

DEGRADABILITY ADDITIVES IN PETROLEUM-BASED PLASTICS

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The SPC **does not support the use of any kind of degradability additives** in packaging, including additives that seek to make packaging more degradable (i.e. break down more rapidly) in landfills, marine environments, or open environments (e.g. as litter). This includes “biodegradable”, “degradable”, “oxo-degradable”, and all other types of degradability additives used in petroleum-based plastics. (For brevity, the term “additive” is used as shorthand for “degradability additives” throughout this document).

The SPC disagrees with the premise that degradability additives contribute any enhancement to the sustainability of petroleum-based plastics. Rather, these additives do not offer any sustainability advantages and they may actually result in more environmental harm.

Barring significant advancements, the **SPC’s position is firmly against the use of any degradability additives** in any petroleum-based plastic. The SPC’s rationale is outlined below.



Photo by Naja Bertolt Jensen on Unsplash.

1. Additives Have a Negative Impact on Recyclability

Plastics have two inherent attributes that make them ideal for recovery: their high embodied energy content qualifies their value for controlled energy recovery, and their exceptional durability renders them ideal for recycling. Additives that are fundamentally designed to compromise the structural integrity of a recyclable material are counterproductive to efforts to recycle more materials and to extract as much future value as possible from existing materials.

2. Additives Contribute to Microplastics on Land and in Water

Most additives are designed to break plastics down into smaller pieces in order to make it sufficiently available to the microorganisms that perform biodegradation. These fragmented pieces may be invisible to the naked eye, yet their effects as microplastics have been shown to be seriously detrimental.

Terrestrial litter is likely to migrate, either by human or natural means, into a marine environment. Additives that are designed to enable biodegradation in terrestrial (on-land) conditions are not tested or designed to be effective in marine conditions. This is because marine conditions have a wider variability in temperature, microbial and nutrient availability, and exposure to sunlight.

In a marine environment, any fragmentation of petroleum-based plastic will exacerbate its harmfulness as pollution. Whether or not biodegradation successfully occurs in these various environments and conditions, petroleum-based plastics should not be designed to encourage fragmentation.

3. Additives are not an Enabler for Compostability

Compostability describes a material’s ability to successfully undergo biological decomposition and transformation into a stabilized organic matter within a specified period of time. To beneficially complete the natural biological cycle, biodegradation should occur in a managed and controlled environment, such as an industrial composting operation. The material must also break down in a way that is non-toxic and harmless to human health and the environment.

Petroleum-based plastics made with biodegradability additives do not break down in such a manner. To date, these additives have not enabled non-compostable plastics to become compostable.

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4. Degradation Releases Greenhouse Gas Emissions

As organic materials degrade, their carbon content is transformed to one or more greenhouse gasses — either carbon dioxide if the degradation occurs in the presence of abundant oxygen, or [methane](#) if the degradation occurs in an oxygen-deficient environment such as a landfill.

When bio-based materials (such as fiber-based packaging) biodegrade in an oxygen-rich environment, like a composting facility, they complete a naturally-occurring, net-carbon-neutral [carbon cycle](#). This is because the material's carbon content was recently sequestered from atmospheric carbon dioxide. As material transforms its carbon content into carbon dioxide emissions, the environment shows no net loss or gain of carbon dioxide over the short lifecycle of the material.

Petroleum-based plastics, however, are not bio-based, and the addition of additives does not change that characteristic. If a petroleum-based plastic degrades in an oxygen-rich environment, such as when it becomes litter, it results in the release of previously dormant carbon. These emissions would not occur if the material remained intact and was instead reused or recycled.

In a landfill, petroleum-based plastics with degradability additives also generate methane, a more potent greenhouse gas than carbon dioxide. Even landfills that capture methane are harmful, because gas capture systems typically operate with limited efficiency.

Petroleum-based plastics that are not designed to biodegrade in landfills will remain mostly inert, storing their carbon and preventing it from reentering the atmosphere indefinitely. For this reason, encouraging an otherwise inert material to degrade in a landfill should be avoided.

5. Biodegradability Marketing Claims are Increasingly Unlawful

It is illegal in [California](#), [Maryland](#), [Minnesota](#), and [Washington](#) to use the term “biodegradable” in marketing claims related to plastic products and/or bags. In some instances, states and jurisdictions specifically restrict the use of marine degradable claims, as well as “oxo-degradable”, “decomposable”, and “degradable”. The [Federal Trade Commission's “Green Guides”](#) also offer guidance on how marketers should avoid using these terms in ways that lead to consumer deception, and explicitly state that “Unqualified degradable claims for items that are customarily disposed in landfills, incinerators, and recycling facilities are deceptive because these locations do not present condition in which complete decomposition will occur within one year.”

Furthermore, marketing any non-compostable material to consumers as being beneficial due to its biodegradability may be misleading and detrimental to efforts intended to advance compostable packaging.

6. Products with Additives Can Contribute to Littering and Consumer Confusion

An additive that is intended to make packaging “litter-friendly” and is marketed to consumers as biodegradable is a severe step in the wrong direction. [Work conducted in 2009](#) by Keep America Beautiful found that consumers are more likely to litter when the item is marked as being “biodegradable”, although more recent data on the exact impacts on consumer behavior remains limited. A [2020 European Commission report](#) references several studies showing a perception amongst consumers that “biodegradable” is an “inherently virtuous aspect of a product and that littering such an item would be less impactful.”

More broadly, studies have shown that consumers do not have a clear understanding of what the term “biodegradable” means. For example, a [2020 study of UK consumers](#) found that 30-41% of consumers believed the term meant a product was home compostable, industrially compostable, would cause no harm to the marine environment, or would cause less harm if it was littered.

These behavioral trends indicate additives are counterproductive to the concerted efforts of industry and NGOs to change littering behavior and promote correct composting behaviors and responsible disposal.

POSITION STATEMENT



Summary

While the material composition or performance qualities of biodegradability additives may change over time, their underlying impacts tend to remain the same — they break down a package into smaller fragments while confusing consumers. They have been found to be detrimental to recycling efforts, composting efforts, and open and marine environments.

For the reasons stated above, the SPC maintains its position firmly against the use of any additive in any petroleum-based plastic.

Additional Industry Position Statements

The SPC supports the position statements of the following organizations:

- » Association of Postconsumer Plastics Recyclers (APR) — [Statement on the Effects of Degradable Additives on Plastics Recycling](#)
- » Ellen MacArthur Foundation — [Oxo Statement](#)
- » National Association for PET Container Resources (NAPCOR) — [Degradable Additives Provide Poor End-Of-Life Option For Pet Packaging](#)

For more on biodegradability, please see the [SPC's Position on Biodegradable Packaging](#).

To learn more, contact spcinfo@greenblue.org.

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