

OPA response to Welsh Government

Consultation Document Number: WG40193

“Reducing single use plastics”

1. Coronavirus has made everyone realise that single-use plastic is essential to protect us from the spread of disease, and it is in use today for a wide variety of personal protective equipment and packaging. This is not a temporary phenomenon, because people are never going to forget the need to protect themselves and their families from microbial attack. In addition, plastic is the only material in common use which can itself be made antimicrobial, and it has been proved by testing in accordance with ISO 21072 to destroy 99.9% of viruses within one hour of coming into contact with it. All single-use plastics should now be made with anti-microbial technology.
 - 1.1 Some of this plastic will however get into the environment after its useful life, and as yet very few governments have a policy for dealing with plastic which has escaped, despite their best efforts into the open environment, from which it cannot realistically be collected. The reason for this consultation by the Welsh Government is described by the Deputy Minister when she says in the introduction “Single use plastic items make up a significant proportion of litter on our streets, parks and seas. It blights our communities and has a devastating impact on our wildlife.” This is reinforced in paras. 8-12 of the consultation.
 - 1.2 It was to address this very problem that oxo-biodegradable plastic was invented many years ago by the scientists who had themselves created plastics and who realised that the durability which they had achieved could be a problem. They therefore found a way to cause the molecular structure of the plastic to convert automatically by oxidation into low molecular-weight materials which are biodegradable. They called this process “oxo-biodegradation” and it occurs anywhere in the open environment where oxygen is present, without any need to take the plastic to a composting facility.
 - 1.3 The Welsh government now has an opportunity to adopt a policy for dealing with plastic which has escaped into the open environment, and especially the oceans, from which it cannot realistically be collected for recycling or anything else.

- 1.4 Therefore in answer to **Questions 6 and 7** we consider that oxo-biodegradable plastic should not only be exempted from any ban, but that all short-life plastics in Wales should be required to be made with oxo-biodegradable technology, as they have already done in some countries in the Middle-East.

2.0 OXO-BIODEGRADABLE PLASTIC

- 2.1 Para. 22 says “We are particularly mindful that our research data was more limited in relation to oxo-degradable plastics than for other items” and para. 2.25 of the Preliminary study for the Welsh Government says that “The impacts of a ban on oxo-degradable plastics were not modelled in this research.”
- 2.2 **Question 4** asks “Should oxo-degradable plastics be included on the list of items to be banned?” It should be noted that inclusion on this list would ban all oxo-degradable plastics, whether they are single-use plastics or not, and the consultation document gives no reasons for extending the list beyond single-use plastics.
- 2.3 When considering oxo-degradable plastics, it is first necessary to distinguish between oxo-degradable and oxo-biodegradable.
- 2.4 “Oxo-degradation” is defined by CEN (the European Standards authority) in TR15351 as “degradation identified as resulting from oxidative cleavage of macromolecules.” This describes ordinary plastics, which degrade by oxidation under the influence of light and heat in the open environment and create microplastics, but do not become biodegradable except over a very long period of time. Oxo-degradable (as distinct from oxo-biodegradable) plastic has been banned for good reason in Saudi Arabia, the UAE, and elsewhere for a wide range of everyday plastic products, and it should also be banned in Wales.
- 2.5 Nobody makes plastic and sells it as “oxo-degradable” but this terminology is used by the Ellen MacArthur Foundation, the EU Commission, and others who are reluctant to acknowledge the difference between oxo-degradable and oxo-biodegradable plastic.
- 2.6 “Oxo-biodegradation” is defined by CEN as “degradation resulting from oxidative and cell-mediated phenomena, either simultaneously or successively”. This means that the plastic degrades by oxidation until its molecular weight is low enough to be accessible to bacteria and fungi, who then recycle it back into nature by cell-mediated phenomena. It does not leave microplastics.
- 2.7 Oxo-biodegradable plastics are tested according to ASTM D6954; BS 8472, PAS 9017 and similar Standards, which prescribe tests for biodegradation as well as abiotic degradation. They also include tests to ensure that there is no toxicity, and no prohibited metals or gel content above the prescribed level. Plastic should NOT therefore be banned if it is proved to be oxo-biodegradable by tests performed according to these Standards. Recent tests for OPA members by Eurofins Laboratories show 88.9% biodegradation within 121 days.

- 2.8 In relation to **Questions 9 and 10** it is possible for enforcement authorities to ascertain quickly, using a portable xrf device, whether a product sold as oxo-biodegradable is actually oxo-biodegradable. This cannot be done with other forms of biodegradable plastic.
- 2.9 Microplastics are seen today as the main problem with plastics. They are tiny pieces of plastic, which are being found on land, in the sea, and now even in the air we breathe. Most of them are created by the fragmentation of ordinary plastics caused by the effects of uv light and mechanical stress. The problem is that although these plastics are fragmenting, their molecular-weight remains too high for biodegradation, so they persist in the environment, getting smaller and smaller over a period of many decades.
- 2.10 The European Chemicals Agency (ECHA) was asked by the EU Commission in December 2017 whether oxo-biodegradable plastic created microplastics. Ten months later, on 30th October 2018, ECHA advised that they were not convinced that they did.
- 2.11 If plastic products are made with oxo-biodegradable technology, and get into the open environment, the molecular-weight of the plastic will rapidly reduce and it will cease to be plastic. It will then have become a source of nutrition for naturally-occurring micro-organisms. This technology is suitable for almost all products made with polyethylene, polypropylene, or polystyrene, but is not used for PolyethyleneTerephthalate (PET) or Polyvinylchloride (PVC).
- 2.12 A report was published in 2017 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 financially supported by the producers of crop-based plastics who see oxo-biodegradable plastics as a threat to their market-share. The Report claimed that oxo-biodegradable plastics (which they incorrectly describe as "oxo-degradable" plastics) simply fragmented into tiny pieces of plastic.
- 2.13 We discovered that the author of the Report was not a scientist, and having engaged with our scientists they no longer say that. They now admit in their May 2019 report that oxo-biodegradable plastics are manufactured so that they can degrade faster than conventional plastics and that they do become biodegradable, but they say that "it is not yet possible accurately to predict the duration of the biodegradation for such plastics."
- 2.14 For that reason a broad indication only can be given as to timescale. It is however possible to say with certainty that at any given time and place in the open environment an oxo-biodegradable plastic item will become biodegradable significantly more quickly than an ordinary plastic item.
- 2.15 It is not particularly important how long a specific piece of plastic will take to biodegrade – the importance of oxo-biodegradable technology is that it will quickly reduce the overall burden of plastic in the environment. Of course, we don't want plastic in the environment at all, but that is not the present reality.

- 2.16 There is resistance to this technology from the companies who make “bio-based plastics” and from other companies who will not spend an extra 1% on oxo-biodegradable technology to protect the environment from their products, which everyone can see with their name on them, littered all over the globe. There has been aggressive lobbying of governments and international institutions, coming especially from Germany and Italy. One of their lobbying organisations, the BBIA has recently lobbied the UK government in a letter which contains many misleading allegations see <https://bioplasticsnews.com/2020/06/04/battle-biodegradable-oxo-compostable-industry/>

3.0 THE SCIENCE

- 3.1 The coronavirus has shown that consensus among scientists is hard to find, but leaders cannot wait for consensus when decisions have to be made, because they have to weigh the evidence and form a view as to what, on balance, is the best course to take. So it is with the environment.

- 3.2 Decision-makers know that thousands of tons of plastic are getting into the open environment every day, and that we may soon have more plastic in the ocean than fish, but what are they doing about it? They are trying to reduce the amount of plastic we use, and to recycle as much of it as possible, but a significant amount will still get into the open environment.

- 3.3 Foremost among the scientists who invented oxo-biodegradable plastics was Professor Gerald Scott, who was Professor of Chemistry at Aston University, and was in later years the Chief Scientific Adviser to the OPA. He published the results of his work in many scientific publications including “Polymers and the Environment” - Royal Society of Chemistry 1999 and “Degradable Polymers: Principles and Applications”- Kluwer Academic Publishers 2002. He was also the holder of several patents for the technology. All of Professor Scott’s published work, and that of many other scientists on this subject, both published and unpublished, can be made available to the Welsh Government.

- 3.4 In these publications the polymer scientists have made it clear that oxo-biodegradable plastic will degrade and then biodegrade in the open environment very much more quickly than ordinary plastic, leaving no microplastics and no toxicity. It is not therefore correct for anyone to say that there is insufficient evidence, or that there are no relevant standards.

- 3.5 Oxo-biodegradable plastic will prevent plastic lying or floating around for decades, and it has been used successfully around the world for more than 20 years. It has been used by the largest bakery in the western world for more than 10 years with no problems, but only a very few forward-looking governments have made it compulsory. What are the rest doing? They prefer to encourage recycling and composting, but if they think about it for a moment these will not help them to deal with plastic in the open environment which cannot realistically be collected.

- 3.6 So why are they not all making oxo-biodegradable plastic mandatory, and instead allowing ordinary plastic to continue in use? In some cases because they are under inappropriate pressure from multinational commercial interests, and in others because they see no complete

consensus among the scientists. There is however sufficient consensus to enable a decision to be made. There is consensus on the following points:

- 3.6.1 Ordinary plastics fragment into microplastics under the influence of weathering, but for many decades their molecular-weight remains too high to allow biodegradation .
- 3.6.2 Adding a pro-degradant catalyst at manufacture reduces the molecular-weight much more quickly if the plastic escapes into the open environment.
- 3.6.3 The only environmental conditions necessary for oxo-biodegradation are oxygen and bacteria, both of which are ubiquitous in the open environment.
- 3.6.4 Bacteria found on land and sea are able to consume the low molecular-weight residues of plastic.
- 3.6.5 These residues are not toxic
- 3.6.6 There are already Standards in place which are suitable for testing oxo-biodegradable plastic.
- 3.6.7 Disagreement remains about:

How long it takes before the plastic becomes biodegradable. Timescale depends on the composition of the plastic, how old it is when it gets out into the environment, and the environmental conditions to which it is exposed. Sunlight and heat are not essential, but they will accelerate the process, and it is most unlikely that a piece of plastic litter will not be exposed to one or both of these. The abiotic process of degradation is unstoppable unless the plastic is completely deprived of oxygen, which will not occur in the open environment. If the plastic is collected and taken to landfill or incinerated it has been responsibly disposed of and is no longer a problem. Biodegradation in landfill is not desirable, as it generates methane.

- 3.6.8 It is known that conventional plastic fragments do not become biodegradable for many decades, but it is possible to say with certainty that at any given time and place in the open environment an oxo-biodegradable plastic item will become biodegradable significantly more quickly than an ordinary plastic item. That is the point. - Do we want ordinary plastic which can lie or float around for decades, or oxo-biodegradable plastic which will be recycled back into nature much more quickly?
- 3.6.9 Will it fully biodegrade? It is known that plastic whose molecular weight has been significantly reduced is biodegradable, and we have heard no reasons from any scientist why, once the process has commenced, it should not continue until biodegradation is complete.

- 3.7 In summary therefore there is sufficient consensus to enable decision-makers to conclude that oxo-biodegradable plastic is better for the environment than ordinary plastic, and to decide to stop plastic accumulating in the environment, by requiring it to be oxo-biodegradable. Delay about this is no longer an option, because thousands of tons of plastic are getting into the open environment every day where they will lie or float around for decades.
- 3.8 In 2018 the scientific evidence was reviewed by a distinguished former deputy judge of the High Court in England. <https://www.biodeg.org/uk-judge-find-the-case-for-oxo-biodegradable-plastic-proven/> This has been confirmed by later research published by Queen Mary University London in February 2020. <https://www.biodeg.org/wp-content/uploads/2020/02/published-report-11.2.20.pdf>
- 3.9 Most recently, on 4th September 2020 scientists at the Laboratoire d'Océanographie Microbienne (LOMIC) reported on a four-year study funded by the French government, of oxo-biodegradable plastics in the marine environment. See below under "Marine Environment."
- 3.10 Life-cycle analyses have been done, which show that oxo-biodegradable plastics have good environmental credentials. See below.

4.0 RE-USABLE BAGS AS AN ALTERNATIVE?

- 4.1 It is obvious that a new single-use bag or package is much less likely to spread disease than one which has been re-used a dozen times.
- 4.2 Re-usable bags are rarely, if ever, washed, and are often stored in a cupboard or boot of the car where germs can multiply. Deadly micro-organisms such as Coronavirus, E.coli and Campylobacter can be transferred to food inside the bag.
- 4.3 On 18th August 2020 The Daily Telegraph wrote "The bag for life is not a synthetic comrade with you until your last breath, it turns out - more an acquaintance briefly entertained before being roundly ditched. Or so say Morrison's, who have begun phasing out their plastic offerings in favour of reusable paper ones over concerns that a bag for life had in fact become a 'bag for a week' habit among British shoppers."
- 4.4 With regard to their environmental credentials, scientists at RMIT University, Melbourne found that reusable shopping bags are only beneficial to the environment if they are used at least 104 times. This is because thicker plastic bags require more plastic and more energy to produce than lightweight bags. Also, they will create greater plastic pollution, including microplastics, if they escape at the end of useful life, unless they are made with oxo-biodegradable technology, which can be programmed to start degrading in whatever timescale is required.
- 4.5 There is therefore a solution for those who still prefer re-usable bags. They can be made with both oxo-biodegradable and anti-microbial technology (see www.d2p.net) which can be

incorporated into the polymer used for making the bags, and can also be incorporated into the laminated lining inside jute or cloth bags.

5.0 PAPER AS AN ALTERNATIVE?

- 5.1 Isn't it better to use paper instead of plastic?
- 5.2 Some supermarkets (most recently Morrisons and Waitrose) have shifted to single-use paper bags, but this is a worrying trend, as paper bags can have much higher environmental impacts. A 2011 study for the Northern Ireland Assembly found that paper bags generally require four times as much energy to manufacture as plastic bags, and cause 70% more atmospheric pollution. The process uses huge amounts of water and creates unpleasant organic waste. Recycling of paper is often uneconomic, and uses toxic chemicals. When it degrades, paper will emit methane in anaerobic conditions. Manufacturing paper requires trees to be cut down, but plastic is made from a by-product of oil refining which used to be wasted.
- 5.3 A stack of 1,000 new plastic carrier bags would be around 2 inches high, but a stack of 1,000 new paper grocery bags could be around 2 feet high. It would take at least seven times the number of trucks to deliver the same number of bags, creating seven times more pollution and road congestion.
- 5.4 Also, because paper bags are not as strong as plastic, people may use two or three bags inside each other. Paper bags are not normally re-used, and are useless if they get wet.
- 5.5 A February 2018, Life-cycle assessment of carrier bags in Denmark concluded that "When factors like ozone depletion, human and ecosystem toxicity and water and air pollution are accounted for, paper bags would need to be reused 43 times to have a lower impact than the average plastic bag." They are not of course durable enough to do this.
- 5.6 "There have been unforeseen consequences in the Irish Experience [taxing plastic bags] resulting in an increase in the use of paper bags which are actually worse for the environment ..." ... Ben Bradshaw, UK Environment Minister, 4 August 2006.
- 5.7 In relation to para. 50, plastic straws are a much better alternative to paper, provided that they are made oxo-biodegradable.

6.0 REFILLABLES?

- 6.1 Concern with the in-store refill model is the reduction in shelf-life for some products. Some fresh drinks would last just two days if poured into a customer's own bottle, compared to 20 to 30 days in a factory-sealed container.

- 6.2 Plastic is actually the best material for a wide range of everyday uses. Not only is it much the best for protecting our food from contamination and preventing food-waste and disease, but it also has a much lower global-warming potential than other materials used for packaging according to LCA's performed by Intertek <https://www.biodeg.org/life-cycle-assessments/life-cycle-assessments-2/>
- 6.3 Plastic is made from a by-product of refining oil, which is extracted to make fuels, and these fuels would be made whether plastic existed or not, so plastic is not itself causing any depletion of fossil-resources. When the plastic becomes waste, its calorific value can be used to generate heat and electricity if, instead of being sent to landfill or if unsuitable for recycling, it is sent to modern, non-polluting, thermal-recycling units
- 6.4 The only problem with plastics is the length of time they can lie or float around if they escape into the open environment, but this problem can now be solved as explained above.

7.0 "COMPOSTABLE" PLASTIC AS AN ALTERNATIVE?

- 7.1 "Compostable" plastics are an irrelevance, because the main problem facing governments today is plastic waste which has escaped into the open environment, from which it cannot realistically be collected and taken to a composting facility.
- 7.2 A "Grocer" magazine survey of more than 1,000 individuals in 2019 found that "consumers think that plant-based compostable plastics are the most environmentally friendly packaging materials," but most consumers don't realise that "compostable" plastic does not convert into compost. It is required by ASTM D6400 and EN13432 to convert rapidly into CO₂ gas, and the last thing the planet needs is more CO₂. Further, if you can collect a piece of plastic there are better things to do with it than waste it by turning it into CO₂.
- 7.3 The German courts in *Güthoff v Deutsche Umwelthilfe* (2014) decided that it is deceptive to market plastic as "compostable."
- 7.4 Also, many consumers do not know that "compostable" plastic is tested to biodegrade in an industrial composting facility – not in the open environment. In November 2019 a Danish court ruled in *Ellepot v Sungrow* that "compostable" PLA plastic plant pots must not therefore be described as biodegradable.
- 7.5 These plastics are often marketed as renewable, but this ignores the fossil fuels used in the agricultural production process by the machines which clear the land, plough the land, bring the seeds to the farm and sow them, harrow the land, bring the fertilisers and pesticides to the farm and spread them, harvest the crop and transport it to the factory, and by the machines which polymerise the raw material.
- 7.6 This marketing claim also ignores the land and water resources devoted to producing the raw materials, which could be used for growing food. EASAC (March 2020 report) says that "replacing PE by a bio-PE would require almost all (93.5%) of global wheat production." This would of course be completely unsustainable.

- 7.7 Although these plastics are marketed as “bio-based” they can contain up to 60% oil-based material, but this is hardly ever mentioned in the marketing material.
- 7.8 As mentioned above, conversion of organic materials to CO₂ at a rapid rate during industrial composting does not create compost, and is not "recovery." Nature's lignocellulosic wastes do not behave in this way, and if they did they would have little value as soil improvers and fertilisers, having lost most of their substance and their carbon. Another problem with polymers manufactured from crops, is that they have significant impacts upon eutrophication due to the application of fertilizers to land.
- 7.9 On 15th July 2020 a report appeared in “Waste Management” Vol. 113, Pages 312-318. The conclusions were:
- In many cases, plastic bags are being replaced with compostable plastic bags.
 - Industrial composting processes do not completely remove film fragments.
 - Compost is thus a potential source of fragments from compostable plastic bags.
 - Compostable plastic fragments are then deteriorated in soil to microplastics.
 - Compostable microplastic results in an increase number of aflatoxigenic fungi.
- 7.10 Moreover, plastics marketed as compostable are too expensive for everyday use, and there are few industrial composting facilities available. In any event the industrial composters do not want plastic of any kind, and in January 2020, the industrial composters of Oregon gave 9 reasons why they did not want it:
- 7.11 <https://bioplasticsnews.com/wp-content/uploads/2019/04/Oregon-composters-dont-want-Compostable-Packagine.pdf>
- 7.12 Then the City of Exeter UK rejected it <https://www.biodeg.org/exeter-rejects-compostable-plastic/>
- 7.13 Then the City of Toronto, Canada <https://www.cbc.ca/news/technology/plastic-packaging-compostable-plastic-marketplace-1.5487617>
- 7.14 Then the SUEZ waste-management company <https://www.usinenouvelle.com/article/sacs-plastiques-compostables-le-grand-malentendu.N926789>
- 7.15 Then a devastating exposé on Netherlands television <https://bioplasticsnews.com/2020/02/17/the-composting-fairy-tale/>
- 7.16 And another TV exposé in Canada about how compostable plastics are typically not being composted but instead sent to landfill or incineration.

<https://www.cbc.ca/news/technology/plastic-packaging-compostable-plastic-marketplace-1.5487617>

- 7.17 Many localities do not have industrial composting plants, and the Welsh Government has refused to invest in them. <https://www.bbc.co.uk/news/uk-wales-47238220> Plant-based compostable plastics are going to landfill rather than recycling because so many local authorities are unable to deal with them.
- 7.18 “Compostable” resins are worse than conventional or oxo-biodegradable plastics when it comes to oxygen transmission-rate or moisture vapour transmission-rate. These resins are also water sensitive, and their physical, optical, mechanical, and chemical properties are inferior.
- 7.19 There are in fact at least 21 reasons why “Compostable” plastic is not useful <https://www.biodeg.org/wp-content/uploads/2020/02/21-reasons-why-2020-copy-anastasia.pdf>

8.00 HOME COMPOSTING

- 8.1 Home composting of plastic is dangerous and should not be encouraged. This is because householders, are unlikely to be aware of any Standard for home-composting, and would probably not understand it anyway. Composting is not therefore likely to be conducted in a manner appropriate for plastic.
- 8.2 A study for the French government at https://www.ademe.fr/sites/default/files/assets/documents/compostage-domestique-industriel-sacs-plastiques-papier_2019.pdf says that “composting management must be in line with good practices recommended by ADEME (weekly brews for one month and then every 1 to 2 months, humidity control), - the average ambient temperature over the first three months of composting must be close to that of the standard: temperature of 25°C - 50°C. It is unlikely that all of these conditions will be met by individuals.”
- 8.3 The study also shows that “plastic bags are poorly disintegrated and biodegraded if good domestic composting practices are not applied. It also shows that, even when good practices are followed, there are still pieces of plastic bags of micrometric or even millimetre size in composts beyond the standard year of home composting.”
- 8.4 In addition, the study says “it appears that the biodegradation of plastic bags suitable for domestic composting makes little or no contribution to the formation of humus because, in accordance with the biodegradation tests of these materials according to the NF T 51-800 standard, at least 90% of the carbon organic dioxide is converted into carbon dioxide.”

- 8.5 Worse still, there is a danger that the plastic may have been contaminated by pathogens e.g. from putrifying food, and that the temperature in a home compost may not be high enough to kill those pathogens.

9.00 RECYCLING

Just as plastic cannot be collected from the oceans and deserts for composting, it cannot be collected for recycling. Recycling does not therefore address the principal concern about plastics – how to deal with the plastic which has escaped into the open environment.

- 9.1 Whilst almost all pre-consumer waste plastic (eg factory offcuts) is recycled or reused, almost all post-consumer waste plastic is not. There are reasons for this, one of which is that a great deal of water is needed to wash post-consumer waste to make it usable, so the amount of waste-water generated is enormous. Moreover, this process leaves large quantities of dirty solid waste, including biological waste that is hazardous and highly undesirable.
- 9.2 The recycling charity RECOUP says (“Recyclability by Design”) that “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.”
- 9.3 It is too costly in financial and environmental terms to collect waste plastic, transport it, sort it, bail it, store it, and then reprocess it, and that is why it was being dumped in the forests in Asia.
- 9.4 By contrast, PET bottles are worth collecting for recycling, and oxo-bio technology is not used in their manufacture.
- 9.5 Most of the plastic that does get reprocessed is larger items e.g. plastic drinks bottles have a 56% rate. https://www.wwf.org.uk/sites/default/files/2018-03/WWF_Plastics_Consumption_Report_Final.pdf
- 9.6 The Guardian (UK) reported on 17th August 2019 that recycling of plastic was “really a complete myth” <https://www.theguardian.com/environment/2019/aug/17/plastic-recycling-myth-what-really-happens-your-rubbish>
- 9.7 The best way to deal with contaminated post-consumer waste plastic is to send it to modern, non-polluting, thermal recycling facilities and to use the energy released from the plastic to generate electricity, instead of wasting it by sending to landfill.
- 9.8 Recycling is sometimes used as an objection to biodegradable plastic, on the basis that it would contaminate a post-consumer waste stream, but this would if true be an objection to all forms of biodegradable plastic, including plastic marketed as compostable.

- 9.9 However, this objection is clearly inapplicable if the relevant type of waste plastic is not going to be mechanically recycled anyway. The objection is also inapplicable if the new product to be made with recyclate is a short-life product for which degradability is actually desirable.
- 9.10 With regard to long-life plastics, a March 2020 Report by the Institute of Environmental Engineering, Zurich, for the Swiss Federal Office for the Environment found that:
- 9.11 “Conventional plastics may contain pro-oxidant additives that were added for different intended functionalities. Moura et al. (1997) described that colorants in general can act as pro-oxidants. If they partake in the creation of radicals or reactive oxygen species, such as singlet oxygen ($^1\Delta_g$), they can trigger photo-degradation of the polymer matrix.” “Conventional plastic products (n = 23) were found to regularly contain Fe, Ba, Ti, Zn, Cu and V. Some individual conventional plastic bag samples also contained Cr and Pb” “Thus, a potentially much higher number of plastics on the market may match the current legal definition of oxo-degradable plastics without being advertised or intended as such, i.e. unintentional ODP.”
- 9.12 Users of any recyclate cannot therefore assume that the recyclate does not contain pro-oxidants.
- 9.13 Further, the Austrian specialist laboratory TCKT said in para. 1 of its March 2016 report. [http://www.biodeg.org/TCKT%20Report%2017.3.16\(1\).pdf](http://www.biodeg.org/TCKT%20Report%2017.3.16(1).pdf) that “long-life films should be made with virgin polymer, or be stabilized to deal with loss of properties caused by the recycling process, whether or not any pro-degradant additive is present. Such stabilization would effectively neutralize the effect of any pro-degradant additive.”
- 9.14 Although oxo-biodegradable plastic is used for low-value items which are not worth recycling, the experts in Austria (TCKT Report para. 4) and South Africa (Roediger Report May 2012 page 3 <http://www.biodeg.org/ROEDIGER%20REPORT%2021%20May%202012.pdf>) have confirmed that if anyone wished to recycle them, they may be recycled without any significant detriment to the newly formed recycled product.
- 9.15 This accords with the experience of OPA members who have recycled many thousands of tons of oxo-biodegradable plastic over the past 20 years without any adverse effects.
- 9.16 The experts also found that “compostable” plastics are not recyclable in a conventional plastic waste-stream. This is well known, but is seldom heard as an objection to that type of plastic.
- 9.17 Having considered all the issues mentioned above policymakers have to decide whether recycling is any sufficient reason to object to oxo-biodegradable technology and continue to allow ordinary plastic to be used for short-life packaging, which could get into the open environment and lie or float around for many decades. In our view it is not.

10.00 STANDARDS

- 10.1 The main Standards for testing oxo-bio plastic 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, such as SASO 2879 in Saudi Arabia, and a new PAS (9017) was introduced in 2020 by the British Standards Institute.
- 10.2 ASTM D6954 contains 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).
- 10.3 It is for customers and governments to decide what timescales are acceptable to them.
- 10.4 European standard EN 13432 and ASTM D6400 apply to biodegradation of plastic packaging under industrial composting conditions, but they are not appropriate for testing oxo-biodegradable plastics. Hydro-biodegradable plastic is compliant with those Standards, precisely because it emits CO₂ (a greenhouse gas) at a very high rate. Oxo-biodegradable plastic does not.
- 10.5 If a leaf were subjected to the CO₂ emission tests included in these Standards it would not be certified biodegradable or compostable!
- 10.6 EN 13432 does not apply at all to applications other than composting of packaging, and para. 1 makes it clear that it does not apply to packaging waste which may end up in the environment through uncontrolled means, ie as litter.

11.00 NON-TOXICITY

- 11.1 The Oxo-biodegradable industry is as much concerned as anyone that its products should not introduce toxicity into the environment, and for this reason the standards for oxo-bio require testing to confirm that the residues are harmless. They have to pass the same tests in EN 13432 as “compostable” plastic to ensure that there is no toxicity and no metals exceeding the prescribed limits.

12.00 THE MARINE ENVIRONMENT

- 12.1 On 4th September 2020 scientists at the Laboratoire d’Océanographie Microbienne (LOMIC) reported on a four-year study funded by the French government, of oxo-biodegradable plastics in the marine environment. The report has been made available to the Welsh Government.

- 12.2 The purpose of the ANR-OXOMAR project is to investigate whether oxo-biodegradable plastics will fully biodegrade in a reasonable time in the marine environment, and to investigate whether oxo-biodegradable plastic or its by-products create any toxicity in the marine environment. It involves the complementary expertise of four independent laboratories (CNEP, LOMIC, ICCF, and IFREMER).
- 12.3 A summary of the results, dated 4th September 2020, says:
- “We have obtained congruent results from our multidisciplinary approach that clearly show that Oxo-biodegradable plastics biodegrade in seawater and do so with a significantly higher efficiency than conventional plastics. The oxidation level obtained due to the d2w prodegradant catalyst was found to be of crucial importance in the degradation process. Out of the six-formulations tested, the Mn/Fe pro-oxidant was the most efficient, with no toxic effects under our experimental conditions. Biodegradability was demonstrated either by using the culture bacteria *Rhodococcus rhodochrous* or by a complex natural marine community of microorganisms.”
- 12.4 According to Dr. Jean-François Ghiglione of LOMIC “Oxo-bio plastic 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 “sea-surface micro-layer” (the top millimetre of the ocean surface), where bacteria are different from those further below the surface. The bacteria in the sea-surface micro-layer 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.”
- 12.5 Some marine bacteria, such as *Alcanivorax borkumensis* and *R. rhodochrous* 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.”
- 12.6 Evidence is available - from tests done in real time at Bandol on the coast of France that oxo-bio plastic will degrade to low molecular-weight materials under natural conditions in water, and samples aged under those conditions were studied 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.
- 12.7 “ For the OPA response to the Plymouth report see <https://www.biodeg.org/wp-content/uploads/2019/11/opa-comments-on-plymouth-10.pdf>

13.00 PROPENSITY TO LITTER?

- 13.1 It is sometimes claimed that biodegradable plastics are likely to encourage littering, but if true, this also applies to bio-based plastics marketed as compostable.
- 13.2 However, even if there were a label describing a product as biodegradable, it is unlikely that the people who deliberately 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 for the sake of argument 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 many decades?
- 13.3 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.
- 13.4 A Life-cycle Assessment by Intertek shows that when the litter metric is included, OBP is 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](http://www.biodeg.org/New%20LCA%20by%20Intertek%20%20-%20Final%20Report%2015.5.12(1)%20(1).pdf)

14.00 THE EUROPEAN UNION

- 14.1 The EU is referred to in para. 5.58 of the Preliminary Report to the Welsh Government.
- The January 2018 report of the EU Commission was concerned about microplastics, and the OPA commented on it at <https://www.biodeg.org/wp-content/uploads/2019/12/opa-responds-to-european-commission.pdf> It did not recommend a ban, but recommended that a restriction process be commenced. Accordingly the European Chemicals Agency (ECHA) were requested to make a study. This request was made under Art 69 of the REACH Regulation 2006/1907, and the OPA submitted a substantial body of evidence to ECHA. See <https://www.biodeg.org/opa-comments-on-european-union-legislation/>
- 14.2 Ten months into the study, ECHA advised that they were not convinced that microplastics are formed, and requested more time. The Commission did not allow further time but promptly terminated the study and proceeded to legislate, so there is no scientific justification for any ban from the European Union's own scientific experts. All the safeguards in Arts 69-73 of REACH have been circumvented, and the purported ban is unconstitutional and illegal. The CEN definitions of oxo-degradable and oxo-biodegradable plastic in TR15351 have also been ignored, and the EU have used a definition which has not been approved by CEN.
- 14.3 ECHA also received a large number of submissions from all over the world that a ban of this technology would be seriously damaging for the environment if it were followed in their countries.

- 14.4 Fortunately the Directive has no legal effect anywhere in the UK, and Wales should not feel obliged to follow it.

15.00 GENERAL ISSUES

- 15.1 For the reasons given above, the OPA would not wish it to be thought that we agree with the general proposition that single-use plastics should be banned. However, we do consider that they should no longer be made with conventional plastic.
- 15.2 In January 2020 a report was published by the Green Alliance https://www.green-alliance.org.uk/plastic_promises who had interviewed representatives from five of the UK's major supermarkets as well as from major consumer goods and beverage companies. One of them had received complaints saying that "plastic is evil and has no place, regardless of any positives it might have in addressing food waste and what not... the complaints have been ferocious."
- 15.3 However, the report finds that "Worryingly, the brands report that decisions to switch away from plastic are often made without considering the environmental impact of the substitute materials chosen." Multiple interviewees indicated the desire to avoid "kneejerk reactions" and another noted: "there's a lot of pressure to move to alternatives, which aren't necessarily better from an environmental and climate-impact point of view."
- 15.4 The Report says that some decisions have been taken knowing it could actually increase environmental burdens. One supermarket representative was frank: "We are aware that [by switching from plastic to other materials] we may, in some cases, be increasing our carbon footprint" and a brand representative bluntly complained about misinformation being spread about the environmental credentials of non-plastic single use packaging formats: "The past year has really annoyed me with companies coming out and boasting about not using plastic, even when they're in single use glass, and their carbon emissions are going to be off the scale."

16.00 CORONAVIRUS

Question 5 refers to the effects of the Coronavirus.

- 16.1 The virus has shown that it can defeat the human immune system, so it is essential to destroy it before it gets into the human body. As mentioned above, the pandemic has made everyone realise that single-use plastic is essential to protect us from the spread of disease, and plastic can and should be given anti-microbial properties.
- 16.2 In relation to para. 36 of the consultation paper, the most effective way to protect against the virus is not by spraying or wiping, but by making surfaces in contact with microbes permanently lethal to bacteria and viruses. This can be done simply and at reasonable cost

with plastic, but not with any of the alternative materials such as paper, cardboard, cloth, jute, glass, or metal (except silver, which is too expensive).

- 16.3 To see how it can be done with plastic see <https://bioplasticsnews.com/2020/07/23/symphony-environmental-first-plastic-stop-corona-virus/>
- 16.4 The reason why single-use plastics have been opposed is not because they are too expensive and not because they are made from a by-product of oil-refining, but because the mainstream plastics industry has failed to offer policymakers a way to deal with the single-use plastic products which get into the open environment all over the world, where they lie or float around for decades. It is the sight of animals and birds entangled with plastic which has generated such monumental public concern and has created plastiphobia, leading to an outright ban.
- 16.5 The European plastics industry could have addressed this problem, to the great benefit of themselves and the environment, by making everyday plastic products with oxo-biodegradable technology. However, (probably because of their internal power-structure) Plastics Europe have dismissed this technology instead of engaging with the experts in the oxo-biodegradable plastics industry and seeking to understand it better and to explain it to their members and to the public.
- 16.6 They have concentrated instead on redesign and recycling, but it must be obvious to them that this cannot deal with the plastic which escapes into the open environment from which it cannot be collected for recycling. Nor can the so-called compostable plastics, which have to be collected and taken for composting.

London 19th October 2020