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# THE PRACTICAL SUSTAINABLE SOLUTION

## FOR THE ENVIRONMENTALLY CONSCIOUS COMPANY

The “BEDA” Solution – Bio-Enhanced Degradable Additive

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## WHAT IS THE MARKET NEED FOR PLASTIC?

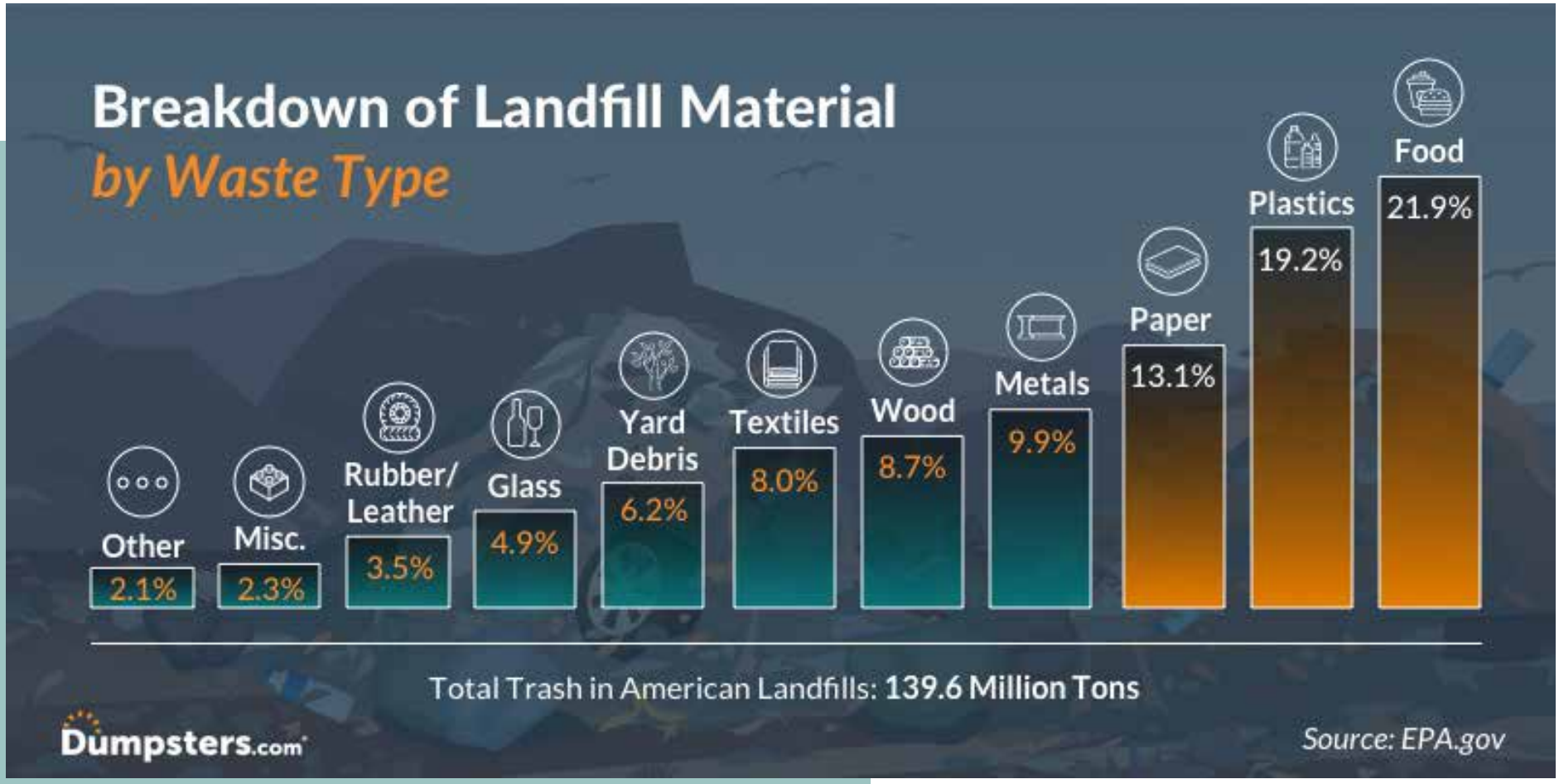
- Can be produced into any shape or form
- Is rigid or soft
- Thick or thin
- Liquid holdout
- Very cost effective
- Durable and lasts forever

The Problem?

# IT LASTS FOREVER!

## LANDFILLS & RECYCLING

**The U.S. produces approximately 268 million tons of trash each year. Of that, 140 million tons goes to landfills and 128 million tons are recycled.**




Source: https://www.dumpsters.com/blog/us-trash-production

## ARE THERE OPTIONS TO SOLVE THE PLASTIC DILEMMA?

- Reduce, Re-use, Recycle
- Use products that break down faster when discarded. This includes Compostable PLA & Multiplast BEDA®.

## WHAT DOES COMPOSTABLE PLA MEAN?

New generation of plastics which are degradable exclusively in commercial compost facilities*.

- Corn starch is the most commonly used raw material for making compostable plastics (also know as PLA)
- Compostable polymer (PLA) is not recyclable and must be separated from all other waste if it is to be composted
- PLA will not degrade in a traditional landfill
- Currently, the U.S. has 218 commercial composting facilities that process in excess of 20,000 tons/year**

A commercial compost facility requires a balance of heat, moisture, and oxygen to break down organic and plant-based materials. Without this effect ecosystem, compostable products don't break down.

* Source: mamaeco.com
** Source: compost-turner.net

COMPOSTABLE

## WHAT DOES THE NO, 7-PLA SYMBOL MEAN?

Code 7 compostable – a.k.a #7/PLA – indicates a plant based resin that will degrade under certain conditions. Unfortunately, a landfill isn't one of them, though that's where most of them end up.

- They are not very "biodegradable", in truth few communities recycle any code 7 plastics
- Code 7 compostables require processing at a modern, high-rate composting facility but there aren't many around

* Source: McGill Environmental Systems

# WHAT IS BEDA®?

BEDA® (Bio-Enhanced Degradable Additive) is a proprietary additive that when added at 1% to other plastics it allows for the material to naturally biodegrade in traditional landfill environments.

- Recyclable with your normal recycling program
- Biodegradation is the breakdown of organic matter by micro-organisms, such as bacteria and fungi*


* Focht DD. “Biodegradation”. AccessSceince

# BEDA® TECHNOLOGY

Products with BEDA® Biodegrades in landfill conditions

**HOW IT WORKS –**
BEDA® formula attracts microorganisms (microbes) to plastics - initiating degradation

- Microbes attach onto plastic products
- Microbes excrete Carbon Dioxide (food for plant life) and Methane (can be captured and turned into energy)
- No toxic residue or heavy metals harmful to living organisms
- Oxygen or sunlight is not needed for degradation
- Does not require commercial composting
- Degrades in normal landfills
- ASTM-D5511 & D5338 Independent Laboratory tested

# BEDA® TECHNOLOGY COMPARED TO PLA PRODUCTS

| Considerations | BEDA® | PLA |
|---|---|---|
| **DEGRADATION** | | |
| Degrades in landfill | YES | NO |
| Compostable “C” or degrades “D” in commercial compost | YES “D” | YES “C” |
| **RECYCLING** | | |
| Recyclable with normal recycle stream | YES | NO |
| Products can be made with recycled resins PIR/PCR | YES | NO |
| **COLLECTION PROCESS** | | |
| Can be discarded with standard trash & waste | YES | NO |
| Does NOT require supplemental trash hauling arrangements | YES | NO |
| **PROPERTIES** | | |
| Special storage conditions are NOT required | YES | NO |
| Shelf life is the same as traditional resins | YES | NA |
| Does not use exposure to light, oxygen or external stresses in degradation process | YES | NO |
| Degradation begins only at time of disposal | YES | NO*** |
| **PERFORMANCE** | | |
| Physical properties of the original material are unchanged and no redesign of the end-product is needed | YES | NO |
| **ENVIRONMENT** | | |
| No heavy metals - ecologically and environmentally safe | YES | YES |
| Returns to the environment as renewable resources - not as small particles | YES | YES** |

* Source:PLA Master-BI8, PHB and combinations (NatureWorks LLC, Novamont S.P.A., et al
**EPI Environmental Products Inc. Symphony Environmental, Inc. etc.
***Required product to be coated to withstand heat

# TESTING & DEGRADATION

ASTM D5338 – “Standard test method for determining aerobic degradation of plastic materials under composting conditions” - test for C02

**ASTM D5511 – “Standard test method for determining anaerobic degradation of plastic materials under high solids anaerobic digestion conditions” - test for methane**

| EXAMPLE OF TEST DATA RESULT | | | |
|---|---|---|---|
| Results (Average of 3) | | | |
| | Gaseous Carbon Recovered | Theoretical Grams | (%) Biodegradation Days 1-30 |
| HDPE/PE w Biolene 14 | 0.097 | 4.56 | 2.13% |
| Negative Control | 0 | 7.56 | 0% |
| Positive Control (Cellulose) | 2.6 | 2.2 | 100% |

Landfills vary significantly in temperature, moisture, compression, and other factors specific to weather conditions that will impact degradation through the year. With this variability and FTC ruling that no time frame can be stated, from MSI, 3rd part laboratories, or any other source unless testing has been fully completed and the plastic product being tested is completely degraded, we are unable to provide complete degradation time estimates.

**The ASTM D5338 and ASTM 5511 test results demonstrated biodegradation of the BEDA material in accelerated versus traditional material and positively impacts the environment versus traditional plastic.**