Anaerobic Digestion of certified compostable products

Industrially compostable plastics play an essential role in putting the envisioned circular economy into practice. With reference to the European waste hierarchy, industrially compostable plastics provide added value through organic recycling. This includes both industrial composting and anaerobic digestion.

Certified industrially compostable plastic products such as biowaste bags or fresh food packaging are intended to end up in municipal biowaste streams. They are suitable for organic recycling as they can be collected and organically recycled together with the food waste. By offering consumers an easy solution to separate their household biowaste, they increase the volume and quality of valuable compost that is generated via industrial composting. In case the waste is processed via anaerobic digestion a larger amount of separately collected biowaste can additionally help to increase the share of biogas production.

Certified compostable products help to safeguard separate waste streams

Organic recycling of municipal biowaste contributes to a considerable extent to a circular bioeconomy:

- diverting municipal biowaste away from landfills reduces greenhouse gas emissions,
- diverting it away from incineration prevents material and energy losses[1],
- diverting it from mechanical recycling streams reduces the contamination of those streams, and
- via organic recycling it generates valuable compost to be used as fertiliser or soil improver.

With the establishment of an EU-wide mandatory biowaste collection[2] and correspondingly growing amounts of organic waste, capacities for the treatment of municipal biowaste in the EU will need to be increased in the near future.

[1] As the presence of wet biowaste among municipal solid waste increases, the moisture of the material mix that goes into incineration increases, which decreases the calorific value of the mix and thus leads to a lower energy efficiency.
[2] By 31 December 2023, EU Member States had to establish a separate collection of biowaste (or recycling at source).

Separate collection of biowaste is an essential precondition for high-quality organic recycling. **Certified compostable products have been proven to facilitate this separate collection and are instrumental to divert biowaste from the residual to the organic waste stream.**[3,4,5] Since the beginning of 2024, separate collection and effective organic recycling need to be implemented by all member states of the EU. Additional measures should be in place to reduce the contamination (of e.g., glass, metals, conventional plastics) in the input streams to secure high quality final compost.

EUBP calls for the recognition of the significant contribution that certified compostable products add to the increased collection of municipal biowaste – especially food and kitchen waste.

Certified compostable products are designed for organic recycling and help to ensure the quality of digestate and compost

Today, more municipal biowaste is being composted than treated in anaerobic digestion (AD).[6] However, given the currently growing demand for natural gas in the EU, whenever new capacities are being established, many Member States opt for AD technologies as the primary choice over industrial composting. Other arguments to use AD are that

- less land is needed,
- odour exposure can be reduced, and as a result
- they can be closer to cities to reduce transportation distances.

However, the higher costs for building and running the plants are often deemed a drawback of AD.

While European Bioplastics (EUBP) in principle supports the development of AD technologies to generate additional biogas from organic waste, we also stress the need for a wide range of organic recycling technologies, since there is no technology that works for all waste streams. However, within the concept of recycling, **it should be ensured that the resulting output, be it digestate and/or compost, is of high quality**, meaning that it contains an added value such as being suitable to replace other substances or fertilisers in line with the EU Fertilising Products Regulation.

A range of Anaerobic Digestion technologies and configurations exist throughout Europe, which are biomass-specific. Municipal biowaste usually consists of a mixture of organic kitchen waste and (garden/yard) green waste. Given that the ligneous part of green waste is difficult to convert to biogas in anaerobic digestion, **combinations of an anaerobic and aerobic steps are deemed most suitable for processing biowaste.** Via this combination, the maximum value is taken out of biowaste: biogas as a source of energy, and compost as a fertiliser or soil-improver.

[3] Dubois, Sims, Moerman, Watson, Bauer, Bel, Mehlhart, (2020). Guidance for separate collection of municipal waste.
[4] Cucina M (2023). The lesser of two evils: Enhancing biodegradable bioplastics use to fight plastic pollution requires policy makers interventions in Europe Environmental Impact Assessment Review 103-107230
[5] Targets set in the EU Waste Framework Directive
[6] The ECN data report 2022 shows a median of 72 kg/ capita/annum being sent for composting and 48kg for AD. Source: ECN Data Report 2022. Compost and digestate for a circular bioeconomy.

Technologies generating biogas and high-quality compost from biowaste are well suited for compostable packaging. A recent study confirms that "bioplastics within organic municipal waste are a critical component for the future of waste management with particular reference to the quality of the final products, i.e., digestate and compost."[7]

Certified compostable products are compatible with anaerobic digestion. Different pre- and post- treatment processes make them suitable for anaerobic digestion streams that treat municipal biowaste

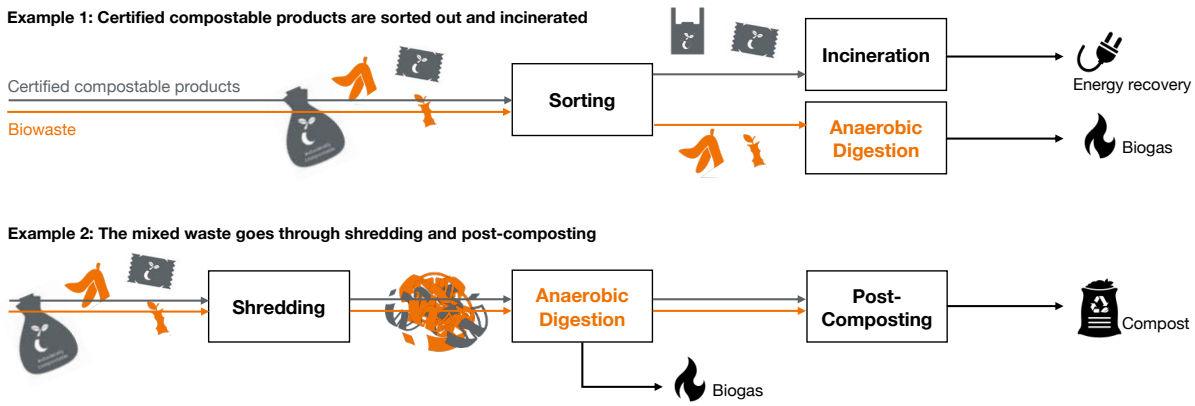

Figure 1: Certified compostable products in AD municipal biowaste streams – examples of up- and downstream processes for treating certified compostable plastics

If anaerobic digestion technologies are used to treat municipal biowaste**, upstream processes exist (e.g., mechanical pre-treatments) that allow for compostable packaging to be properly treated** (see Figure 1). Sorting technologies enable certified compostable products to circumvent the digestion phase, whereas within some processes a shredding step allows these materials to enter the fermenter together with the other biowaste. These two examples of upstream processes, together with the option of a post-composting step, equally allow for compostable packaging and slowly biodegradable organic materials (e.g., with a high lignin content like woody plant parts) to be handled within the municipal biowaste stream. A recent study confirms that "the collaborative collection and treatment of certified compostable products and food waste through anaerobic digestion (AD) and post- digestion composting processes are generally feasible."[8]

The general misconception that certified compostable plastics products are not suitable for organic recycling based on AD processes is therefore unjustified.

[7] Papa G et al. Anaerobic digestion of organic waste allows recovering energy and enhancing the subsequent bioplastic degradation in soil. Resources, Conservation and Recycling, Volume 188, January 2023, 106694. https://doi.org/10.1016/j.resconrec.2022.106694

[8] Ziyi Su, Pin-Jing He, Fan Lü, Hua Zhang, Liqun Ren, Kun Lü, Rowan Williams, and Wei Peng. Certified Compostable Products and Sustainable Food Waste Management via Laboratory-Level Simulation Anaerobic Digestion and Postdigestion Composting. ACS Sustainable Chemistry & Engineering 2024 12 (10), 4146-4155. DOI: 10.1021/acssuschemeng.3c07601

The revision of EN 13432 should be adapted to reflect current and future organic recycling processes

In Europe, several independent certification schemes and labels exist to verify the industrial compostability of compostable products, all of which are based on the harmonised European standard EN 13432.[9]

European Bioplastics is following the current revision of EN 13432[10] and supports adapting it to reflect current and future organic recycling processes, i.e., the developments in organic recycling technologies and the actual recycling routes that biowaste take. Municipal biowaste is the main waste stream for compostable packaging to enter organic recycling. This waste stream per se contains a wide range of different materials, from almost liquid kitchen waste to woody garden waste. **The standard for organic recycling needs to take the actual recycling route into account when defining realistic biodegradability criteria**. Also, to avoid customer confusion, **we support a clear consumer-oriented claim based on one single standard** for the organic recycling of compostable products, covering the relevant processes.[11]

Conclusion

Certified compostable products play an important role within the municipal biowaste management:

- They are designed for organic recycling.
- They help to safeguard separate waste streams.
- They help to increase the collection of biowaste.
- They help to ensure the quality of digestate and compost.
- **They are suitable for anaerobic digestion streams that treat municipal biowaste and include different pre- and post- treatment processes.**

[9] European Bioplastics' own label, the Seedling logo, may be featured if the respective compostable product has been formally certified. The certification process is carried out by the independent certifiers DIN CERTCO (Germany) and TÜV AUSTRIA Belgium according to the certification scheme "Products made of industrially compostable materials".
[10] EN 13432: Requirements for packaging recoverable through composting and biodegradation - Test scheme and evaluation criteria for the final acceptance of packaging. A possible revision of this standard is currently being prepared within the CEN Working group.
[11] Exemptions should be possible for B2B-claims or for criteria for specific AD practices such as in closed-loop processes.

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About European Bioplastics

European Bioplastics (EUBP) is the European association representing the interests of the bioplastics industry along the entire value chain. Its members produce, refine, and distribute bioplastics i.e. plastics that are biobased, biodegradable, or both. More information is available at www.european-bioplastics.org