Fédération Européenne des Activités de la Dépollution et de l'Environnement
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Biodegradable and Bio-Based Plastics

FEAD is the representative body of the private waste management and resource industry in the European Union. In this capacity, FEAD has produced a short guide explaining the impact biodegradable and bio-based plastics have on waste.

In line with our objective of achieving a more sustainable environment, this document helps provide insight into how to achieve this by using different types of bioplastics.

By way of introduction, it is important to make a clear distinction between bio-based, biodegradable and compostable plastics, recognising that some bio-based plastics are not compostable, and some compostable plastics are not bio-based.

Bio-based plastics also called **Bio-sourced plastics** are plastics made (partially) from organic materials: some are identical to fossil-based plastics, such as bio polyethylene (PE) or bio polypropylene (PP), while some are polymers intended to be compostable.
Biodegradable plastics is not a regulated term so it's not unambiguous. This term refers to plastics that are degradable through the action of naturally occurring microorganisms such as bacteria, fungi and algae. It gives the wrong idea that such material is harmless if littered. As long as the degradation is not complete, the polymer remains harmful for the environment. The kinetic of degradation depends on the environment (humidity, light, salinity, temperature, …). They can be also of petrochemical origin, such as polycaprolactone (PCL).
Compostable plastics are plastics which degrade through the process of composting, which is a controlled aerobic process.
A distinction between industrial composting and home composting is necessary: *Industrial composting* conditions require an elevated temperature combined with a high relative humidity and the presence of oxygen. EN 13432 is a product norm for packaging materials, not a waste treatment norm, and complying with it cannot be considered a guarantee of complete industrial compostability. *Home composting* conditions have lower and less constant temperatures, making it a slower process, depending on the type of material. The existing standard for home composting is NF T 51800.

Main problems:

Standards

Bio-based and biodegradable plastics do not have any appropriate standards that are supported by sound scientific testing, meaning that a variety of formulations and lack of regulations do not guarantee correct environmental and market performances.
Some bio-based materials, such as bio-PE, bio-PET and bio-PP are fully recyclable, whereas biodegradable and compostable plastics cannot be recycled together with conventional plastics[1].

1 An Assessment of the Value Chain for BioBased and Biodegradable Plastics in Norway, Eunomia, January 2019

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Degradation

Indeed, **some biodegradable and compostable (EN 13432) materials may also affect bio-waste treatment negatively**. Composting or anaerobic digestion processes that aim at producing high quality organic fertilisers have a strict limit in physical contaminants, regardless of whether they are biodegradable in theory or not. Residues of plastics in the digestate and compost can cause mechanical trouble to equipment used in agriculture[1].

Given the difficulty of distinguishing between biodegradable and compostable plastics and conventional plastics, even if they are correctly disposed of by households, they are likely to be sorted out at the composting plant and sent for thermal recovery or disposal, which has a negative influence on the carbon footprint.

Mixing with recyclable plastics

Biodegradable and compostable plastics are also problematic when they are mixed with recyclable plastics, as they do not have the same material properties and may impact the integrity of the recyclates. Their presence compromises the quality and purity of the final product obtained, as they are not of the same nature (which is also the case when mixing "traditional" polymers)[2] and more quickly lose certain chemical and/or physical properties with time and/or temperature and/or water compared to most "traditional" polymers. The mere risk that this might happen has already been known to discourage manufacturers from using recycled content.

Biodegradable and compostable plastics that are disposed of together with recyclable plastics must therefore always **be removed in the sorting process**. When the amount of biodegradable and compostable plastics increases it will however not be possible to have them all removed in the sorting process. It is therefore important that biodegradable and compostable plastics are not used in products that can end up in recyclable plastics, as consumers cannot be expected to see the difference between biodegradable and compostable and non-biodegradable plastics.

The contrary is true as well: consumer confusion can lead to an increased pollution of VFY-waste (Vegetable, Fruit and Yard waste) with bio-based plastics that do not degrade in a composting facility.

Environmental benefits

A transition to a circular economy means that materials come back into the loop as new products after being disposed of. Using resources to make packaging material that ends up in the bio-waste stream (single use products) **is not circular** since the biodegradable and compostable plastics are either sorted out and sent to waste incinerator or are transformed into water and CO_2 and leave the loop. Recycling of biobased plastics is circular. For this reason, we encourage producers to create **biobased products that can be recycled**.

Biodegradable and compostable plastics only bring environmental benefits when there is a clear co-benefit: separating more bio-waste from residual waste and when they do not degrade the quality of organic waste.

Given these points there should be an assessment framework with **clear criteria** that assesses in which applications the use of biodegradable and compostable plastics is indeed **beneficial to the environment**. In other cases, the use of biodegradable and compostable plastics should be avoided.

Consumers' perception

The use of biodegradable and compostable plastics leads to **confusion amongst consumers** and creates new risks to both the environment and industry. The very fact of labelling products as (bio)degradable can have an impact on people's behavior and sense of responsibility. Public perceptions on the term "biodegradable" can remove people's waste management responsibility, consequently leading to an

[2] *Biodegradable Plastics and marine litter. Misconceptions, concerns and impacts on marine environment. UNEP, 2015. Page 3*

increase of littering. For example, if a plastic bag is labelled "biodegradable", users might think that leaving it in the open environment is an acceptable solution, and littering would increase.[3] Furthermore, they are left with the impression that when something is labelled as biodegradable or compostable, it can be disposed of in the bio-waste bin. But, as discussed earlier, behaving as such does not always lead to the most sustainable result.

The use of biodegradable and compostable plastics must be so specific that **the correct waste management route is clearly identifiable** for the consumer/user.

Our Recommendations

Alternatives to conventional fossil-based plastics could offer environmental benefits. However, this is on the condition that they have been developed in compliance with **EN standards, they are clearly bringing environmental benefits** and that there is a collection and treatment infrastructure in place to manage them. As this is often not the case for biodegradable and compostable plastics, **promotion and marketing of biodegradable and compostable plastics at this stage is premature**. **Recycling** of biobased plastics should therefore be favored over biodegradation, which only provides sustainable benefits in very specific applications.

For further information, please contact: info@fead.be

FEAD, the European Federation for Waste Management and Environmental Services, represents the private waste and resource management industry across Europe. FEAD's members are national waste management associations covering 19 Member States, Norway and Serbia.

FEAD's members represent over

- 3,000 companies with activities in all forms of waste management;
- 60% share in the household waste market;
- Handle more than 75% of industrial and commercial waste in Europe;
- Combined annual turnover of approximately € 75 billion;
- Employment of 320,000 people who operate around 2,400 recycling and sorting centres, 1,100 composting sites, 260 waste-to-energy plants and 900 controlled landfills.

They enable the transition to a circular economy by producing resources that can be reinjected in the economy and by supplying energy. Our companies add value through innovative and cost-efficient collection, sorting, and recycling of secondary raw materials. As a result, they play a crucial role in achieving the best economic and environmental outcomes.

[3] *Biodegradable Plastics and marine litter. Misconceptions, concerns and impacts on marine environment. UNEP, 2015. Page 31*