

Biopolymer packaging in UK grocery market

WRAP Briefing

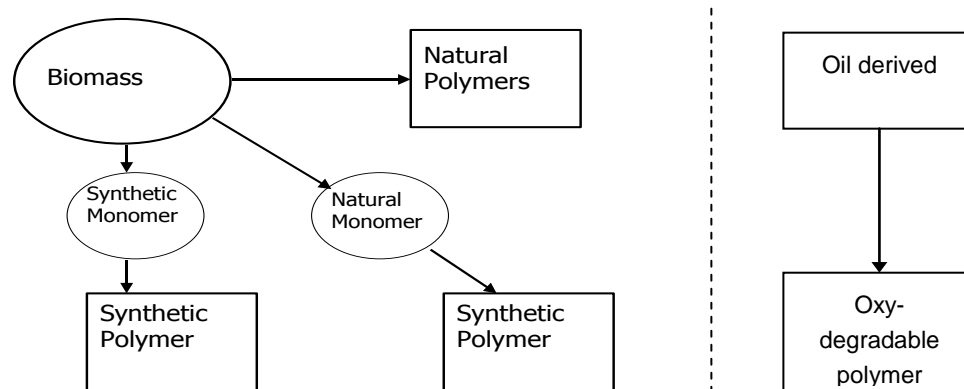
1 Summary of the issue:

The UK is seeing a significant growth in the development and use of biopolymer and compostable packaging in the retail grocery sector. The introduction of these new materials create risks for established recycling operations for both oil based plastics and compostable material, and must be managed carefully. Those brands and retailers introducing packs in the new materials have a special responsibility to address the risks and to improve public understanding of the materials.

There is a growing interest in using biopolymers amongst the major grocery retailers and brands, partly as a result of an increase in conventional packaging costs, but predominantly as a point of differentiation and for the positive consumer perceptions associated with the term 'biodegradable' or 'compostable'.

2 Definitions:

Biopolymers are polymers derived from biomass. They may be natural polymers (e.g. cellulose), or synthetic polymers made from biomass monomers (e.g. Polylactic Acid) or synthetic polymers made from synthetic monomers derived from biomass (e.g. Polythene derived from bioethanol). Oxy-degradable (degradable) plastics are not biopolymers. See point 5 below for further details.



Renewable polymers: Such polymers are often described as renewable polymers. In general, the property of being 'renewable' is good. Not only can the original biomass be reproduced, but also the overall carbon dioxide (CO₂) emission may be less. However, it is not zero: farming, pesticide production and other crop producing activities do have CO₂ outputs.

Biodegradable: Biopolymers may be biodegradable, or they may not. Biodegradation is the process whereby the polymer is broken down into simpler compounds. The term 'biodegradable' does not imply any particular time scale or process. Polylactic Acid (PLA) is biodegradable. Polythene derived from bioethanol is renewable but not biodegradable.

Compostable: Means that a biodegradable polymer will biodegrade and disintegrate under standard test conditions. A material in the form of a thin film might be compostable, but the same material in a thicker form may not. Compostability is not an inherent property of a material; it is a property of a particular form (or pack) of a material. There is a European standard for 'compostability', EN 13432. This relates to industrial composting conditions only.

See <http://www.european-bioplastics.org/index.php?id=158> for further details.

3 WRAP position: key points

WRAP believes that introduction of biopolymers should be done in a way which can demonstrate benefit to the environment. Pending a full life cycle assessment, it is likely that a benefit will be demonstrable in the following circumstances:

- products using the new materials are designed to minimise the amount of material used;
- use of the material provides improved performance or technical benefits e.g. a reduction in food waste;
- it is compostable – and preferably home compostable. Packaging should be certified as compostable and conform to EN 13432;
- it is clearly identified and differentiated from oil-based polymers;
- users of the material are fully informed about how to distinguish it from other polymers and enabled to dispose of it appropriately at end of life;
- practical arrangements can be made for the collection and appropriate treatment of the new materials; and
- considering applications where established recycling systems are not in place.

The principal risks arise at the end of life phase. Instead of being composted, biopolymers may find their way into the recyclables stream which would increase the cost of recycling or prevent it completely. Alternatively biopolymers could be added to the residual waste stream and increase the biodegradable waste sent to landfill, making it harder for the UK to meet its legal waste obligations and increasing the amounts of methane gases generated.

WRAP has identified the following priority activities which it will pursue with other interested parties:

- development of standard "branding" and messaging for products using these materials to aid separation;
- identification of technologies for separating polymers of different origins;
- development of guidelines on the treatment of biopolymers in waste collections for composting;
- development of a home composting standard;
- life cycle assessment where appropriate; and
- publication of clear technical advice on biopolymers.

4 Issues Associated with Biopolymer use:

WRAP considers that the introduction to biopolymers has a number of significant implications, these include;

- i. **Packaging weight:** Some rigid biopolymers (e.g. PLA) tend to have better structural properties than their conventional fossil fuel-based counterparts with 10-15% reductions in packaging weight being possible, provided the same lean design principles are adopted. Other biopolymers may need a heavier gauge to provide the same strength.

- ii. **Energy:** The manufacture of some biopolymers may involve the use of less energy in substrate production and conversion (forming), compared to oil based conventional alternatives. Full life energy utilisation is less well understood.
- iii. **Renewable:** In general, the property of being 'renewable' is good. Use of by-product of food production, rather than primary crops is preferable.
- iv. **Natural Resources:** The use of land, water and other resources for the production of biomass for packaging or fuels may have significant wider social, environmental and economic consequences on food supply and commodity prices.
- v. **GM crops:** Biopolymers sourced from North America, especially PLA-based packaging, have historically been manufactured from genetically modified (GM) feedstock. European consumers are typically resistant to anything that has been genetically modified.
- vi. **Labelling:** The only European Standard for compostable packaging materials is EN13432. The associated European icon to notify compostable packaging is administered by the Composting Association in the UK. WRAP advocates that biopolymer packaging should conform to EN 13432. There is no European wide home composting standard at present, although work is underway.
- vii. **Compost disposal:** Most biopolymers (and all rigid biopolymers) are designed to compost in specific environmental conditions – normally in a commercial composting facility achieving temperatures of 60°C+. Currently no UK local authority will accept biopolymer packaging in the organic waste collection, except kitchen caddy liners, due to the risk of contamination with conventional plastics. Not all the available biopolymers are suitable for the lower temperatures achieved in home composting. It is vital in providing these materials to end consumers that this distinction is made.

Disposal of biopolymers to landfill will increase the generation and release of methane gas and is directly counter to achievement of the UK's obligations under the EU Landfill Directive.
- viii. **Communication:** Communication on recycling, composting and disposal options for biopolymer packaging needs to be clear, to ensure that compostable and plastic recycling waste collection schemes are not compromised. Little communication has taken place to date and there appears to be a great deal of confusion amongst consumers. In particular there is a low level of understanding of the term 'biodegradable' or 'compostable' and its implications. It is the responsibility of those introducing new materials to ensure that their implications are fully understood by consumers and others.
- ix. **Plastic recycling:** It is believed that biopolymers can be separated from conventional plastics using near infra red and laser fluorescence technologies but this would necessitate a significant investment by reprocessors and waste management companies. Without separation biopolymers can contaminate the recycle stream even at low levels (less than 1%).
- x. **Shelf life and transportation:** If the use of biopolymers affects the product shelf life (i.e. reduces shelf life) or necessitates additional temperature controlled storage or distribution conditions, this may reduce the environmental benefits being sought.

5 Degradable plastics:

Whilst not classed as a biopolymer, degradable plastics (also called 'Oxo-biodegradable', 'Oxy-degradable' or 'UV-degradable') are also being used for packaging. These are polyethylene (oil based polymers) not from a renewable source and contain additives that act as catalysts to accelerate the degradation process. These additives break down under UV exposure and/or dry heat and mechanical stress, leaving small particles of plastic. These may then potentially biodegrade, reducing the material to water, CO₂, biomass and trace elements. This process can take 18 months or more in optimum conditions.

Degradable plastics are not certified as 'compostable' and do not conform to standard EN13432.

Degradable plastics will not degrade effectively in a landfill site and could potentially hinder the quality of recycled plastic if they enter the plastic recycling system in high concentrations. WRAP does not therefore advocate the use of degradable plastic for retail primary packaging.

6 Further research:

WRAP has published findings from consumer perception research into biodegradable and compostable packaging in September 2007. [Report](#).

Further areas of work required are:

- impact of biodegradable packaging in the organics and plastics recycling streams; and
- development of a certification service for home compostable packaging. This is being pursued by the Association for Organics Recycling (AFOR).

7 Useful links:

WRAP/Green Alliance roundtable event in 2007 (presentations):

<http://www.wrap.org.uk/retail/materials/biodegradable.html>

Green Alliance decision flowchart for which packaging applications are more suitable for compostable packaging:

<http://www.green-alliance.org.uk/waste-content.aspx?id=2340>

Association for Organics Recycling (AFOR) www.organics-recycling.org.uk (previously the Composting Association)

European Bioplastics (formally IBAW): www.european-bioplastics.org

Vincotte. http://www.vincotte.com/Frontmodules/EN/diensten_servfind_detail.asp?ServiceID=70

8 WRAP lead contact:

Stephanie Egee, WRAP Retail Team: stephanie.egee@wrap.org.uk

While steps have been taken to ensure its accuracy, WRAP cannot accept responsibility or help liable to any person for any loss or damage arising out of or in connection with this information being inaccurate, incomplete or misleading. For more detail, please refer to our Terms & Conditions on our website: www.wrap.org.uk.

www.wrap.org.uk/retail

December 2010

