

# **BioPlastics and Biodegradable Plastics -- Role in sustainability, Reducing Carbon Footprint and Environmental Responsibility**

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BioPlastics offers the intrinsic value proposition for managing our carbon in a sustainable manner and provide a carbon neutral footprint in complete harmony with the natural biological carbon cycle. Biodegradable plastics offers the potential to manage single use, short-life, disposable packaging and consumer goods in a environmentally responsible manner. Plastics recycling and waste to energy operations also offer environmentally responsible approaches to managing plastic waste.

Many questions arise:

What is a biobased plastic? Why and how are they sustainable and environmentally responsible? How does one identify and measure biobased content? How does one document and quantify the positive environmental attributes of biobased plastics?

What about biodegradable plastics? Is degrading the plastic the goal? Or is it more important to ensure that these degraded fragments are completely consumed/assimilated by the microorganisms within a reasonable and short time in the specified disposal environment? Composting is one such environment under which biodegradability occurs. In the composting environment, the nature of the environment, the degree of microbial utilization (biodegradation), and the time frame within which it occurs are specified in an ASTM standard. What are the environmental consequences and risks associated with degradable or partially biodegradable plastics without ensuing complete biodegradability? What is the relationship between biobased and biodegradable, biobased but not biodegradable? How does one document the reduced carbon footprint (LCA) and obtain carbon credits.

The answers to these fundamental questions provide the basis and scientific rationale for designing and engineering biobased, and biodegradable plastics, and lay the foundation for standards and regulations world-wide. Life Cycle Assessment (LCAs) of these renewable/biobased materials often show reduced environmental impact and energy use when compared to petroleum-based materials, which we will review, and learn. We will look at successful technology exemplars that showcase the above “bio” model.

**Keywords:** bioplastics; biodegradable plastics; carbon footprint

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[1] Narayan, Ramani, Biobased and Biodegradable Materials, Rationale, Drivers, & Technology Exemplars, ACS (An American Chemical Society Publication) Symposium Ser 939, Ch 18, pg 282, 2006