

Expanded Polystyrene Biodegradable Foam Packaging

The EPS industry is dedicated to providing environmental packaging solutions and strives to increase product performance while providing optimized end-of-life solutions. For more than 30 years, efforts to increase EPS recycling have been successful due to an ongoing evolution of innovative technologies that support sustainable manufacturing practices and circular economy principals. On that front, the industry recently introduced biodegradable and oxo-biodegradable EPS packaging to its sustainability portfolio.

Biodegradable & Oxo-Biodegradable Solutions

The terms biodegradability and oxo-biodegradability are frequently a source of confusion. Although these terms are often used interchangeably, they are not synonymous. Biodegradable plastics, when disposed of in a biologically active landfill, are converted into water, carbon dioxide (CO₂) and biomass with the help of micro-organisms. Biologically active landfills, also called anaerobic bioreactor landfills, rapidly transform and degrade organic waste through the addition of liquid to enhance microbial processes. Biodegradation occurring in the absence of oxygen (anaerobically) produces landfill gas, i.e., methane. The landfill gas may be used to produce electricity; thereby minimizing the greenhouse gas emissions from the landfill. According to the EPA, in bioreactor landfills approximately 75% of the methane emissions

captured are converted to electricity. *Anaerobic bioreactor landfills may not exist in many areas.*

Oxo-biodegradability is most easily described as a conventional plastic mixed with an additive in order to initiate biodegradation. Degradation rates for biodegradable and oxo-biodegradable plastic will vary based on individual material formulations and the specific disposal conditions.

Adherence to FTC Green Guides prevents false or misleading environmental claims. Products using unqualified claims must degrade within one year. Otherwise, a qualified claim is needed to specify the time to degrade and proper disposal availability.

Biodegradable and oxo-biodegradable EPS are safe for food contact and meet FDA 21 CFR, EU framework 1935/2004 and EU regulation 10/2011 requirements for direct food contact applications. Biodegradable and oxo-biodegradable EPS may be recycled with other polystyrene solid waste without having to be segregated and is fully compatible within the existing EPS recycling infrastructure. Best practices have shown that they can be easily recycled within mechanical and advanced recycling processes. Biodegradable and oxo-biodegradable EPS are not compostable. Biodegradable products of any kind are not a license to litter.

Biodegradable Plastics in Context

The length of the biodegradation process is highly dependent on environmental factors such as humidity and temperature, which is why claiming that a plastic is “biodegradable” without any further context (i.e., in what time frame and under what environmental conditions) can be misleading. Therefore, accurate labeling to reflect the use and conditions of biodegradable plastics is essential to ensure proper disposal. Proper labeling will inform consumers to ensure these materials are disposed of through the proper channels. Ultimately, proper disposal of biodegradable plastics may divert waste from conventional landfills and reduce greenhouse gas emissions.

The Federal Trade Commission (FTC) Green Guides provide guidance on environmental marketing claims and assesses whether they are false or misleading. The Green Guides require a product to biodegrade within one year in common disposal settings (landfill, litter or backyard compost) to make an unqualified biodegradable claim. Otherwise, claims must be qualified with more details.

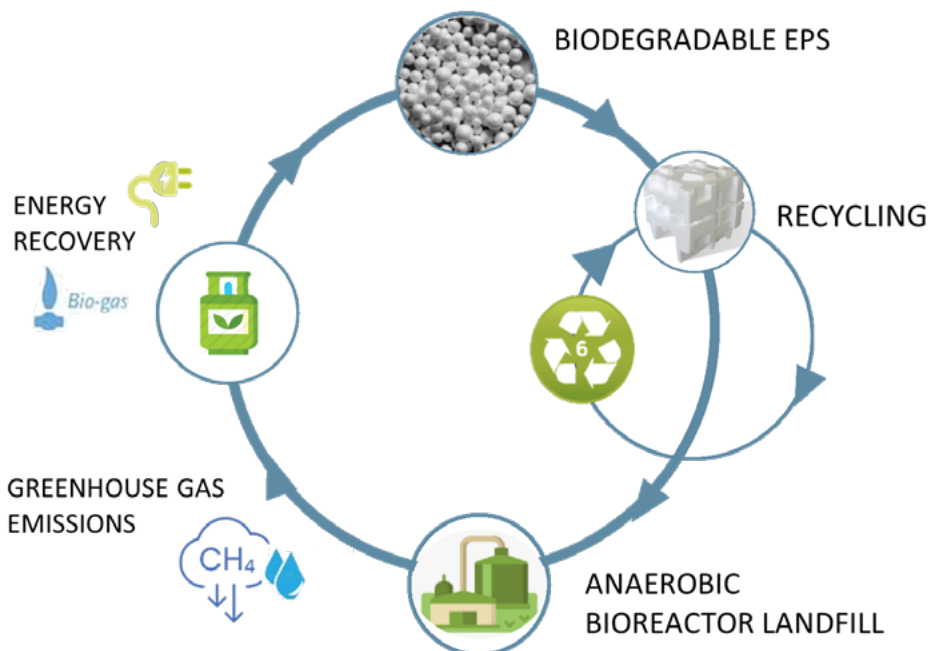
California has even more stringent regulations on environmental marketing claims for degradable plastic products sold in the state. This law, passed in 2011, requires claims be supported with clear scientific evidence, noting biodegradation is a complex process dependent on physical and chemical structure, environmental conditions and time.

Standardized Test Protocols

In addition to proper labeling, appropriate testing and certification is necessary to understand the biodegradability parameters for different plastic materials. ASTM International's D20.96 Subcommittee on Environmentally Degradable Plastics and Biobased Products, part of the D20 Plastics Committee, began developing much-needed global standards for environmentally degradable plastics in 2008. The D20.96 Subcommittee now oversees 18 active standards with several more underway.

The primary test protocol for anaerobically biodegradable plastics is **ASTM D5511**, *Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic-Digestion Conditions*. As a short-term test, ASTM D5511 can predict if materials will biodegrade anaerobically over conventional time frames.

Biodegradable and oxo-biodegradable plastics present challenges and opportunities. While these new plastics will not solve all environmental problems, they are one avenue on the path to sustainability. These plastics can offer environmental benefits by expanding their acceptance in various waste management scenarios but are still in the formative stage of widespread implementation. Biodegradable and oxo-biodegradable EPS is just one end-of-life solution, helping to increase its ability to meet today's circular economy goals.



References

- [Federal Trade Commission Green Guides, 2012.](#)
- [EPA Landfill Methane Outreach Program, 2020.](#)
- [California Public Resources Code \(PRC\) Sections 42355-42358.5, 2011.](#)

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