

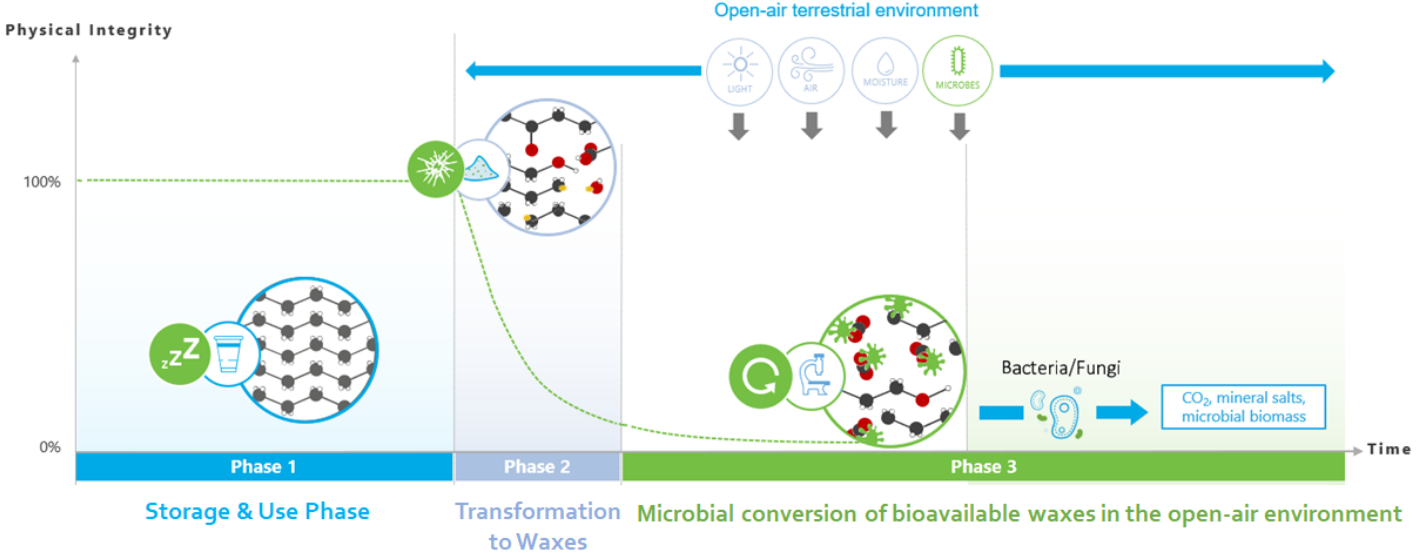
## OUR SOLUTION

A world's first biodegradation technology capable of delivering full biological decomposition on PP & PE materials

- Advanced catalytic system<sup>1</sup> able to transform PP & PE materials into a bioavailable wax which naturally occurring microorganisms can easily assimilate
- Unlike Oxo-degradation, no microplastics<sup>2</sup> or toxic substances are left behind post-degradation stage
- Time controlled process to allow optimal use phase and recycling recovery, if recycling option is available
- Tested & certified to international biodegradability standard (BSI PAS 9017)<sup>3</sup> underpinned by EN, ASTM and ISO standards (ASTM D5988/ISO 17556)
- Verified through ISO/IEC 17025 accredited independent 3<sup>rd</sup> party. Lab data cross-checked with real world conditions



## BIOTRANSFORMATION – AN INTRODUCTION AND IN ACTION



THE FRAGMENTERS	LANDFILL (ANAEROBIC)	INDUSTRIAL COMPOSTING	HOME COMPOSTING	BIOTRANSFORMATION
DOES NOT WORK	MANAGED WASTE	MANAGED WASTE	MANAGED WASTE	UNMANAGED WASTE
LOW CREDIBILITY	HARD TO VERIFY	INFRASTRUCTURE REQUIREMENTS	LIMITED APPLICATIONS	THE MOST CREDIBLE AND SCALABLE TECHNOLOGY

## BSI PAS 9017 – TESTING & CRITERIA

Phase 2

Weathering

Weathering to a bioavailable wax

Stage gate 1 criteria	
<b>Chemical analysis performed upon conclusion of weathering</b>	
Pass/Fail Criteria defining a bioavailable wax:	
Carbonyl Index (CI)	> 1
Reduction in weight-average molecular weight (Mw)	> 90%
Number-average molecular weight (Mn)	< 5,000 Da
Z-average Molecular weight (Mz)	< 30,000 Da
UV weathering under ASTM D4329 / ISO 4892-3 Xenon-arc weathering under ASTM D2565 / ISO 4892-2.	
UV (film) or Xenon-arc (rigid) for a defined short period of time representing (through calculation) to be <b>no more than 4 months corresponding to South Florida conditions</b>	

Stage gate 2 criteria	
<b>Environmental safety of the waxes</b>	
Pass/Fail Criteria defining environmental safety of bioavailable waxes:	
Tested for both acute and chronic effects	
OECD 202	OECD 211
OECD 208	OECD 222
Passing OECD 211 demonstrates no heavy metals, no toxic compounds and no leachates of harmful impact to aquatic systems.	
Passing OECD 208, & 222 demonstrate no chronic harmful effects due to longer term exposure in soil.	

Phase 3

Biodegradation

Mesophilic on soil

Stage gate 3 criteria	
<b>Biodegradation of the waxes</b>	
Pass/Fail Criteria defining bio-assimilation	
Biodegradation on soil under mesophilic conditions	> 90%
Biodegradation testing under ASTM D5988 and ISO 17556	
Shows the conversion of carbon in the test material (the bioavailable wax) to carbon in carbon dioxide.	

## HOW IT IS DEPLOYED

- Formulated as a drop-in Masterbatch Each, at either the Resin manufacturing or Packaging manufacturing stages
- Technology is tailored to the resin's footprint, application profile and required use life
- Fully compatible with biobased or conventional feedstock polyolefins
- Compatible with the normal plastic conversion processes which limits cost and enhances scalability
- No impact to product performance, mechanical properties or functional benefits
- Allow for recycling to happen with no adverse impacts through unique time-controlled process
- Typical loading rate: 2% weight percentage (wt%)

