

BIO-BASED PLASTICS

The issue of feedstock has been around ever since the invention of plastics – the first plastic, Celluloid, was bio-based. More than 95% of the world’s plastic today is made from crude oil or natural gas, and therefore fossil-based. Thanks to innovation and with the discussion around the circular economy the plastics industry has been keen to offer sustainable solutions. In this brief paper, we look at the key facts regarding bio-based plastics.

Sustainability

Agricultural feedstock (e.g. corn, sugarcane), but also waste biomass (e.g. forestry) or CO₂ are “alternative feedstocks” to fossil primary material. The most widely claimed benefit of bio-based plastic is to reduce a final product’s carbon footprint, due to the sequestration of CO₂ during the life of the plant. Life Cycle Analysis shows that the transition from petro-based to bio-based sourcing produces trade-offs, and can have e.g. land use impacts.

Sustainability, underpinned by life-cycle thinking, plays a major role in developing bio-based plastics. However, the sustainability of bio-based plastics, economically and ecologically, is based on a variety of factors:

- 1) cultivation conditions of the biomass for the feedstock
- 2) technological maturity: as biomass production practices develop and processes become more energy and resource efficient;
- 3) region or country specific regulations;
- 4) a broad range of impact categories, as described, for example, in the 12 principles of the Roundtable on Sustainable Biomaterials (RSB) meta-standard¹

Scalability and competitiveness

Bio-based plastics - or their building-blocks - tend to be more expensive than their fossil-based counterparts especially given the current low prices of fossil resources. Therefore, their success often depends on obtaining additional benefits, be it added environmental (e.g. reducing carbon footprint) or social value or product performance (e.g. eco-design). It is worth mentioning that fossil-based plastics can also reduce the carbon footprint of products during the life cycle of a product, through lightweighting, thermal insulation, or other characteristics. To support the competitiveness of renewable feedstock for material use (e.g. plastics), a level playing field should be established by developing mechanisms and instruments in analogy to existing support schemes for a sustainable and cost-effective Europe.

Regulatory certainty

As well as firm sustainability data and criteria, a level playing field is crucial to see development in the use of alternative feedstocks for plastics. For investments in innovative alternative feedstocks like bio-based technologies, a stable long-term regulatory environment is a prerequisite. This includes the development of industry-wide standards (e.g. for mass balance approaches), and certification schemes for sustainability with a full life cycle perspective. Furthermore, regulatory support during R&D and early deployment of these new products may help to increase development of bioplastics.

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¹ RSB meta standard: <http://rsb.org/wp-content/uploads/2017/04/RSB-Guide-to-the-RSB-Standard.pdf>