An open letter to **European Bioplastics e.V.**
European Plastic Converters
Plastic Recyclers Europe
SPI Bioplastics Council

Biodegradable-compostable plastics – a primer vis-à-vis recycling and end-of-life issues

There is some confusion and misperception on the role and value proposition of biodegradable-compostable plastics. As we are active researchers and thought leaders in the bioplastics space, and involved in Standards writing, we are placing on record a clear science based value proposition for biodegradable-compostable plastics.

Plastics and specifically plastics packaging offer considerable value from protection, to performance, to light weighting, to energy savings, and costs. An increasing concern in the continued use of plastics, specifically plastics packaging is its end-of-life – what happens to plastic after use when it enters the waste stream? Therefore, it is important for the plastics industry to support and promote environmentally responsible, scientifically valid end-of-life strategies for the safe and efficacious treatment of plastic waste. Everyone can agree that there can be multiple approaches and technologies to plastics end-of-life. Recycling is clearly an important end-of-life strategy for plastics and continues to grow. Even in recycling there are subsets of technology – mechanical recycling (to same or different product) and chemical recycling (disassembling the polymer back to monomer). Biodegradability (which is a form of natural biological recycling) in concert with disposal/waste management systems like composting, anaerobic digestion, soil (for disposable plasticulture applications) offers an environmentally responsible, efficacious, end-of-life strategy for select disposable and single use plastic packaging, food service ware and similar applications -- for example a compostable carry-out plastic bag offers consumers dual use of serving to protect and carry purchased items, and then used at home to collect compostable biowastes for “composting” or “anaerobic digestion”. This allows closing the loop and ensuing that the compostable plastics is safely, and efficaciously removed from the environment via microbial metabolism.

The truly biodegradable-compostable plastics is an important sub-set of plastics for end-of-life options and complements traditional plastics recycling. It is not a substitute for current plastics recycling efforts, but offers additional, complimentary end-of-life options for a subset of plastics packaging integrated with composting/anaerobic digestion disposal systems. It broadens the scope of plastic resins being offered to the marketplace and contributes to the viability and vibrancy of the plastics sector. To reiterate, truly biodegradable plastics are not in competition with conventional plastics – conventional plastics are more suitable for long-life applications and for mechanical recycling, while biodegradable plastics make more sense for short-life applications associated with food waste, soil contact, moisture, etc., that make mechanical recycling difficult.

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The biodegradable-compostable class of resins are distinct and very different from the dominant, traditional plastic resins like polyethylene (PE), polypropylene (PP), and polyethylene terephthalate (PET). It will not and should not interfere with the use and recycling end-of-life of these resins. The biodegradable-compostable resins offers an additional and distinct class of plastic resins which are integrated to composting/anaerobic digestion end-of-life and targets specific market sector applications as discussed in the earlier paragraph. Because it is tied to composting/anaerobic digestion or soil biodegradability end-of-life, the typical minimum film thickness requirements for a reusable shopping bag (e.g. 50 microns) should not be applicable to ensure efficacious and complete biodegradability (complete removal from the disposal environment via microbial metabolism).

Unfortunately, there are controversial and unproven claims of technologies involving “additives” that supposedly make these PE, PP, PS, and PET resins completely biodegradable or oxo-biodegradable in short time frames ranging from 9 months to 2 years no matter which environment they are disposed in. A recent study commissioned by Plastics Europe found that these claims cannot be substantiated by credible scientific evidence. Several courts and regulatory agencies in different countries have taken action against these companies for false and misleading claims (New Zealand, Australia, Italy, USA). More importantly, the European Recyclers Association and its U.S. counterpart have indicated that these oxo and organic additive based PE, PP, and PET resins are interfering in recycling operations and has potential to derail recycling efforts. It is important to stress again that the truly biodegradable – compostable resins is clearly distinct and different from these oxo or organic additive based PE, PP, and PET resins and have a clear end-of-life option of compostability, anaerobic digestion, and soil applications.

The biodegradable plastics industry has worked hard to develop international consensus standards to test for biodegradability in target disposal environments like composting, anaerobic digestion, soil and also developed specifications for biodegradable plastics in composting environment and also for packaging in (organic) biological recycling. Scientific standards and third-party certifications are essential tools to identify biodegradable products, testing and verifying performance in a transparent way.

The first attempts to define standards for plastics and packaging suitable to composting date back to the beginning of 1990’s, when the Institute for Standards Research (ISR, the ASTM's research arm) in USA and ORCA (Organic Reclamation and Composting Association) in Europe started fundamental preliminary works. Official standard specifications were developed shortly after. ASTM D6400 (Standard Specification for Compostable Plastics) was originally published in 1999, and the year after followed the European harmonized standard EN 13432 (Packaging. Requirements for packaging recoverable through composting and biodegradation. Test scheme and evaluation criteria for the final acceptance of packaging). At present, two international standards are available (ISO 17088 Specifications for compostable plastics, and ISO 18606 Packaging and the environment -- Organic recycling). These standard specifications basically apply the same testing approach (and requirements) based on: assessment of biodegradability (90% in 180 days), assessment of disintegration (90% in 90 days), and assessment of possible negative effects on the final compost (ecotoxicity testing and content of metals).

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Biodegradation has been characterized also in other environments, such as home composting, soil, freshwater and sea water, resulting in a massive number of test methods that are presently available. The research is ongoing, and new standardization projects are being development quickly.

As a result, compostable plastics (which are biodegradable in a composting environment) are currently utilized for several commercial applications (e.g. food waste collection bags, shopping bags, food service ware, cutlery, packaging, etc.), which are satisfactorily composted together with organic waste in composting plants. Soil biodegradable plastics are also finding applications in which biodegradability is a major asset, such as mulch films for agriculture, body bags for green burial, etc. Truly biodegradable and compostable plastics have proven for many years to work well for waste diversion and minimization systems.

Standardization has played a crucial role for the development and acceptance of these innovative products. Biodegradability, the presence of renewable substances, and environmental impact are not characteristics that can be noted directly by consumers without identification. Reproducible test methods are needed to establish any claim of biodegradability, and standardization has provided the proper test methods and requirements. The result is a frame of reference for consumers, who must be able to make purchases based on informed decisions, as well as a level playing field for companies on the market, which must operate under a clear system of rules, and finally as a means of oversight for public authorities, which are responsible for health and safety requirements to protect the public and the environment.

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