Discussion paper of European Bioplastics

BIODEGRADABLE PLASTICS AND THE CIRCULAR ECONOMY IN EUROPE

European Bioplastics (EUBP) welcomes the EU Commission's efforts to replace the traditional linear economy model (make, use, dispose) by implementing an ambitious circular economy throughout Europe. Bioplastics[1], and biodegradable plastics in particular, can play an essential part in putting the envisioned circularity model into practice.

Biodegradable plastics

The term 'biodegradable' means that a material is able to undergo a process in which microorganisms such as bacteria and fungi metabolise the material into water, CO_2, and biomass under aerobic conditions. Whether or not a plastic material is biodegradable depends on its chemical structure not on the feedstock from which it is produced[2]. Claims of biodegradability should always refer to the environment and timeframe in which the process takes place.

This paper refers to biodegradable plastics, which can be processed in industrial composting facilities or contribute to biogas generation in anaerobic digestion facilities (in line with the harmonised European standard EN 13432). Various standards, certification schemes, and labels for biodegradability are already in place and new standards are being developed[3].

Added value for the circular economy

With reference to the European waste hierarchy, biodegradable plastics can provide added value through organic recycling (i.e. industrial composting and anaerobic digestion) as an additional waste treatment option. Industrially compostable plastics certified according to the harmonised European standard EN 13432 for the organic recovery of packaging[4] contribute to efficient waste management and circular preservation of resources by:

- Optimising the separate collection of bio-waste (collection of more valuable resources)[5];
- Diverting bio-waste from landfills into organic recycling;
- Diverting bio-waste from incineration into organic recycling (bio-waste often has a high moisture content and therefore complicates incineration but furthers organic recycling);
- Diverting bio-waste from mechanical plastic recycling streams into organic recycling;
- Reducing impurities in the organic waste collection caused by misthrows of conventional, non-biodegradable plastics that often end up in the final compost product and thereby in the environment;
- Providing additional second-generation bio-based raw materials for industrial purposes, such as the production of bio-based plastics[6] or organic fertilisers;
- Supporting biogas production through the possible processing in anaerobic digestion[7].

Unreflecting demands for 'biodegradability in the environment' divert attention from the concept of circularity and the main challenges: to set up an efficient waste management infrastructure across Europe and to increase efforts on educating consumers about correct waste disposal[8].

Key applications of biodegradable plastic for the circular economy

By recognising that prevention and reduction are paramount in the EU waste hierarchy, and that bioplastics are not intended to simply replace existing applications but offer innovative plastic solutions, EUBP calls on the European institutions to consider proven applications for biodegradable plastics (see list below) when discussing the contribution of biodegradable plastics to a circular economy in the context of the waste legislative proposals as well as initiatives resulting from the Commission's Action Plan, such as the Plastics Strategy.

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[1] Bioplastics are plastics that are bio-based, biodegradable, or both.
[2] Bio-based and biodegradable plastics are for example PLA and PHA. There are fossil-based plastics like PBAT, which are also biodegradable. The latter are mainly used in blends with bio-based, biodegradable materials to achieve certain technical properties.
[3] European Bioplastics, Fact Sheet ‚Bioplastics – Industry standards & labels' (2017): http://docs.european-bioplastics.org/publications/fs/EUBP_FS_Standards.pdf
[4] Requirements comprise for example the progress of biodegradation and disintegration in a set timeframe, and extensive ecotoxicity and heavy metals testing.
[5] According to European Compost Network the largest fraction of municipal waste – up to 50% - is bio-waste. Only about 25% of this resource is currently collected. About 100 million tonnes are wasted in landfills or incinerated; In Germany alone the amount of bio-waste currently incinerated is estimated at around 5 million tonnes annually (Kern, M., Siepenkothen, J., Bioabfallpotenzial im Hausmüll, Müll & Abfall 7/14, S. 356ff., 2014.)
[6] Ivanov et al.: Production and apllications of crude polyhydroxyalkanoate-containing bioplastis from the organic fraction of municipal solid waste, Int. J. Environ. Sci. Technol., 2015 (12), p. 725-738
[7] European Bioplastics, Fact Sheet on biodegradable plastics in anaerobic digestion plants (2015): http://docs.european-bioplastics.org/publications/fs/EUBP_FS_Biodegradable_plastics.pdf; European Bioplastics blog-post (29 May 2017) on successful tests on the use of biodegradable plastic bags in anaerobic digestion plants - http://www.european-bioplastics.org/successful-test-on-the-use-of-biodegradable-carrier-bags-in-anaerobic-digestion-plants/.
[8] European Bioplastics, Fact Sheet on marine littering (2016): http://docs.european-bioplastics.org/publications/pp/EUBP_PP_Marine_litter.pdf

Compostable bio-waste bags, fruit & vegetable bags, lightweight carrier bags

Compostable bio-waste plastic bags support the separate collection of organic waste. They are a convenient, clean, and hygienic tool, which helps households to collect more kitchen and garden waste while reducing the misthrow rate of conventional plastics in organic waste streams[9]. They are instrumental to fully implementing the separate collection of bio-waste from households and are proven to lead to increased biomass input for biogas production in anaerobic digestion plants as well as compost production in industrial composting facilities.

Likewise, compostable fruit and vegetable bags and lightweight carrier bags serve a dual function that conventional plastic bags cannot fulfil: they are a convenient way for shoppers to carry home groceries and can after be used to collect biodegradable kitchen and food waste.

Compostable fruit labels

Using fruit labels made from conventional, non-biodegradable plastics causes significant amounts of plastic to be discarded in bio-waste bins, as consumers will rarely remove these labels from fruit peels before disposing them in the bio-waste. Compostable fruit labels can remain attached to and be discarded together with fruit peels without introducing impurities to the bio-waste stream. The fruit and labels can be organically recycled together avoiding the contamination of non-degradable plastics fragments in the final compost.

Coffee capsules and tea bags

Coffee capsules and tea bags are a part of modern everyday life. These applications need to combine high performance requirements (such as brewing process, food contact, aroma barriers) with an efficient end-of-life solution. After they have been used, the organic content (coffee or tea residues) and the capsules or bags are difficult to separate, leading to confusion about the appropriate way of disposal as well as misthrows. Coffee capsules and tea bags made from fully compostable plastics provide the same performance while offering an alternative that can be organically recycled together with the organic content. Coffee and tea waste are highly desired in industrial composting plants as they stimulate microbial activity in the composting process. Furthermore, coffee capsules and tea bags are amongst some of the mass products that are usually not being mechanically recycled.[10]

Thin film applications for fruit & vegetable packaging

Food that has past its expiry date and is packed in conventional plastic packaging is usually not separated from its packaging. The plastic packaging together with its contents is usually either thrown into the bio-waste bin, where it constitutes an impurity, or the biodegradable food content still inside the packaging ends up in the residual waste bin and is no longer available for organic recycling and thus wasted as a possible valuable resource. The main share of plastic food packaging is not being recycled today[11].

Compostable plastic packaging can help to solve this problem as it can be discarded together with its organic contents and without introducing impurities into the organic recycling process. At the same time, it helps to divert organic and biodegradable materials from the residual waste stream.

When discussing these specific applications in the context of a circular economy, EUBP recommends focussing on thin film packaging applications that are highly food-contaminated with a thickness below 100 microns such as fruit and vegetable packaging (e.g. cucumber wrappings, flow packs). These compostable plastic packaging solutions could be supported and introduced in the European market flanked by educational efforts for a two to three year period until the advantages of compostable plastics for the circular economy are consolidated knowledge along the value chain including the consumer.

Final remarks

EUBP calls on the European institution to stimulate the use of biodegradable, certified industrially compostable plastics for the aforementioned applications. EUBP and its members look forward to continuing the discussion with all interested stakeholders in the on-going initiatives of the EU Circular Economy Package.

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[9] Petrone, Paola; Vismara, Danilo: Separate collection of residential food waste in the city of Milan. Müll und Abfall 05/2014, p. 253ff; M. Kanthak, F. Söling, "Analysis of the use of compostable ecovio® organic waste bags". Müll und Abfall 08/2012.
[10] In contrast to common believe, the average tea bag consists of 20-30 percent fossil-based PP (not compostable), which is usually disposed of in the bio-waste bin and thus contaminating the organic recycling stream. Source: WUR, Bio-based and biodegradable plastics – Facts and Figures, 2017
[11] Ellen Mac Arthur Foundation, The New Plastics Economy: Rethinking the Future of Plastics, 2016