MILLS OAKLEY

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16 August 2018

Your ref:
Our ref: SJGM:AZWM/5669896

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Dear Elizabeth

Certification Trade Mark Applications 1852559 and 1852561-63 – Applicant OxoPak Pty Ltd

We confirm we act for OxoPak Pty Ltd (**the Applicant**), the applicant for Australia Certification Trade Marks, numbered 1852559 and 1852561-63 **(the Certification Trade Marks).**

We are in receipt of your letter dated 18 July 2018 (your Letter), which invites our client in make a submission is response to the various submissions received from interested parties.

Our client has reviewed your letter and the submissions received from the interested parties and wishes to make the following observations with respect to the matters arising.

Background

On behalf of our client we have reviewed the ACCC's 2011 published document entitled *Certification Trade Marks – the role of the ACCC* and our client's comments hereunder are in the context of that document.

Our client observes that the ACCC should only approve a Certification Trade Mark application if it is satisfied that:

(a) the attributes required of approved CTM assessors are sufficient to enable the person to competently assess whether goods and/or services meet the certification requirements and

(b) the CTM rules would not be to the detriment of the public and are satisfactory having regard to the principles of competition, unconscionable conduct and consumer protection.

Our Clients Business

Our client notes that your Letter does not make any assertion regarding the competence of our client to certify but nonetheless we are instructed to advise that the principals of our client have extensive experience and knowledge in the area of oxo-biodegradability and its application to packaging products.

MILLS OAKLEY

Our client notes the assertion in the submission of Good Environmental Choice Australia (GECA) that our client won't comply with ISO 14024 as they are not independent verifiers and thus do not manage to avoid a conflict of interest. GECA appears to base this view on their assertion that "they seem to be producers of such plastic packaging themselves as well".

Our client would like to clarify this assertion despite GECA not providing any material in support of that assertion.

We are instructed that our client can and does direct businesses seeking to have oxo-biodegradable products manufactured to a credible company called Reverte Bio-Plastic Pte Ltd. They are the largest manufacturer in Singapore of oxo-biodegradable packaging and work direct with Wells UK Ltd for the supply of the Reverte oxo-bio additive. Wells UK Ltd, is also an unrelated entity with respect to our client.

Our client, in the course of promoting the manufacture of oxo-biodegradable products, will explain the purpose of additives to businesses seeking to have oxo-biodegradable products manufactured and manufacturers and direct them to the source of those additives.

Our client then intends allowing the manufacturers to use the Certification Trade Marks only if their products contain the additives that ensure those products are oxo-biodegradable.

Accordingly our client is a legitimate certifier of the use of oxo-bio technology who works with manufacturers to educate and assist them in achieving the use of that technology and certifying by granting use of the Certification Trade Mark that such technology has been used (and will continue to be used in order for that manufacturer to maintain the use of the Certification Trade Mark). Our client instructs that it is definitely not a manufacturer itself.

Oxo-Biodegradability

Our client notes the view expressed in your Letter that "a key consideration for the ACCC in its assessment of the CTMs is whether the marks indicate that certified products are environmentally safe and/or beneficial because of the use of oxo-degradable packaging when this is not the case."

Preliminary Observation

Your letter refers to oxo-degradable technology. It is important to recognise that Oxo-degradable plastic technology is a different, older technology to oxo-biodegradable plastics technology.

OXO-biodegradation is defined by CEN (the European Standards Organisation) {CEN/TR 1535–2006} as "degradation resulting from oxidative and cell-mediated phenomena, either simultaneously or successively Sometimes described as "OXO-degradable" but this describes only the first or oxidative phase and this description should not be used for material which degrades by the process of OXO-biodegradation defined by CEN. The correct description is "OXO-biodegradable."

Our client asserts strongly that the Certification Trade Marks are intended to certify ONLY that products are "oxo-biodegradable".

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Our client refers the ACCC to the following source to identify the significant differences between the two similarly named, but significantly different technologies:

The Oxo-Biodegradable Plastics Association at https://biodge.org

In particular our client refers the ACCC to the Oxo-biodegradable Plastics Association publication *The new plastics economy – Rethinking the Future of Plastics*, (attached as Appendix A to this submission) which at page 6 states "The term biodegradable plastic should not be used as it immediately begs the question whether you mean oxo-biodegradable or hydro-biodegradable. These two are completely different technologies with different purposes."

Our client also refers the ACCC to a number of publications that distinguish between oxo-biodegradability and bio-degradability including *Biodegradable Polymers for Industrial applications* (edited by Ray Smith), *Introduction to Bioplastics Engineering* by Syed Ali Ashter, and a report entitled *Waste Strategy for England 2007* which states "oxo-biodegradable plastics can be recycled with other clean commercial polyolefin wastes, provided that regard is had to the inclusion rate and the level of degradation, and that stabilisers are added where necessary. Hydro-biodegradable plastics cannot be recycled with other polymer components of waste. They would therefore have to be extracted from the waste stream and treated separately, at prohibitive cost."

Submission

In view of the distinction between oxo-biodegradability and bio-degradability our client submits that the correct question that the ACCC should investigate is whether the use of the Certification Trade Marks is likely to mislead consumers about the qualities of the products bearing the trade marks.

Our client's submission is that the use of the Certification Trade Marks simply shows that the products comply with the standards required for those products to be considered oxo-biodegradable, that is that those products are the result of specific technology required to indeed make the products oxo-biodegradable.

Our clients submit that none of the submissions made by interested parties call into question the use of the Certification Trade Marks but rather offer alternative views about the effectiveness of other technologies.

The **Australasian BioPlastics Association submission** refers specifically to a study regarding oxo-degradable and bio-degradable technology. As noted above, these two technologies are not the same as oxo-biodegradable technology. Respectfully, the concerns raised by the Australasian BioPlastics Association submission address different issues to those that ought be the subject of the ACCC's consideration.

The **Planet Ark submission** concludes with the statement, "We believe these CTMs should not be granted as they are detrimental to the Australian public. They are confusing, ambiguous and misleading". The final paragraph of the Planet Ark Submission reads, "In summary we support the conclusions of the New Plastics Economy report – "uncertainties surrounding the effect of oxo-degradable plastics on the conventional plastics recycling process means that the safest solution is to keep oxo-degradable plastics out of mainstream plastics recycling processes." Again our client emphasises that it is important to recognise that Oxo-degradable plastic technology is a different, older technology to oxo-biodegradable plastics technology, effectively undermining the relevance of the Planet Ark submission.

MILLS OAKLEY

With respect to the **Plastic Free July Foundation** submission, Rebecca Prince-Ruiz, Executive Director of the Plastic Free July Foundation notes that the foundation objects the registration of the CTM's "Due to the issues raised and concerns raised in the attached submission we believe these CTMs should not be granted as they are detrimental to the Australian public by appearing to provide a solution to the plastic litter situation which is not supported by research or processed adequately by Australian waste management systems".

Our client notes that there is no evidence provided or asserted for that statement and there is nothing to suggest that this submission actually considers the **oxo-biodegradable** plastics technology.

Impact of Oxo-biodegradable Technology

While perhaps unnecessary given that the use of the Certification Trade Marks is simply to identify that products are the result of the use of oxo-biodegradable plastic technology, our client instructs us to provide, the following explanation of the use of oxo-biodegradable plastic technology as a solution to plastic litter.

A major advantage of oxo-biodegradable technology is that the use-life and time-to-degrade periods can be controlled by means of adjustments to the additive formulation but using the same resin. There is no need for a different resin for each application and this represents a significant saving over other technologies. The products of oxo-biodegradation from polyethylene agricultural mulch films, based on Scott/Gilead technology, have been shown to be harmless and non-toxic in extensive testing and trials.

Oxo-biodegradable plastics do not self-destruct. They are designed to give a controllable service life and, when used in short-term applications such as clean bottles and containers, they can be readily reprocessed (recycled) with recovered commodity polyolefins after use.

Oxo-biodegradable plastic does not emit methane under any conditions. Attention is again drawn to the Waste Strategy for England 2007, which states, "Oxo-Biodegradable plastics can be recycled with other clean commercial polyolefin wastes provided that regard is had to the inclusion rate and the level of degradation and that stabilisers are added where necessary."

Further Submission

It is our client's submission that while it is acknowledged that there are differences in opinion of the effectiveness of different technologies with respect to the environmental impact of plastic technologies, there is a clear body of opinion that oxo-biodegradable plastics are beneficial to the environment. Our client emphasises that the use of the Certification Trade Marks is simply to indicate that a product abides by the requirements to be deemed "oxo-biodegradable".

Review of the Certification Trade Marks

With regard to the Good Environmental Choice (GECA) submission our client observes the statement "*It is not shown on the labels who the certifying is (sic) and so it is not transparent and possible for customers to check the label rules, scheme and governance.*" Our client responds that the labels are clearly identifiable as they contain unique, clear text-based terms on which consumers can easily find more information on the label rules, schemes and governance by doing a simple google search of the text terms used in the Certification Trade Marks. As the ACCC is well aware IP Australia maintains an easily searchable database of the proprietors registered trade marks in Australia.

MILLS OAKLEY

The GECA submission also states, "*The wording of all four labels is hard to understand and vague and makes it hard to know what is being certified.*" Our client responds that each trade mark contains both an image relating specifically to the type of certification and text that describes what is being certified and the fact that it is considered 'certified'. Our client believes there is ample information for consumers to be informed about the certification. Again our client emphasises that the use of the Certification Trade Marks is simply to indicate that a product abides by the requirements to be deemed "oxo-biodegradable" and that the Certification Trade Marks in the form of the application clearly fulfil that use.

Conclusion

Our client believes that by way of this response to the submissions made and due to the clarification of its intended use of the Certification Trade Marks that it has provided the ACCC with all necessary grounds to approve the Certification Trade Mark applications made by our client.

Yours sincerely

Stuart Gibson
PARTNER

Andrew Watt
ASSOCIATE

Oxo-biodegradable Plastics Assoc.
www.biodeg.org

The new plastics economy

RETHINKING THE FUTURE OF PLASTICS

Applying circular economy principles to global plastic packaging could transform the plastics economy, but we need to go one step further.

Oxo-Biodegradable Plastics Association

The Oxo-biodegradable Plastics Association **(www.biodeg.org)** is a not-for profit organisation, incorporated in England as a company limited by guarantee. It was established in 2007 to provide information to encourage greater understanding of oxo-biodegradable plastic technology and how it can protect the environment for future generations.

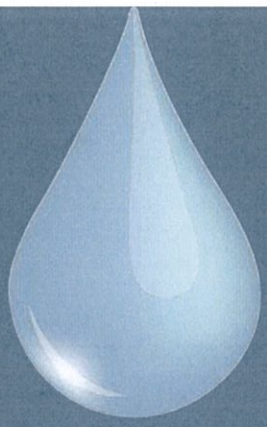
There are 1,602 members of the Association, who are manufacturers, distributors, importers, exporters and commercial end-users of oxo-biodegradable products in the countries shown at **http://www.biodeg.org/members.html**

Summary

Smart "oxo-biodegradable" plastic (OBP) should be seen as part of an overall strategy to improve the Environment, and they are fully consistent with the principles of "Reduce" "Re-use" "Redesign and "Recycle".

- Plastic waste is a serious environmental problem.
- Microplastics are caused by the embrittlement and erosion of ordinary plastic, and these fragments of plastic can lie or float around for decades adsorbing toxins.
- We need to stop using ordinary plastic for everyday items.
- Everyday plastic items should urgently be upgraded with OBP technology so that they will safely degrade and biodegrade in a much shorter time, if they get into the open environment.
- **It is essential to understand that OBP do not just fragment into pieces of plastic – they convert at the end of their useful life, into materials with a low molecular weight which are no longer plastics and will be recycled back into nature by naturally-occurring bacteria and fungi.**
- Bag taxes, and incentives to reduce and recycle are not enough, because thousands of tons of ordinary plastic will still get into the environment every day, where they will create microplastics.
- OBP will biodegrade on land and water and do not leave harmful residues.
- OBP cost little or no more than ordinary plastics. They can be made by the same factories with the same machinery, so there are no job-losses.
- OBP can contain a tracer so that they can be identified by waste-sorting equipment, but this is not necessary. They can be recycled with ordinary plastics if collected during their useful life, but crop-based plastics cannot.
- OBP are made from a by-product of oil refining, so the same amount of oil would be extracted from the ground even if they did not exist. There is no need to switch to expensive crop-based alternatives, which consume land and water resources as well as fossil-fuels, and are themselves made with up to 70% petroleum components.
- Crop-based plastics are in any event the wrong choice if we are concerned about litter - because they are tested to biodegrade in an industrial composting unit – not in the open environment[1] Nor do they convert to compost – they convert into CO_2.
- **It is important to understand that oxo-biodegradable plastic is not a completely new product – it is ordinary plastic, upgraded so that it will not lie or float around in the environment for hundreds of years.**

[1] EN13432 para 1. Provides that "This European standard makes provision for obtaining information on the processing of packaging in controlled waste treatment plants, but does not take into account packaging waste which may end up in the environment through uncontrolled means, i.e. as litter."



1% of additive

can make all the difference

Support for Circular Economy

This Association fully supports the idea of a circular economy for plastics, and (OBP) is entirely consistent with those principles. We support the redesign of plastics, we support re-use of plastics, and we support recycling of plastic.

At the present time, and for most applications plastic is the best option for protecting our food and other goods from damage and contamination. It is waterproof, strong and flexible; it can be adapted for a variety of products, it is not expensive, and is made from raw materials which are readily available.

A Life-cycle Assessment by Intertek for the UK Government in 2011 put plastic ahead of all the other materials used to make shopping bags. Intertek performed another LCA for shopping bags in 2012 which included the litter metric, and they put the environmental credentials of OBP ahead of bio-based and conventional plastic.

A study published on 19th July 2017 in "Science Advances" by researchers at the University of California, Santa Barbara, the University of Georgia, and the Law of the Sea Education Association in Woods Hole, Mass, said that ***"The same properties that make plastics so versatile — durability and resistance to degradation — make these materials difficult or impossible for nature to assimilate." The researchers concluded that "humans are conducting an uncontrolled experiment on a global scale, in which billions of metric tons of material will accumulate across all major terrestrial and aquatic ecosystems on the planet"***

This is the very reason why OBP has been invented. It performs in exactly the same way as normal plastic, but it protects the environment from the accumulation of plastic waste by converting at the end of its useful life into biodegradable materials which are no longer plastic. The micro-organisms then return the material to nature.

Urgent action is therefore necessary. Governments must stop dithering and make it mandatory for all short-life products made from polyethylene or polypropylene to be made with OBP. This has already been done in Saudi Arabia, the UAE, and other countries, and it is time that the rest of the world followed their example.

These countries recognise that upgrading the plastic is preferable to trying to ban it. They do not want to leave plastic waste in the environment as a problem for future generations, and they understand that OBP offers an "insurance policy" if all else fails. **Factories and brand-owners are not allowed to export to those countries unless their plastic products and plastic packaging are made with OBP technology.** See http://www.symphonyenvironmental.com/exporting-plastic-products-saudi-arabia/

Whilst the amount of plastic waste and leakage into the environment can be reduced by suitable policies, the only way to prevent plastic fragments getting into the environment entirely is to ban all plastics, which is clearly disproportionate and not practicable. Nobody doubts that all plastics (OBP, crop-based, and conventional) will fragment as they degrade, but OBP has been designed to convert rapidly at the end of its useful life into low molecular-weight biodegradable materials in the outdoor environment with access to oxygen. Nobody doubts that this does occur. Sunlight and heat will accelerate the process but they are not essential.

Similarly, nobody doubts that the length of time that this process takes will depend on conditions in the environmentEqually, nobody doubts that under the same environmental conditions OBP will become biodegradable much more quickly than conventional or crop-based plastic. However, questions are asked as to whether the whole of the plastic will convert to low-molecular-weight materials, but this is well understood and the industry standards for OBP place limits on the formation of non-degradable fractions.

Support (continued)

If OBP merely fragmented without biodegrading, CEN would not have defined oxo-biodegradability[2], and the American and British and French Standards authorities would not have included tests for biodegradability in ASTM D6954, BS8472 and AC T51-808

The Eunomia Report (2016) to the EU Commission concluded that ***"The debate around the biodegradability of OBP plastic is not finalised, but should move forward from the assertion that OBP plastics merely fragment, towards confirming whether the timeframes observed for total biodegradation are acceptable from an environmental point of view and whether this is likely to take place in natural environments."*** As to these issues see below. There is therefore no longer any justification for anyone to refer to OBP as " oxo-degradable" or "oxo-fragmentable."

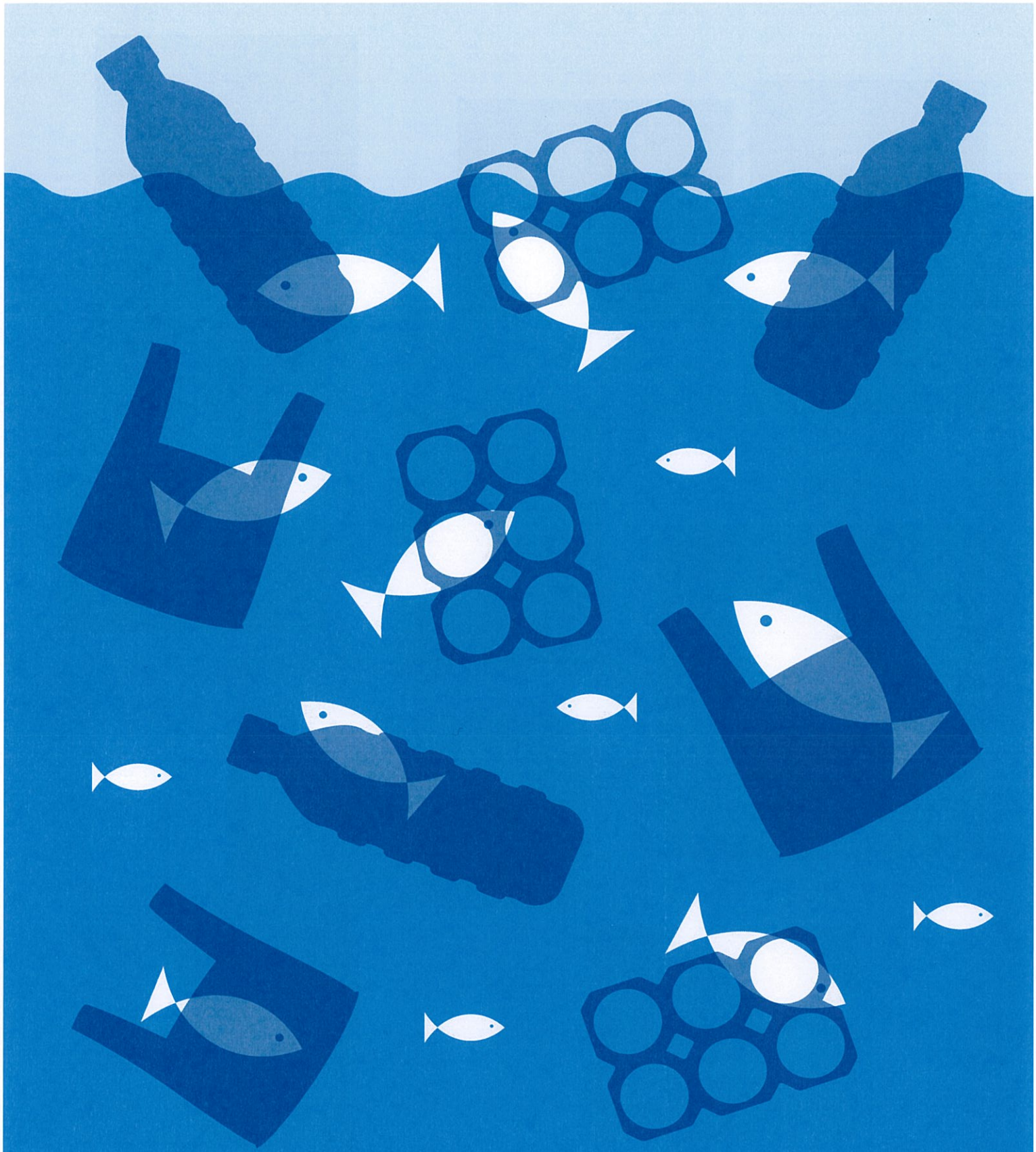
A report has also been issued by the Ellen MacArthur Foundation, and endorsed by some of the world's largest producers of the very plastic packaging which is polluting the oceans. It was also supported by the producers of crop-based plastics who see oxo-biodegradable plastics as a threat to their market-share. A draft of this report was submitted to Prof. Ignacy Jakubowicz, one of the world's leading polymer scientists, who replied that it did not accord with his understanding, nor the science in this field. http://www.biodeg.org/Reply%20to%20Ellen%20MacArthur%20Foundation%20from%20Prof%20Ignacy%20Jakubowicz%20-%2021-8-17.pdf.

[2] TR 15351 "degradation identified as resulting from oxidative and cell-mediated phenomena, either simultaneously or Successively."

He also explained to them that ***"The degradation process is not only a fragmentation, but is an entire change of the material from a high molecular weight polymer, to monomeric and oligomeric fragments, and from hydrocarbon molecules to oxygen-containing molecules which can be bioassimilated."*** They are then recycled back into nature by the naturally-occurring micro-organisms. **This point is absolutely crucial to an understanding of (OBP)** but the MacArthur researchers have failed to understand it. The same mistake was made by the authors of the January 2018 EU Commission report on oxo-biodegradable plastic.

For the OPA response to the MacArthur report see http://www.biodeg.org/OPA%20response%20to%20MacArthur%20-%2012-11-17.pdf

For the OPA response to the EU Commission report see http://www.biodeg.org/OPA%20responds%20to%20European%20Commission%20%20-%20%20%2019%20January%202018.pdf



1.2 billion tonnes annually by 2050

Biodegradable Plastic

The term **'biodegradable plastic'** should not be used, as it immediately begs the question whether you mean oxo-biodegradable or hydro-biodegradable. These two are completely different technologies, with different purposes:

Oxo-biodegradable

is made from polymers such as PE, and PP, and contains special ingredients (which do not include any metals exceeding the prescribed limits.[3] OBP products are tested according to ASTM D6954 to prove that they are biodegradable and non-toxic. They can also be recycled during their useful life, and independent reports proving this are publicly available on the OPA website.[4] Starch is not used in OBP.

[3] EU Packaging Waste Directive 94/62/EC Art. 11 and Annex A.1.2 of EN13432.
[4] For definition of plastic see ASTM D883

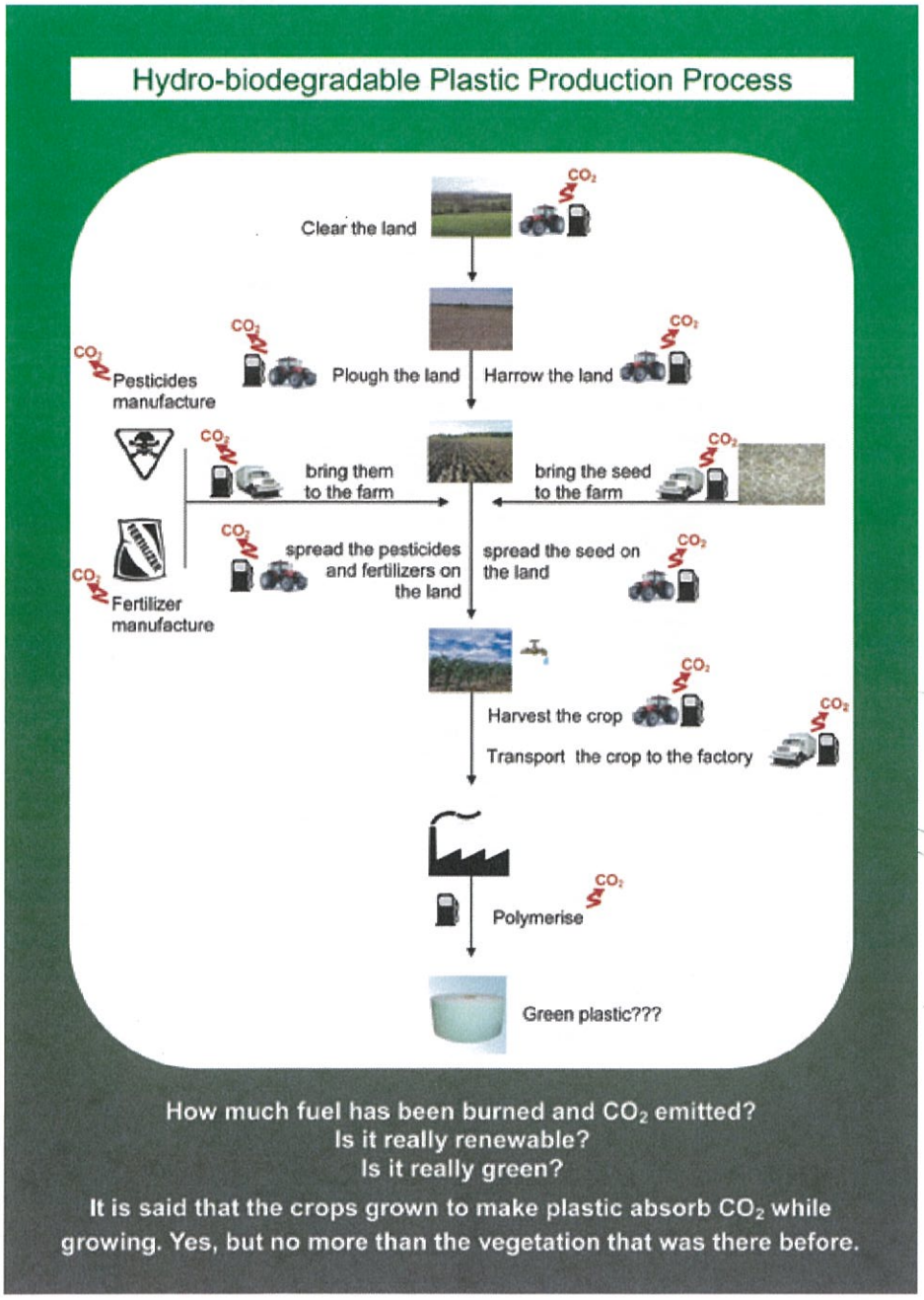
It would be misleading to describe crop based plastics as 'renewable.'

Crop-based Plastics

Crop-based hydro-biodegradable plastics (HBP)

(also loosely known as "bio-based plastics" or "bioplastics" or "compostable plastics"). These contain a high proportion of oil-based material, and are tested according to EN 13432 or ASTM D6400 to biodegrade in the special conditions found in industrial composting. For more detail about that type of plastic see the Annex to this briefing note.

Polymers made from crops such as sugar-cane, would benefit from the inclusion of oxo-biodegradable technology because they are not otherwise biodegradable. There are in addition some additives marketed as "enzymatic" or "microbiological" but these are not oxo-biodegradable, and it is doubtful whether the plastic (as distinct from the additive) will degrade at all. For OBP generally see www.biodeg.org



Oxo-biodegradation has been studied by scientists for many years

The Science

Oxo-biodegradation has been studied by scientists for many years, most recently by the Eurofins laboratory in Spain in 2016, who tested specimens according to ASTM D6954 and found that the prodegradant additive reduced the molecular weight of the plastic to the point where it became a low molecular weight material accessible by bacteria as a food-source, and no longer a plastic.[3]

At that point they tested for presence of metals, and found that there were none exceeding the limits prescribed in Annex A.1.2 of EN13432.

They then subjected the degraded material to biodegradation testing, and found that the bacteria generated a quantity of CO_2 which showed that they had consumed the residual material to the extent of 88.9%, at a rate which **produced that consumption in 121 days.** They then proved compliance with the eco-toxicity tests prescribed by OECD 207 and 208.

Oxo-biodegradation has also been proved in France[5] by an entirely different methodology set out in AFNOR, AC T51-808, which also uses bacteria which are found in soil and in marine environments.

Work has also been done at the Technical Research Institute of Sweden and the Swedish University of Agricultural Sciences, and a peer-reviewed report, was published in Vol 96 of the journal of Polymer Degradation & Stability (2011) 919-928. **They found 91% biodegradation within 24 months.** French academics at the Institut de Chimie de Clermond-Ferrand have also found that fragmentation of polymer led to the formation of a complex mix of small compounds that are readily water-soluble and totally assimilated by bacteria.

None of these tests mentioned above were designed to prove biodegradation in the laboratory only, but were designed to show what would be likely to happen under real-world conditions, just as tests done on "compostable" plastic are done in a laboratory according to EN13432 or ASTM D6400.

OBP has the same tensile strength as ordinary plastic, but it automatically converts in the presence of oxygen into CO_2, water, and biomass if discarded into the open environment. It does not therefore leave microplastics behind - and the particles of plastic which have been found in the oceans by NGOs and scientists are particles of ordinary plastic. Light and elevated temperatures are not necessary for the conversion process, but they will accelerate it. Nor is moisture necessary.

The first (abiotic) phase of oxo-biodegradation can be as short as a few months depending on the heat, UV light, and stress in the disposal location, as compared with 50 years or more for old-fashioned plastics. The residues are harmless, as proved by the OECD eco-toxicity tests,[6] and the material has also become hydrophilic and polar - so it will stick to the earth and will be much less likely to blow around as dust than would fragments of conventional plastic.

Materials such as twigs and straw, which are obviously biodegradable, will take much longer than OBP to biodegrade. After the molecular reduction has occurred, the oxo-biodegradable material will be converted into water and humus by naturally-occurring bacteria and fungi, **thus completing the cycle from oil, back to nature.**

When anything degrades in aerobic conditions CO_2 is released, and in the case of bio-based plastic this has to occur very rapidly in an industrial composting unit to satisfy EN13432 or ASTM D6400. By contrast, OBPs release CO_2 much more slowly, and it can be absorbed by the surrounding vegetation and used by micro-organisms as a food-source.

[5] CNEP R2014-222- May 2014
[6] See reports from Eurofins, LGA1 and OWS

There are four issues of particular concern:

1. Microplastics and litter
2. Resource depletion
3. Recycling
4. Composting and food waste

1. Microplastics and litter

Microplastics are a serious environmental problem. They are caused by the embrittlement and erosion of conventional plastic, and these fragments can lie or float around for decades, adsorbing toxins.

It is well known that millions of tonnes of plastic waste end up in the environment every year. [8] Plastic packaging is estimated to represent the highest share, as its weight, size and low-value make it prone to uncontrolled disposal.

Plastic pollution of the open environment is a worldwide problem, and that is the reason why campaigners around the world are wanting to ban or tax plastic bags.[9] The level of pollution by plastic litter, including microplastics, is alarming, and almost all of it is conventional plastic, which can persist in the environment for decades. It is necessary to stop using conventional plastic as a matter of urgency.

A public-opinion poll by You Gov in the UK in July 2015 showed that 85% of people thought that all plastic carrier bags should be both recyclable and biodegradable [i.e. oxo-biodegradable] in case they accidentally get into the open environment. A similar result was found in Mexico.

In an ideal world, all the used plastics would be collected, but we don't live in an ideal world. In some countries government strategy aims at improving the economics, quality and uptake of plastic recycling and reuse, and reducing plastic leakage into the environment, and we agree with this. However, there is nothing in this strategy for dealing with the thousands of tons of plastic which (despite the strategy) will for the foreseeable future still escape into the open environment, endangering wildlife and clogging up waterways. Somehow, we have to make sure that it does not lie or float around for decades.

To meet this challenge OBP was developed by polymer scientists.

It is important to stress that OBP is consistent with a circular economy. This is because OBP items can be redesigned, they can be re-used unless and until they get into the open environment as litter, and they can be recycled [10] without the need for separation if collected during the useful life of the product. OBP is not designed to be deliberately lost to the economy – but it is there to protect the environment if all else fails.

Micro-beads – used in products such as cosmetics and made from PE, or PP have attracted a lot of attention recently, but they too could be made oxo-biodegradable.

The problem which OBP is designed to address has nothing to do with landfill. Biodegradation is not desirable in landfill, because biodegradation in anaerobic conditions generates methane, which is a dangerous greenhouse gas, more powerful than CO_2.

Plastic should not be landfilled at all, and soon it will not be allowed in Europe - because plastic which has been collected is useful for its calorific value and for recycling.

[8] EU Packaging Waste Directive 94/62/EC Art.11 and Annex A1.2 of EN13432

[9] http://www.biodeg.org/bagbansandtaxes.html

[10] http://ww.biodeg.org/reycling.html

1. Microplastics and litter (continued)

A crop-based "compostable" plastic will generate methane in anaerobic conditions in landfill, but OBP will not. Some landfills are designed to capture methane but how do you know at the point of manufacture whether your plastic item will end up in one of them?

Nobody doubts that any type of plastic which has converted to low molecular-weight materials has become accessible to micro-organisms, who can use it as a food source, and that these micro-organisms exist on land and in the sea. The dispute is about how quickly they will bioassimilate the material, and whether they will bioassimilate all of it.

Once the material has become biodegradable in the open environment it really does not matter how long it takes to biodegrade completely if it has been proved to be non-toxic. This would matter only in the unlikely situation that large quantities of plastic residues had been discarded in the same place, and this is not likely in the case of carrier bags or packaging. **One thing is certain – that under any conditions in the open environment OBP will have biodegraded much more quickly than old-fashioned plastic in the same place.**

If we are concerned about litter on land and sea which cannot realistically be collected, there is no point in choosing 'compostable' plastics, which obviously have to be collected before they can be put into a composting unit, and no point in choosing the type of crop-based plastic (sometimes called 'drop-in plastic') which is no more biodegradable than conventional plastic (See "Fossil Resources" below). By contrast, OBPs can be re-used and recycled during their useful life, and only if they do not get collected would they degrade and biodegrade in the open environment.

OBP can be used to make **mulch films for agriculture,** but it is a bespoke product. A reputable supplier will formulate the polymer and additive having regard to the particular circumstances on the particular farm, and to the particular type of crop and its growing-season. Allowance will be made for exposure to UV light on the surface of the field during the growing season, and trials will be done in situ with a range of formulations before an OBP mulch-film is supplied to a farmer in commercial quantity. Crop-based plastic is not useful for this purpose, because the time for degradation cannot be controlled.

As to whether the micro-organisms will bioassimilate the whole of the low molecular-weight material, biodegradation of 91% has been proved as noted above, at the Technical Research Institute of Sweden and the Swedish University of Agricultural Sciences, and of 88.9% in the Eurofins laboratory in Spain. This is complete biodegradation for all practical purposes (the limit specified for "compostable" plastic in EN13432 is 90% of the maximum degradation of a suitable reference material, and this could be even less than 90% of the actual material).

Evaluation of degradation can be done in the open environment, as was done in seawater at Bandol[11] but the evaluation of biodegradation has to be done under laboratory conditions (as is also the case with bio-based plastics) – it cannot be done in a field or an ocean or a compost heap. These tests are very expensive and are not done for the amusement of scientists. They are designed to replicate conditions in the real world, and there is no reason to think that in the open environment the micro-organisms will stop before they have consumed all of the available material. It is for those who think so to provide credible reasons.

When comparing the performance of OBP with conventional plastic, the conventional plastic will not biodegrade at all until it has acquired biodegradability after exposure for very many years, and then its performance will be much the same as the degraded residues of OBP. The purpose of OBP is therefore to reduce very significantly the period of time that the plastic is lying or floating around, and accumulating in the environment and adsorbing toxins before it becomes biodegradable.

[11] See note 16 below

85%

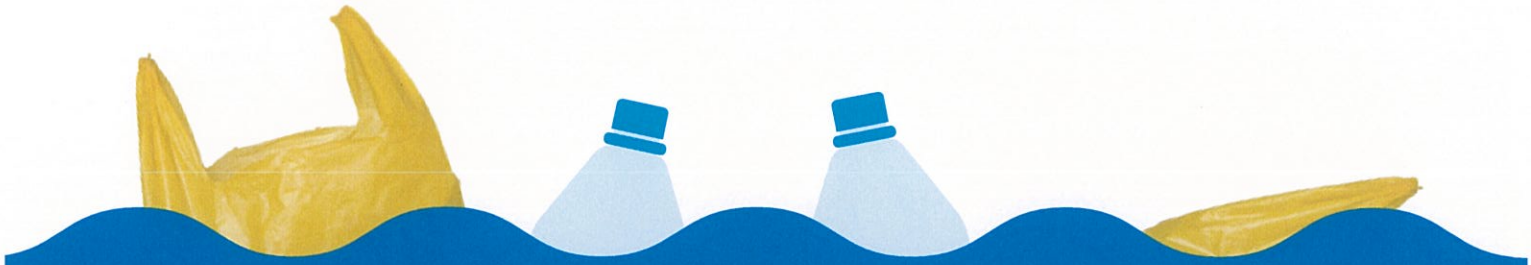
of people thought that all plastic carrier bags should be recyclable and biodegradable

Propensity to litter

It is often claimed that biodegradable plastics are likely to encourage littering, but this is rarely advanced as an objection to bio-based plastics. The Eunomia Report says, *"rather than speculation, objective behavioural research is required to move this topic forward in a constructive manner."*

In our view, even if there were a label describing a product as oxo-biodegradable, it is unlikely that the people who cause litter will look for the label before deciding to throw a plastic item out of a car window. Further, even if it were true that biodegradability encourages littering, and supposing that there would be 10% more litter - is it preferable to have 110 plastic items in the environment which will degrade and biodegrade in a few years or even months, or 100 plastic items which will lie or float around for decades?

It is not acceptable to continue debating this speculative proposition any longer, while thousands of tonnes of conventional plastic are getting into the environment every day, which will accumulate and pollute the environment for decades into the future.



A Life-cycle Assessment by Intertek shows that when the litter metric is included OBP is actually the best material for making carrier bags.

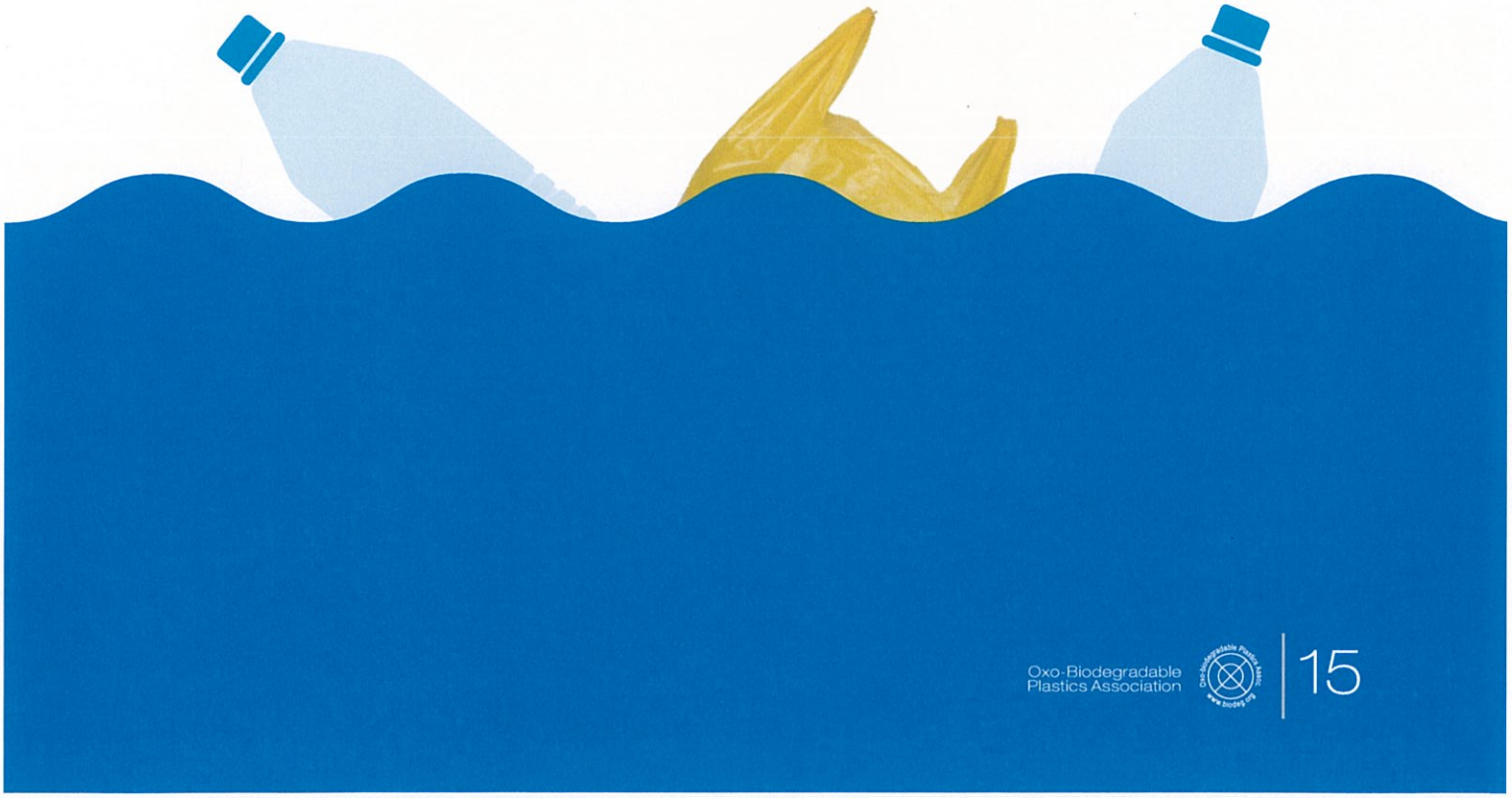
See http://www.biodeg.org/New%20LCA%20by%20Intertek%20%20-%20Final%20Report%2015.5.12(1)%20(1).pdf

would you prefer 110

items which will degrade **and biodegrade** in a few months

OR

100 items which will float around for decades, creating microplastics?



2. Resource depletion

We find it hard to understand the trend towards replacing conventional oil-based plastics with plastics derived partly or fully from crops.

Oil-based plastics, including OBP, do not cause fossil resource-depletion. This is because they are made from ethylene – a by-product of oil-refining which used to be wasted. The oil is extracted to make fuels and lubricants, and the same amount would be extracted even if oil-based plastics did not exist. Therefore, until other fuels and lubricants are found for vehicles, ships, aircraft, buildings, and factories, it makes sense to use this by-product instead of consuming large amounts of fossil fuel in the agricultural production, transport, and polymerisation of "crop-based" plastics. See http://www.biodeg.org/biobased.html

It would therefore be misleading to describe crop-based plastics as "renewable."

Oil is extracted to make fuels and lubricants, and the same amount would be extracted even if oil-based plastics did not exist

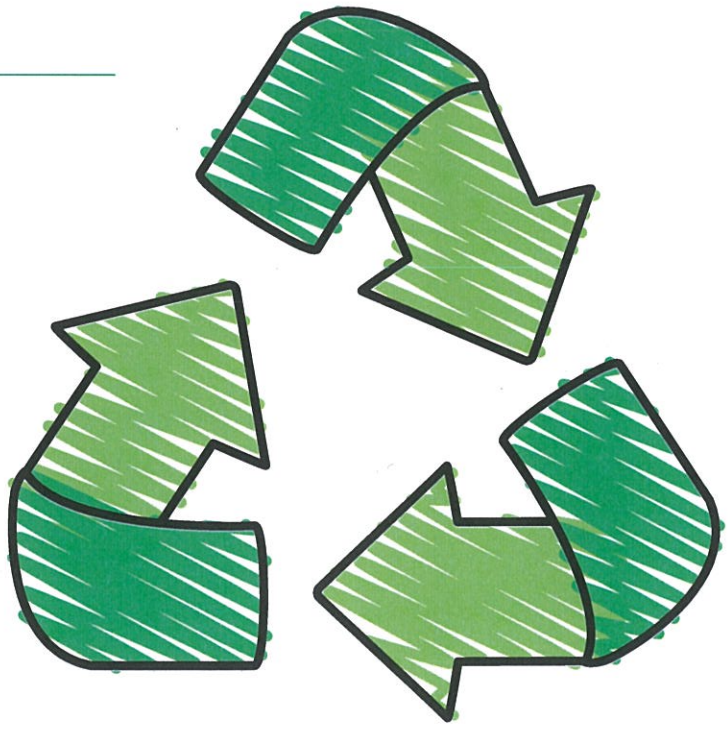
It makes sense to use this by-product instead of consuming large amounts of fossil fuel

Plastic pollution of the open environment is a worldwide problem

3. Recycling

According to the recycling charity RECOUP ("Recyclability by Design" 2006) "In cases where plastic products are particularly lightweight and contaminated with other materials, the energy and resources used in a recycling process may be more than those required for producing new plastics. In such cases recycling may not be the most environmentally sound option." These are the very products in which OBP technology is commonly used and they are not plastics in high-value use.

Separation of the different types of polymer is a problem with all types of plastic film, and is one reason why post-consumer plastic film is not attractive to recyclers. Other reasons are that the material is often contaminated and it would not be cost-effective to clean it, given that the material from which it is made is inexpensive and readily available.



3. Recycling (continued)

It is also too costly in financial and environmental terms to collect it, transport it, sort it, bail it, store it, and then reprocess it, so it is generally sold as mixed plastic for low grade uses (not for long-life uses such as building films or pipes, which are normally made from virgin polymer or from used-plastics of known type and provenance).

It is sometimes said that oxo-biodegradable plastic cannot be separated from ordinary plastic in the waste stream by the existing equipment, and that it could compromise the quality of recycled products. This is easily remedied by the inclusion of a tracer in the OBP at manufacture which the equipment can recognise, but it is not necessary because oxo-biodegradable plastic can be safely recycled without separation. See http://www.biodeg.org/recycling.html for reports by specialist researchers.

It is clear from these scientific reports that it is not necessary to add stabilisers unless the recyclate is being used to make long-life products, in which case the manufacturer of those products would be adding stabilisers anyway. These stabilisers are in a quantity and with a chemistry which he would normally use, and no special arrangements are necessary for recyclate containing OBP.

Most conventional waste plastics will have been exposed to UV radiation, in particular agricultural film, and may have oxidised to some extent, but not enough to become biodegradable. Recyclers of mixed plastic wastes have no way of knowing which have been exposed and for how long, and it is also known that printing inks, and other chemicals will affect the recycling process. Therefore, the industry already has the problem of identification when dealing with post-consumer plastic films, and deals with it by using those materials for low-value/short-life applications such as carrier bags and garbage sacks. If an OBP carrier bag is going to be collected for recycling at all it is likely to be collected during its useful life, and during that time, it will be unlikely to have oxidised.

The position of the OBP industry is therefore based on scientific reports by specialist researchers, and we have seen no evidence of any deleterious effect on any product made from recyclate containing OBP.

In the last four years alone, enough masterbatch has been sold by one OPA member to make 600,000 tonnes of OBP products from polyethylene and polypropylene.[12] We know that OBP products have been successfully recycled for the past 10 years by OPA members and their customers around the world, and in those ten years we have heard no reports of any difficulty encountered.

Our experience is entirely consistent with the specialist reports, that oxo-bio plastic can be safely recycled, but the recyclers have presented no technical evidence and no actual experience, to the contrary

However, as mentioned above a tracer could be included in OBP so that if desired it can be identified and separated by the waste-sorting equipment. It is time for a much better dialogue between the recyclers and the OBP industry. If we can combine oxo-biodegradable technology with the three R's of 'Reduce, Reuse and Recycle', we can all help win the battle against plastic waste - for the lasting benefit of future generations.

The specialist researchers also confirmed that crop-based 'compostable' plastics cannot be safely recycled with oil-based plastics. Anyone who wants to promote recycling should certainly be concerned about bio-based plastic. Some of it will get into the plastic waste recycling stream – especially as it is being promoted for carrier bags and packaging.

[12] Oxo-biodegradable additive is not suitable for PET

4. Composting and food waste

In the first place, we need to protect food from wastage by damage and contamination, and for this purpose plastic is necessary. In today's fast moving society it is inconceivable that enough food could be put on enough tables within the required timescale without using plastic. For the reasons given above this should be OBP.

Second, we need to educate ourselves not to waste food, and not to use agricultural land and water resources for producing bio-fuels and bio-plastics, instead of producing food.

The main purpose of HBP is to make bags which are used to carry compostable material to an industrial composting plant and which do not therefore have to be emptied there. OBP has in fact been trialled for this purpose in the UK and was found satisfactory by industrial composters, but it is not marketed for composting for the bizarre reason that it does not produce CO_2 gas quickly enough to pass EN13432, (which makes no allowance for the period of useful life during which OBP is designed NOT to degrade). The carbon in OBP residues would therefore remain as a nutrient for the soil until it is returned to nature by the action of micro-organisms.

EN13432 is a standard written by the bio-based industry representatives on CEN for their particular technology, and is not relevant to OBP (except that OBP meets the same non-toxicity criteria). In fact the desirability of this standard and this product must be questioned in an age where great efforts are being made to reduce CO_2 emissions. HBP is also sometimes used for packaging and carrier bags, in the mistaken belief that it is better to make plastic from crops instead of oil - See "Fossil Resources" above.

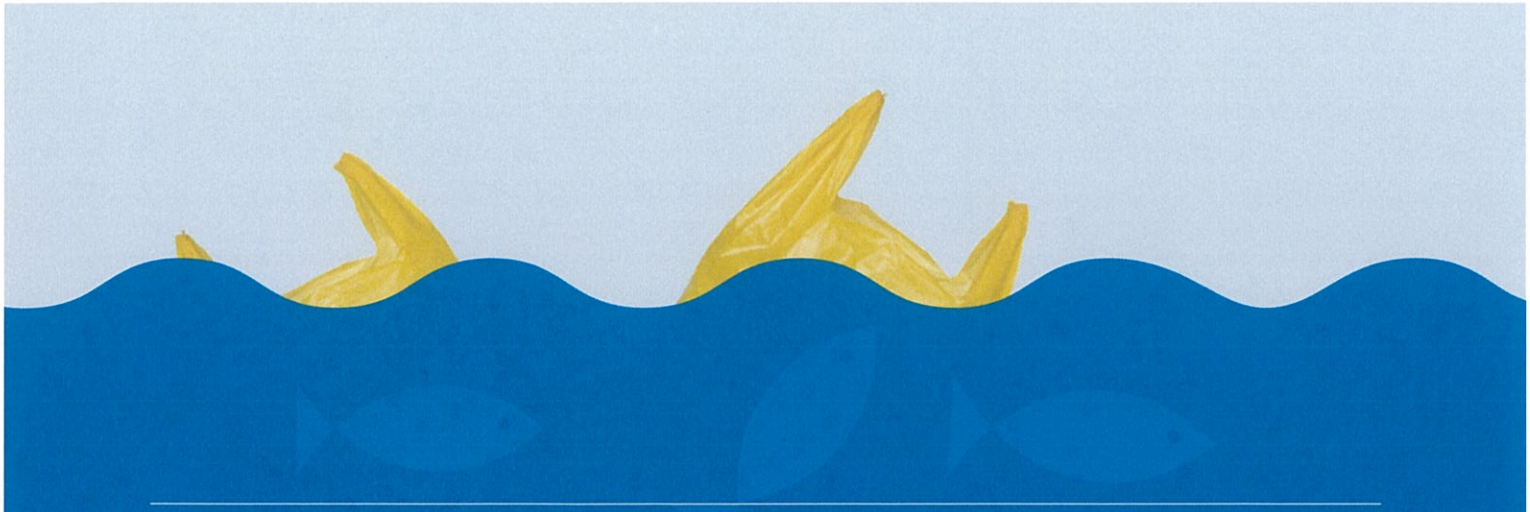
Marine environment

According to Dr. Jean-François Ghiglione: [13]

"OBP will float and be at almost all times subjected to UV light, which accelerates the abiotic phase of degradation. This is not always the case on land, where plastic pieces are often covered by soil, leaves etc. and are less exposed to UV light." He points out that "there are specific bacteria living in the "seasurface microlayer" (the top millimetre of the ocean surface), where bacteria are different from those further below the surface. The bacteria in the sea-surface microlayer are particularly adapted to a hydrophobic environment (e.g. where oil materials are floating) and these bacteria are known to present a high capability for hydrocarbon degradation. These bacteria are therefore potential OBP-degraders, and such an environment does not exist at the surface of soil. These bacteria are probably less abundant and less diverse in the ocean than in soil, but probably more effective to degrade OBP."

"Some marine bacteria, such as Alcanivorax borkumensis and R. rhodochorous are noted for their ability to biodegrade hydrocarbons and they are ubiquitous in the oceans. They occur in low concentrations in unpolluted seas, but are observed to accumulate in waters polluted by oil spills. When presented with a source of carbon which is recognisable to the microorganisms as food, it seems therefore that they will respond with increased populations. The relatively low concentrations of microorganisms found in unpolluted oceans is not therefore a reason for expecting slow biodegradation of OBP."

[14] Directeur adjoint de L'Observatoire Océanologique de Banyuls, in his response to the Eunomia Report.



Evidence is available - from tests done in real time at Bandol [14] on the coast of France that OBP will degrade to low molecular-weight materials under natural conditions in water, and samples aged under those conditions were studied in 2016 at Queen Mary University London where the abiotically degraded plastic was presented as the only source of carbon available to the bacteria. The samples were proved to be biodegraded by bacteria commonly found in the oceans, and separate samples were biodegraded by bacteria commonly found on land. The degraded plastic was also proved to be non-toxic to those bacteria.

The final products of abiotic degradation of OBP are not fragments of plastic. As noted above, the molecular structure has been dismantled and the plastic has converted into low molecular weight oxidised materials which are no longer plastic. These are water soluble and biodegradable, and this abiotic degradation will proceed without the involvement of microorganisms. By contrast, conventional plastics can be observed to fragment, but will remain in the environment for a long period of time as high molecular-weight microplastics.

Several studies have been done, including those by Pascall et al, Takada et al, Mato et al and Teuten et al, which demonstrate that conventional polymers such as polyethylene and polypropylene will readily adsorb PCB and other toxins. This is because the polymers are inherently non-polar and hydrophobic in nature, and with a low Tg (glass transition temperature), their nature allows for greater segmental mobility, pore-size, free volume, diffusion and partition coefficients. This means that hydrophobic organic toxins such as PCB can in theory adsorb to the polymers (through Van der Waals attractive forces) from the aqueous environment.

The increased pore-size and free volume also means that if the toxin is adsorbed to the conventional polymer, it will not readily desorb. Over long periods of time the plastic will break down by friction, shear, and weathering, and the potential for the plastic fragments to adsorb toxins increases. Takada et al demonstrated in a field experiment in Tokyo Bay that conventional plastic fragments collected from the bay had adsorbed up to 892 ng/g. This suggests that the plastic had persisted in that area for at least twenty-seven years (assuming a linear uptake).

Under the action of oxygen, UV light, and ambient heat, polyethylene and polypropylene which contains oxo-biodegradable additives will change its molecular structure and break down. Hydroperoxy intermediates are readily formed in the initial phase of degradation, and immediately there is a change in chemical structure and increase in polarity. The formation of these oxygenated species already makes the polymer less susceptible to adsorption of PCB and related hydrophobic toxins.

Lower diffusion and partition coefficients result from increased cohesive forces, thereby reducing segmental mobility and pore-size. The highly polar functional groups that are formed will not interact with the non-polar toxins, either through chemical reaction or intermolecular interaction.

The second stage of degradation is the molecular-weight reduction of the hydroperoxy intermediates (with the vicinal form proceeding more rapidly) to intermediate and short-chain aldehydes, ketones, esters, and hydroxyl and hydrocarbon radicals. These will proceed further to carboxylic acids which will be readily bioassimilated by micro-organisms.

In summary, the constantly progressing chemical breakdown of the oxo-biodegradable polymer, results in species with increased hydrophilic character that will readily solubilise and emulsify in the ocean environment. It would, therefore, not be possible for hydrophobic toxins such as PCB to accumulate on OBP materials.

[13] Directeur adjoint de L'Observatoire Océanologique de Banyuls, in his response to the Eunomia Report.

[14] Station d'essais de Viellissement Natural de Bandol

[15] Station d'essais de Viellissement Natural de Bandol

Standards

The main Standards which have been written for testing OBP are ASTM D6954 (USA); BS8472 (UK); AFNOR AC T51-808 (France); and SPCR 141 (Sweden).

Variants of these standards have also been adopted in other countries. There is no European standard for OBP because the technical committees of CEN are dominated by representatives of the bio-based plastics industry who do not wish to see a standard which might increase competition from OBP. Accordingly the OBP industry has worked at its own expense in the other standards organisations around the world to assist in developing new and better standards.

ASTM D6954 contains no less than six pass/fail criteria.

1. For the abiotic phase of the test (6.3 - 5% e-o-b and 5,000DA)
2. The tests for metal content and other elements (6.9.6),
3. Gel content (6.6.1),
4. Ecotoxicity (6.9.6 - 6.9.10),
5. PH value (6.9.6) and
6. For the biodegradation phase (for unless at least 60% of the organic carbon is converted to carbon dioxide the test cannot be considered completed). It is for customers and governments to decide what timescales are acceptable to them.

ASTM INTERNATIONAL
Standards Worldwide

BSI
FM3799

afnor GROUPE

SP

Oxo-biodegradable Plastics Assoc.
www.biodeg.org

Meeting high standards

Non-toxicity

The OBP industry is as much concerned as anyone that its products should not introduce toxicity into the environment, and for this reason the standards for OBP require testing to confirm that the residues are harmless.

Essentially OBP are made from the same materials as conventional plastics, with the addition of only 1% of a masterbatch (most of which is ordinary polymer), and they have to pass the same tests in EN 13432 as HDP to ensure that there is no toxicity and no metals exceeding the prescribed limits.

Other ingredients which manufacturers may wish to include in plastic products, or which may be generated by the manufacturing process of plastic products, are not the responsibility of the OBP industry, and should be specifically regulated by government.

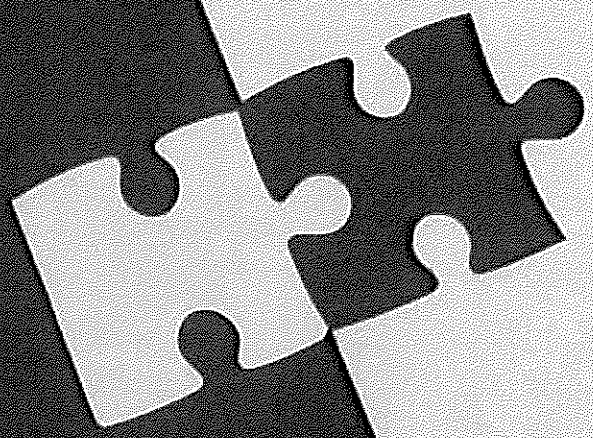
[17] This is not the case in countries such as Saudi Arabia and the UAE who audit the laboratories and production facilities of the suppliers and will authorise only those suppliers who pass the audit.

The Eunomia Report says

" it does appear that the OBP industry can create products that have minimal toxic impact on flora and fauna. ...and it is encouraging that almost all existing test standards for OBP plastic specify some form of toxicity test using established methods (such as germination and earthworm survival tests)."

The Report continues,
"this does not mean that all products on the market avoid negative toxic effects, as there is no regulatory control currently exercised in this regard. Problems remain that (a) accreditation is not mandatory for products on the EU market, and (b) some of the standards do not have pass/fail criteria for the toxicological test results.

This is a criticism not of the OBP industry, but of CEN, and the regulatory authorities in Europe, who have not sought to ensure that OBP is supplied only by reputable manufacturers who can produce evidence that their products have been tested by recognised laboratories[17] according to well established standards such as ASTM D6954, and of regulatory authorities who have not specified what test results they would and would not find acceptable. They have so far done so only by specifying in Art 11.1 of 94/62/EC the maximum concentration of metals allowed.



Final thought...

- Microplastics are a serious environmental problem. They are caused by the embittlement and erosion of plastic, and these fragments of plastic can lie or float around for decades
- The world and particularly the oceans of the world are being choked by plastic.
- In an ideal world all plastic waste would be collected and recycled, but we do not live in an ideal world.
- Oxo-biodegradable plastic offers an insurance policy. It promises that if plastic litter escapes into the open Environment, It will not be there for decades as conventional plastic is now, and given that our oceans are fast approaching a crisis caused by plastic waste - Governments and Legislators worldwide need to be pragmatic and they need to act.
- Oxo-biodegradable plastic may not be the perfect solution – but it is the solution that can be implemented right now.
- The merits of OBP have been debated for more than ten years. We don't think the world, and particularly the oceans of the world, can afford to wait.
- Time is not on our side and a solution will not wait any longer.

Annex

HYDRO-BIODEGRADABLE (HBP) PLASTIC
(Sometimes known as "bioplastic" "bio-based" "crop-based" or "compostable" plastic)

This type of plastic is designed to be taken to an industrial composting or anaerobic digestion unit, and to biodegrade in the special conditions found in those industrial processes. It does not address the problem of plastic litter in the open environment because the original vegetable materials have been polymerised and have become plastics.

1) **HBP cannot be recycled with ordinary plastics,** so anyone who is in favour of recycling should be against them. Even if intended for industrial composting, some of this plastic will get into the oil-based plastic recycling stream and contaminate it.

2) **They are too expensive for everyday use** – costing up to 400% more than ordinary plastic. Even if this cost were substantially reduced in the future it is far too expensive for ordinary people and there is no justification for subsidising it out of taxpayers' money.

3) When something is described as compostable an ordinary person would think that it can be converted into compost, but the Standards for this type of plastic (ASTM D6400, EN13432 etc.) require it to convert into CO_2 gas within six months. **You cannot therefore make compost from it – only greenhouse gas.** This process contributes to climate change but does nothing for the soil, and it cannot be described as organic recycling

4) It should not be described as "biodegradable" because although it will fragment in the open environment **it is tested for biodegradation only in the special conditions found in industrial composting or anaerobic digestion.**

5) It is **not suitable for shopper bags** because they need to be strong and inexpensive, and to be capable of re-use many times before final disposal.

6) **It cannot be made by plastics factories with their existing machinery and workforce, and any large-scale introduction of this type of plastic would lead to job-losses in the plastics industry.**

7) **It is not "renewable" as it contains up to 70% oil-based polyester.** Consider also, the non-renewable fossil fuels consumed and CO_2 emitted by the machines used to clear the land, plough the land, harrow the land, sow the seed, make the fertilisers and pesticides and bring them to the farm, spray the crops, harvest the crops, take the crops to a polymerisation factory, and operate the autoclaves.

8) **Deep in landfill it can generate methane,** which is a greenhouse gas much more powerful than CO_2.

9) **It is not desirable to use land and water resources to grow crops to make plastic.** Those resources should be used to produce food for the people in the world who do not have enough to eat.

   The European Parliament has resolved not to encourage the use of land and water resources for producing bio-fuels (and the same reasoning applies to bio-plastics). The UN issued a report to the same effect on 31st March 2014. Nestlé believes that allocating agricultural land and water to biofuel production will severely impact food and water security. In their view "Forecasts of food production suggest that significant challenges exist for the world to feed future generations..... Even a small percentage of energy from crop based biofuels has a devastating effect on the food market.

10) There is **not nearly enough available arable land and water to grow crops to make enough crop-based plastic to replace ordinary plastic,** even for shopping bags.

11) It is sometimes claimed that the crops being grown to make crop-based plastics will absorb CO_2, but **that would be true of the vegetation which was there before.**

12) It is **not really suitable for agricultural mulch films,** because (unlike OBP) the degradation time cannot be controlled in line with the growing cycle.

13) **It is thicker and heavier for the same strength,** so it needs more trucks to transport it, using more road space, consuming more fuel, and emitting more CO2 and other forms of pollution to atmosphere.

14) HBP **will not comply with the laws of the United Arab Emirates, Pakistan, Saudi Arabia and other countries** which require short-life plastic goods and packaging exported to those countries to be oxo-biodegradable.

15) An LCA by Intertek, published by the UK Government in 2011 and a further LCA by Intertek in 2012 found that **ordinary plastic and oxo-bio plastic have a better LCA than crop-based plastic or paper bags.**

16) A consortium consisting of Friends of the Earth, Surfrider Foundation, Zero Waste Europe, Ecos, and the European Environmental Bureau published a paper in 2017 in which they say ***"The bioplastics industry use their green-sounding credentials to position themselves as helping to speed the reduction in fossil fuel use and solving the ever-growing plastic pollution and marine litter issues.***

    However, there is clear evidence that bioplastics do not solve many of these problems and in fact may create new ones."

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HG1205 P4 - 31.01.2018