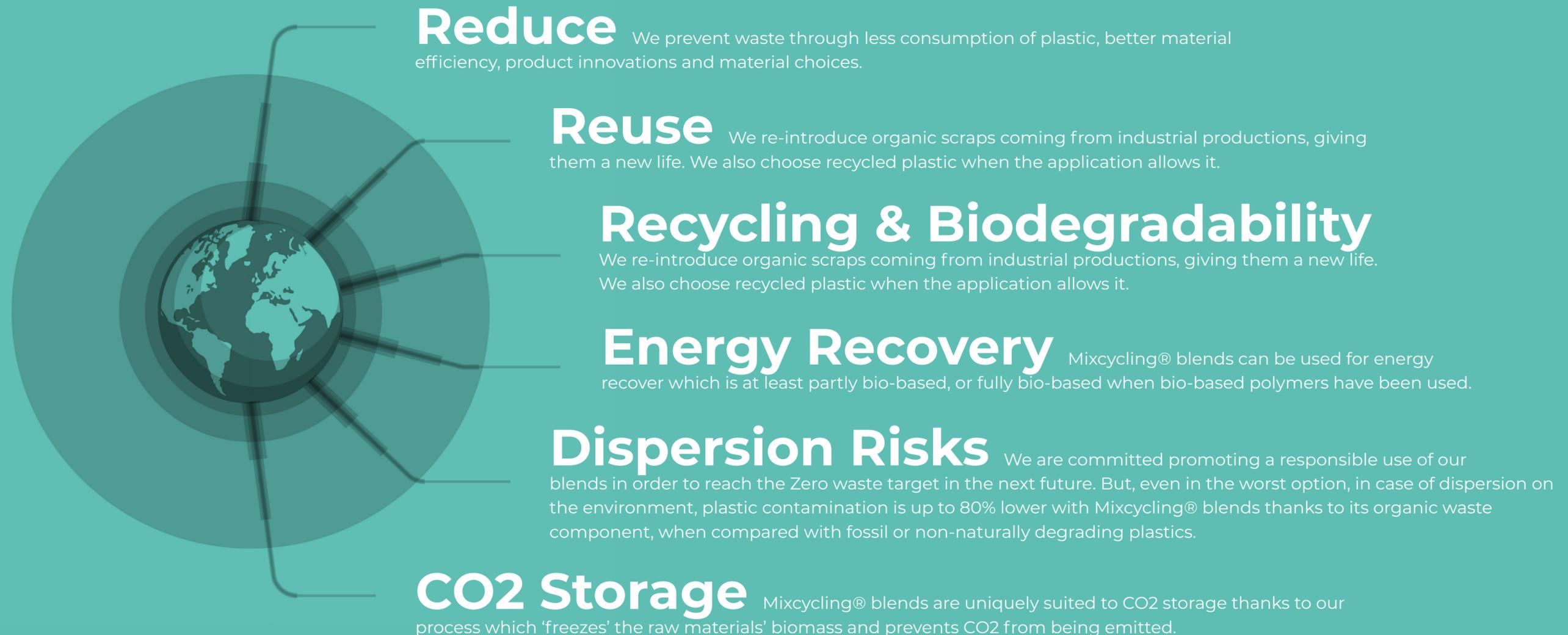


sustainability doc. 2021

Mixcycling® Sustainability & Eco-design

The majority of plastics ends up as mixed waste (not-recyclable) or, at the worst, dispersals in the environment.
Circular Bio-economy is an outcome of a synergy between Production Chains, Regulators, Business Communities and Consumers.

Let's approach the issue all around:



Mixcycling[®] Sustainable Landmarks

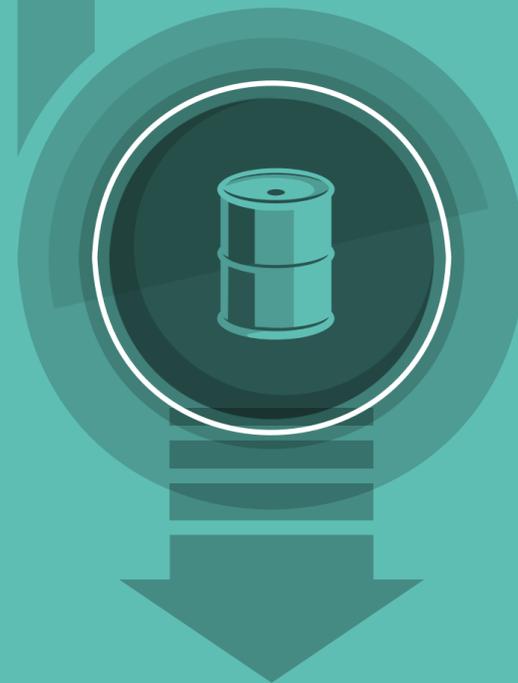
Less Energy

reduction of energy intensive processes



Less Resources

reduction of the consumption of non-renewable or limited resources



Less Pollution

reduction of polluting emissions



Less Impact

reduction of end-of-life environmental impact



Mixcycling®

LCA - Life Cycle Assessment

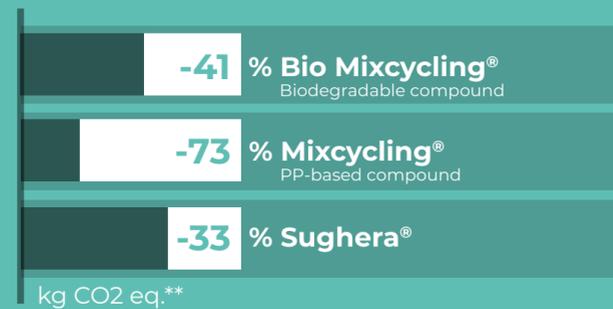
LCA, Life-Cycle Assessment, is an analysis to assess environmental impacts associated with all the stages of a product's life (from raw material extraction through material processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling).

LCA is helpful for either designing sustainable products or implementing any decision-making process during product's production in order to reduce the environmental impact.

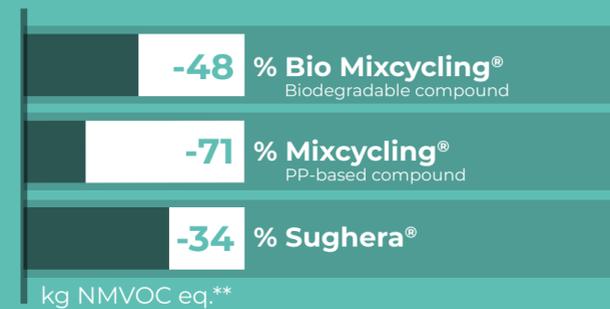
Mixcycling®'s LCA in sum:

Compared to the virgin polymers*:

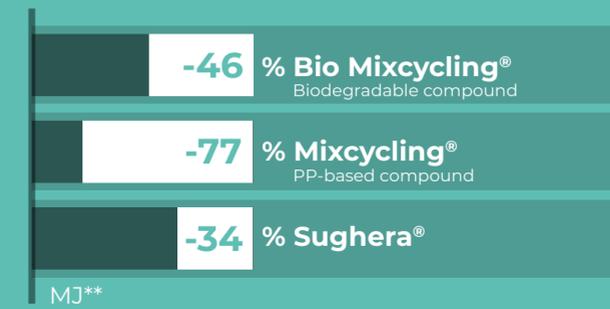
Carbon Footprint



Photochemical Oxidants



Non-Renewable Resources Depletion



The Mixcycling® blends have a reduced environmental impact measured by LCA - Life Cycle Assessment with indicators such as Carbon Footprint, Photochemical Oxidant Formation and Abiotic Depletion, sign of an intelligent and concretely sustainable solution. The use of organic waste as Secondary Raw Materials through Mixcycling® brings an advantage in reducing the environmental impact, depending on the amount of organic waste used.

* Only three of all five Impact Categories are shown by comparing organic Mixcycling® blends with the corresponding Mixcycling® 100% virgin raw materials (in equal conditions).

** the system boundaries analyzed are cradle to gate.

LCA study provided by LCA-lab Srl
submitted to Critical Review



Mixcycling® Biogenic CO₂ Storage

Mixcycling's CO₂ storage project addresses biogenic CO₂, which is contained within the object and therefore is present in the materials: this CO₂ is released during the disposal phase. Until the material is disposed of, the CO₂ is 'trapped' as Carbon within the material itself.

When disposal takes place, there are two possible scenarios:

- 1 If the Carbon component is fossil in origin, it emits 'new' CO₂ into the atmosphere, adding itself on top of biogenic CO₂ and thus increasing CO₂ concentration and the greenhouse effect.
- 2 If the Carbon component is biogenic in origin, it re-enters the atmosphere without causing alterations in concentration, as this CO₂ is part of the natural 'Carbon Cycle'.

Mixcycling's Biogenic CO₂ Storage in sum

Mixcycling's objective is to prolong the Carbon Cycle by sequestering biogenic CO₂ so as to compensate, at least partly, the Fossil Carbon emissions released over the past 100 years and which will probably continue for at least the next 30 years. One 15-gram object made out of Sughera sequesters 7 grams of CO₂. It is then possible to calculate how much CO₂ is sequestered along its entire lifespan.



Kg of biogenic CO₂ contained in 1 kg of fiber**

Cork	2,31 kg
Rice husk	1,39 kg
Silver skin	1,68 kg
Bambù	1,59 kg
Wine scraps	1,84 kg
Miscanthus	1,63 kg
Bran	1,54 kg
Wood	1,68 kg

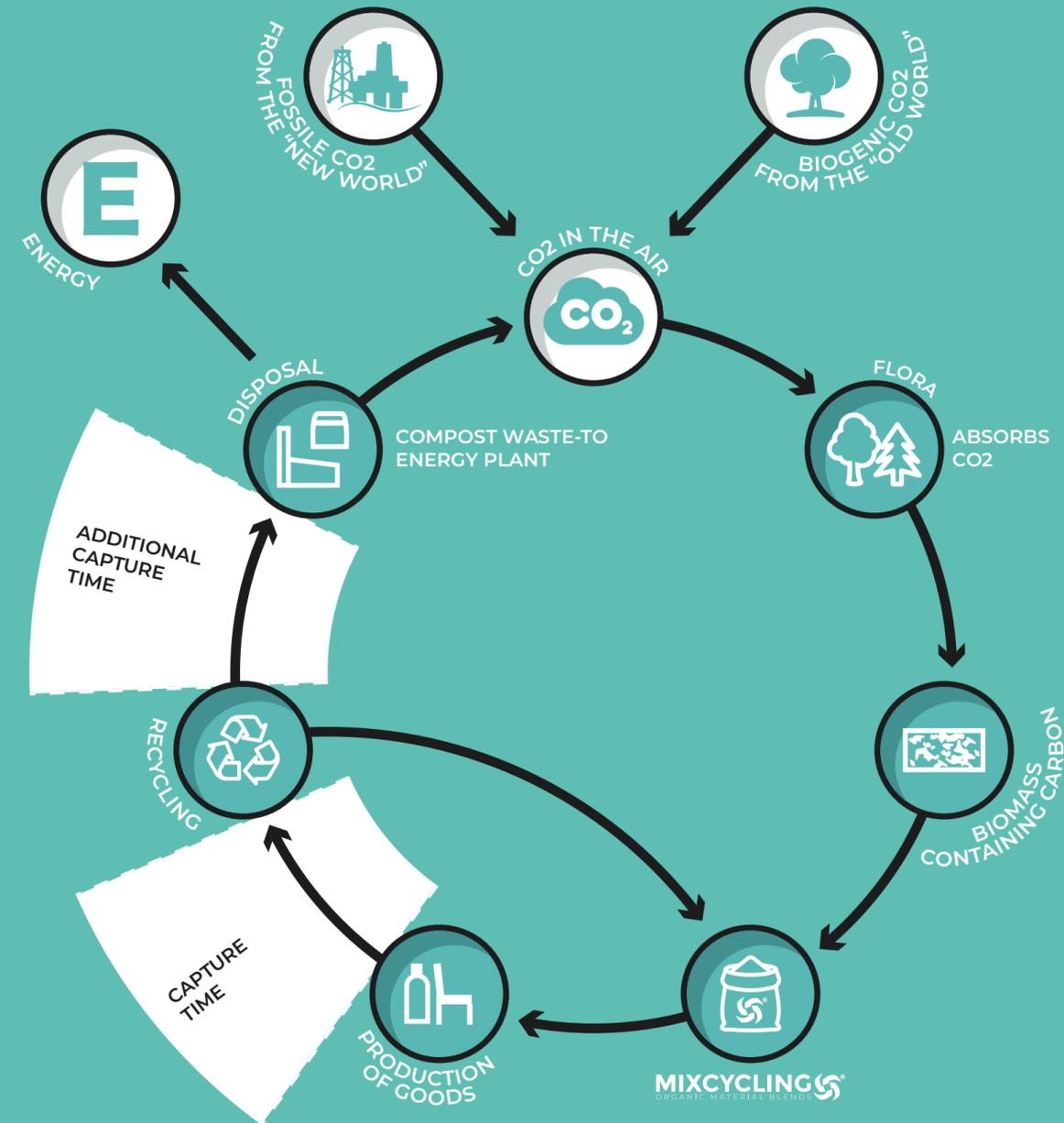
Biogenic carbon is the carbon naturally present in the atmosphere: the concentration value in the pre-industrial era was about 280ppm. Now, with the addition of fossil carbon, CO₂ concentration has reached 400ppm. One 15-gram object made out of Sughera sequesters 7 grams of CO₂. It is then possible to calculate how much CO₂ is sequestered along its entire lifespan.

** calculations done with the support of



Mixcycling® Biogenic CO₂ Storage

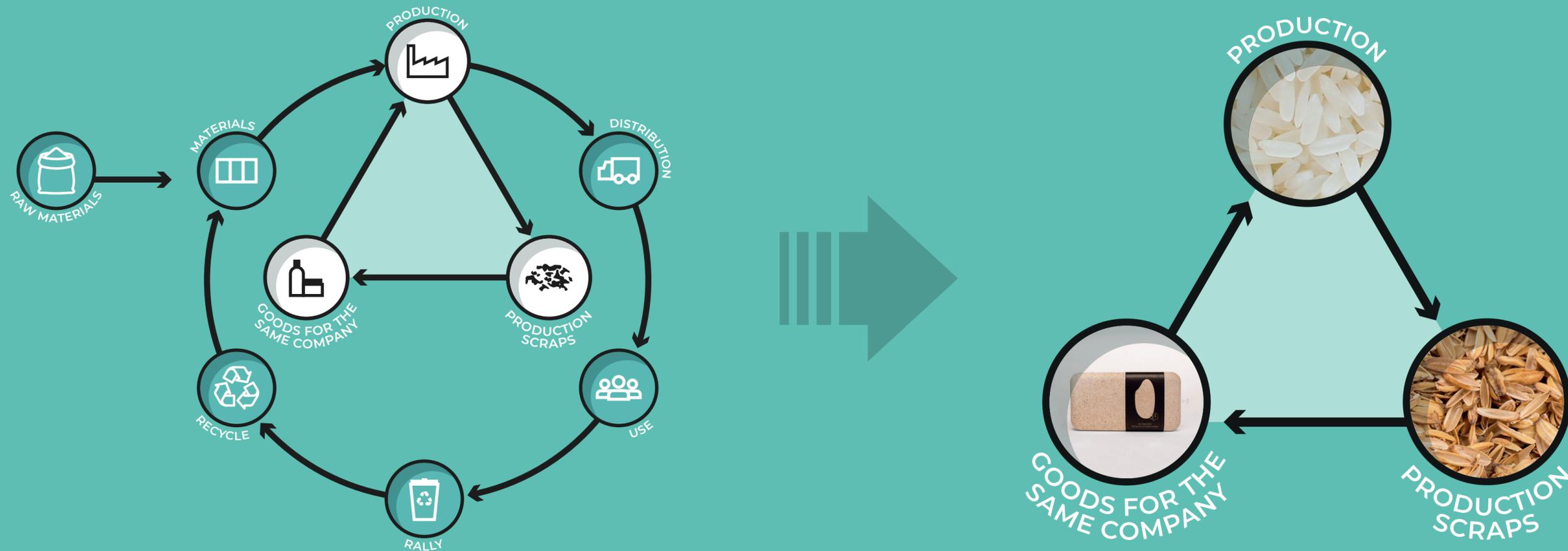
Valuable concept for products with a long life cycle



This information is given according to the requirements for ethical claims set out by UNI ISO/TS 17033

Mixcycling® Triangular Economy

The Triangular Economy is a new point of view for a sustainable economy. The concept has been applied by Mixcycling since early 2020 and it integrates and completes the well-known concept of Circular Economy. **The Triangular Economy perfectly integrates within the established Circular Economy structure, but it makes it even more sustainable.**

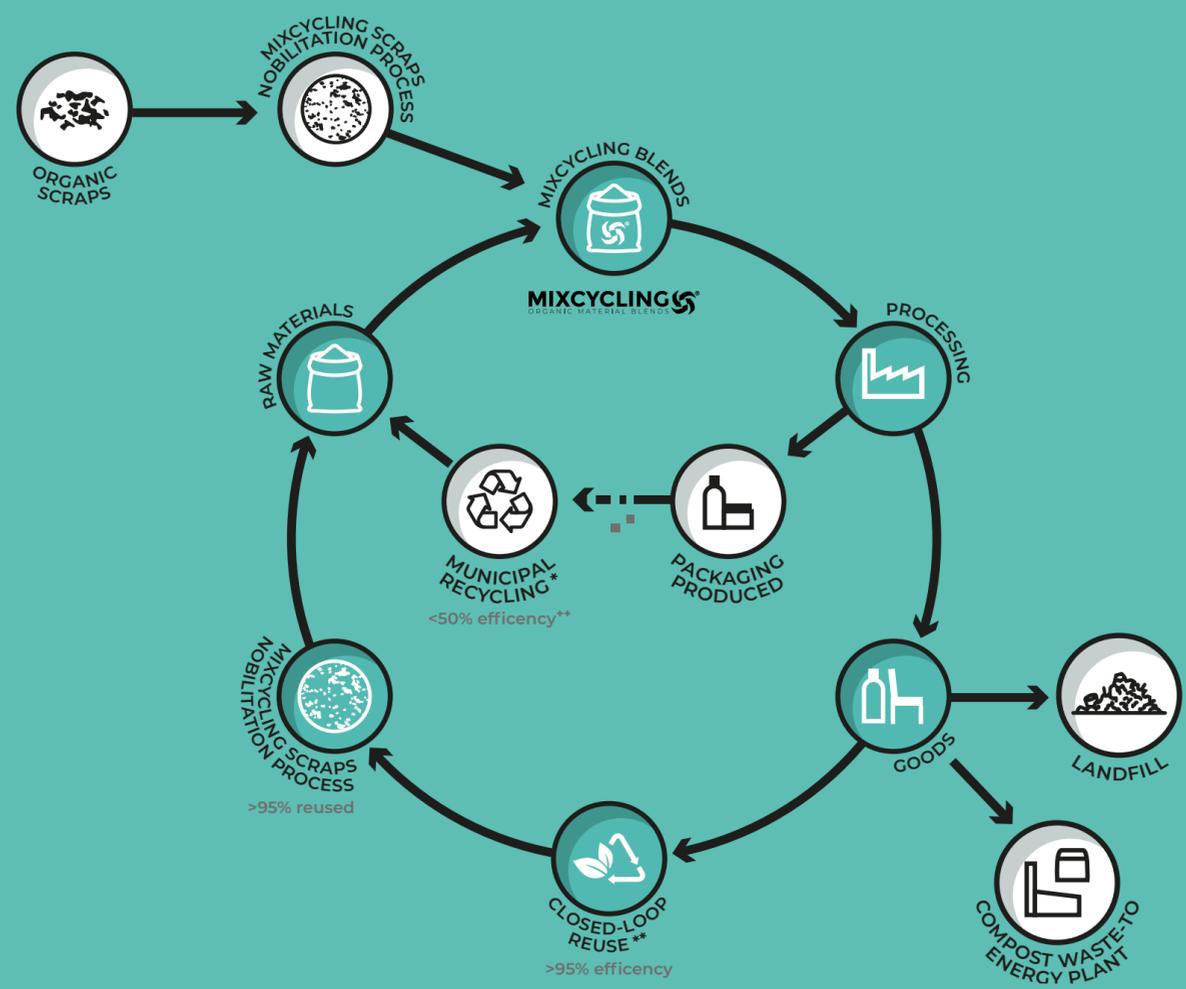


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Mixcycling is producing materials according to the Triangular Economy principles: utilising a partner's production waste we created a new blend that can then be used to make packaging for the very same product that originated the waste, thus reducing supply chain inefficiencies.

Mixcycling® Closed Loop Reuse

None of the existing organised recycling or disposal systems (mechanical, chemical, waste-to-energy plants) are nearly as efficient as closed-loop recycling. By returning the finished product to the manufacturer once it has been used, this system grants a nearly perfect efficiency and allows recovery of clean, easily usable material. Mixcycling calls this system closed-loop reuse, to highlight the desire to create a world in which waste does not exist, but products and materials are entirely recovered and reused. This concept is part of a fundamental circular economy concept known as “product as a service”, whereby an object is not owned definitively by any one consumer, but each actor of the circular process of production and utilisation purchases it as a temporary service at different stages of its life.



++source: EEA 2019

*50% efficiency, material is dirty. Fosters bad habits: throwing away.

**1Next to 100% efficiency, material is clean. Fosters good habits: recovery and reuse.

- not all packaging produced actually ends up in municipal recycling

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Mixcycling® Sustainability map

Blends	Performance	Purpose	End life Disposal	End life Cycle	Sustainable advantages
Mixcycling® blends Biodegradable	Biodegradable Suitable for food contact*	Products design to have a defined medium-short life. Certifiable OK compost**.	- Compostable if certified OK-compost - Separate waste collection if not certified	- Recyclable**** - Compost - Landfill	RESOURCES - more than 90% bio based LCA*** - halved around 50% compared to virgin biodegradable plastic RECYCLABILITY - 100% recyclable in a closed-loop cycle ENERGY RECOVER - reduced energy consumption for their production ENVIRONMENT - plastic contamination reduced up to 80% if dispersed
Mixcycling® blends 100% Recycled Not biodegradable	Resistant and long-lasting Not suitable for food contact*	Long lasting products design to have a long life	Plastic collection	- Recyclable**** - Energy recover - Landfill	RESOURCES - from 20% to 80% less plastic - 100% recycled blend RECYCLABILITY - 100% recyclable in a closed-loop cycle ENERGY RECOVER - reduced energy consumption for their production ENVIRONMENT - plastic contamination reduced up to 80% if dispersed
Mixcycling® blends Not biodegradable	Resistant and long-lasting Suitable for food contact*	Long lasting products design to have a long life	Plastic collection	- Recyclable**** - Energy recover - Landfill	RESOURCES - from 20% to 80% less plastic LCA*** - drastically reduced, more than 70% less compared to virgin plastic RECYCLABILITY - 100% recyclable in a closed-loop cycle ENERGY RECOVER - reduced energy consumption for their production ENVIRONMENT - plastic contamination reduced up to 80% if dispersed

* Food Contact suitability has to be tested on conditions and substances required for the final product

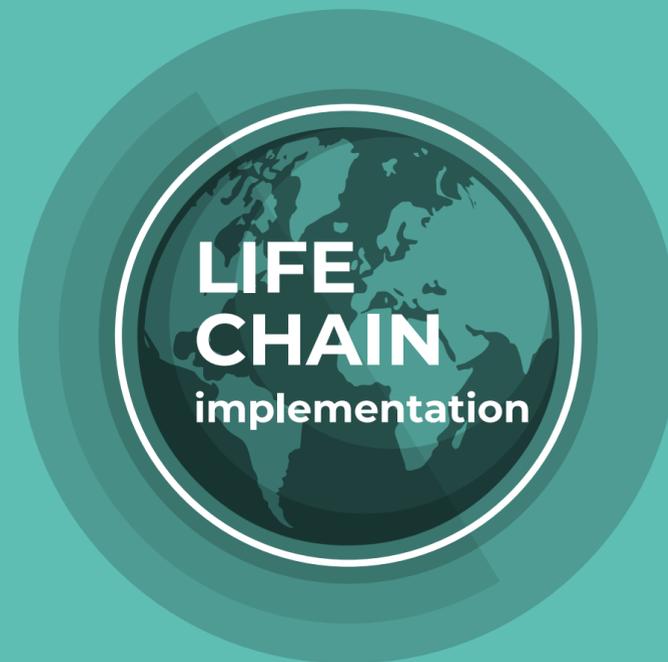
** The final product must be certified OK compost to be disposed into compostable collection.

*** LCA values are calculated on selected blends and under specific scenarios.

**** All Mixcycling® blends are 100% recyclable in a closed-loop cycle, in other cycles according to organic charge percentage, disposal and plants.

Mixcycling® the next sustainable steps

The Mixcycling® vision in 3 concrete objectives to design a better future:



We are constantly working on the whole life chain of Mixcycling®.

From the creation of the materials, towards the transformation processing, till its end of life in order to improve our blends in terms of sustainability and technical performance.



Looking for a future without plastic contamination thanks to Mixcycling®.

Plastic dispersal is one of the main causes of pollution. We are then committed to explore and support solutions against this critical issue.



Committed to reach the target ZERO impact with Mixcycling®.

Mixcycling® was born from the idea of giving a second life to a waste, to make it still useful. Following the same spirit we aim to achieve the goal of zero impact for our blends.

THANK YOU



Mixcycling Srl via dell'artigianato 10, 36042 Breganze (Vicenza) Italia - T. +39.0445.1911890 - W. www.mixcycling.com