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Symphony Environmental Technologies Plc
6 Elstree Gate, Elstree Way
Borehamwood
Hertfordshire WD6 1JD
England

+44 (0)208 207 5900 Telephone
www.d2w.net
dc@d2w.net

Response to
EU COMMISSION CONSULTATION ON PLASTIC BAGS

http://ec.europa.eu/environment/consultations/plasticbags_en.htm

SHOULD PLASTIC CARRIER BAGS BE BANNED?

No. Plastic carrier bags are a wonder of modern technology. They can be made very thin, with minimal raw material, but are still strong enough to carry a full load of heavy shopping and stay strong when wet. No other shopping container can carry 2,500 times its own weight. A typical plastic carrier bag uses 70% less plastic today than 20 years ago, and no other industry has a better track record in material reduction.

Compared with the alternatives, carrier bags made from plastic are the most environmentally-friendly option for the hygienic transport of food and other goods and the minimisation of damage and waste. This was the conclusion of the Life-cycle Assessment of Supermarket Carrier Bags, published by the UK Environment Agency in February 2011 which analysed all aspects of a carrier bag's environmental impact – from production to disposal. In June 2009 Germany's Institute for Energy and Environmental Research reached a similar conclusion.

The UK report found that HDPE bags are, for each use, almost 200 times less damaging to the climate than cotton hold-alls favoured by environmentalists, and have less than one third of the $C0_2$ emissions than paper bags.

The Report found that 76% of these lightweight plastic bags were re-used, and that 53% of households re-used them as kitchen bin-liners. Other uses were as bin-liners in other rooms, as garbage sacks, and for a variety of other uses. The Report found that 18% were re-used for shopping, but it gives no credit for this type of use (known as primary use). If it had, the Controlled-life and conventional lightweight bags would have been rated even higher.

The Report makes an important point. It says "We have avoided calling lightweight bags "single use" or "disposable", because consumers are increasingly reusing lightweight carriers for shopping. Additionally a high proportion were used as a genuine replacement for another product and the secondary reuse of these bags plays an important part in reducing their global warming potential." Indeed "The reuse of conventional HDPE and other lightweight carrier bags for shopping and/or as

bin-liners is pivotal to their environmental performance and reuse as bin liners produces greater benefits than recycling the bags.[1]"

See also the submission to Los Angeles County by the "Save the Plastic Bag" campaign 15th November 2010, which contains further cogent evidence as to why there is no justification for a campaign against plastic carrier bags.

Campaigns against plastic carrier bags are driven by two mistaken beliefs:

1. That plastic bags take hundreds of years to degrade if they escape into the open environment, which some of them surely will. However, they can and should now be made from Controlled-life plastic, which will fragment much more quickly and become invisible and incapable of entangling wildlife or blocking drains. It will then proceed to biodegrade. Controlled-life plastic bags have to pass eco-toxicity tests in the relevant standards (BS8472 and ASTM D6954) so as to ensure that there are no toxic residues. Currently the EU has no policy for plastic waste that may escape into the environment and cannot realistically be collected. The Packaging Waste Directive needs to be amended to require all plastic packaging to be made from Controlled-life plastic.
2. That oil is being extracted to make plastic. However, the polymers from which plastic bags are made are usually derived from naphtha, an inevitable by-product of oil which used to be wasted. Using the naphtha to make plastic does not therefore reduce the fuel available for transport or power-generation, nor does it increase oil extraction or imports. By contrast the consumption of fossil fuels in the agricultural production of bio-based plastics does impact upon fossil resources. Oil-based plastics can actually reduce the amount of oil and gas imported because they can be incinerated after their useful life to release the stored energy, which can be used to generate electricity or to heat buildings.

CONTROLLED-LIFE PLASTIC

The problem with plastic products has been their durability. They have been so well engineered that they can lie or float around for 50 years or more if they escape into the open environment.

Controlled-life plastic contains an additive put into ordinary plastic at manufacture which turns it at the end of its useful life in the presence of oxygen into a material with a different molecular structure which has lost its strength and durability. At that stage it is no longer a plastic and has become a material which is inherently biodegradable in the open environment in the same way as a leaf. Approximate timescale for degradation can be set at manufacture as required. For a video of plastic film degrading, see http://degradable.net/play-videos/4

Provided the fragments are not toxic it does not matter whether they join the trillions of other fragments already present on the surface of the planet or whether they biodegrade. They do in fact biodegrade, because the low molecular weight residues are inherently biodegradable.

Controlled-life plastics are made from exactly the same materials as ordinary plastic, with the addition of a very small amount of a prodegradant formulation. Controlled-life plastics have exactly the same performance characteristics as ordinary plastic until the end of their predetermined service life. They can be made with the same machinery and workforce as ordinary plastic, and there is no need to change suppliers and no loss of jobs. They can also be made with a high recycled-content.

[1] Executive Summary

The British Plastics Federation presented to the UK Government on 21st April 2011 a scientific dossier containing evidence, from peer-reviewed academic literature and from studies in independent laboratories, which proves that:

- Properly formulated OBD plastic films can be made to degrade oxidatively at ambient temperature in short (< 1year) periods to materials whose molecular weights and polarities are such as to make them biodegradable.
- Oxidative degradation in biologically-active environments is faster than in the typical air-oven conditions used for laboratory investigations, so that laboratory testing over -, rather than under- estimates lifetime in the environment.
- Properly formulated OBD plastic films, once oxidatively degraded can be shown to mineralise to CO2 and H2O in soil contact; greater than 90% mineralisation has been demonstrated in independent laboratory testing.
- There is no evidence of any ecotoxicity from OBD plastics at any stage of their degradation, and a great deal of detailed evidence that there are no ecotoxicity implications to their use.
- Claims of accumulation of undegraded or partially degraded plastics in the environment are wholly unjustified.
- OBD plastics will not compromise an oil-based recycling stream.

There is no evidence that plastic fragments are any more likely to attract toxins in the sea than the trillions of naturally-occurring particles already there. Further, as indicated above, because Controlled-life plastics degrade much more rapidly than ordinary plastics they do not float around for decades attracting anything. They will also lose their strength much more rapidly than ordinary plastic, and will then be incapable of entangling wildlife or blocking drains.

DIFFERENCE BETWEEN BIODEGRADABILITY AND COMPOSTABILITY

The Commission itself makes the following points in the consultation document:

"Clear legislative provisions are necessary to make a distinction between compostable products (either industrial composting or home composting) and biodegradable products that should biodegrade in natural conditions in the environment." "The current legislative provisions do not allow for a clear distinction between biodegradability and compostability."

"A product that is compostable in an industrial facility will not necessarily biodegrade in natural conditions found in the environment. Advertising a packaging product as biodegradable when in fact it will not biodegrade in natural conditions can be misleading for the consumer...."

The Packaging Waste Directive provides in Annex II para. 3(d) that:

(d) Biodegradable packaging waste shall be of such a nature that it is capable of undergoing physical, chemical, thermal or biological decomposition such that most of the finished compost ultimately decomposes into carbon dioxide, biomass and water.

Biodegradable packaging waste needs to be capable of degrading in the open environment, and paragraph (d) should be amended as follows to remove the reference to compost. It should say *"Biodegradable packaging waste shall be of such a nature that it is capable of undergoing physical, chemical, thermal and/or biological decomposition such that it ultimately decomposes into carbon dioxide, biomass and water."*

STANDARDS FOR BIODEGRADABILITY

The Commission says: *"There seems to be a wide potential variation in degradability of common packaging materials used for household products, especially in the case of plastic packaging. These aspects need to be further specified to avoid misleading the consumer and reinforce the protection of the environment"*

EN 13432 is designed for plastic which is intended to be *composted* in municipal or industrial biological waste treatment facilities, and the *biodegradation* referred to in that standard is biodegradation under those conditions. The words "and biodegradation" in the title of EN13432 are therefore confusing and should be removed.

The technical requirement to fulfil the criteria of *biodegradability in natural conditions* is therefore NOT set in EN13432. Art 1 of that Standard makes the specific point that the standard does not apply to packaging waste which may end up in the environment through uncontrolled means, ie as litter. There is therefore an urgent need for a standard by which biodegradation of plastics in the open environment can be tested. The Commission should therefore mandate CEN to adopt the new British Standard 8472 without delay as a European Standard. This standard includes tests for degradation, biodegradation, and eco-toxicity.

It is essential to understand the difference between a Standard and a Specification, and the difference between Controlled-life and compostable plastics. BS8472 is a Standard which provides test methods to assess a Controlled-life product. It is the first official recognition in a Standard in Europe of the concept of oxo-biodegradation, which is defined by CEN in TR15351 as "degradation resulting from oxidative and cell-mediated phenomena, either simultaneously or successively."

EN13432 and ASTM D6400 are Specifications, because compostable plastic is designed for aerobic composting in municipal or industrial waste treatment facilities, and it is therefore necessary to specify a timescale which the composters find acceptable for biodegradation in the special conditions found in industrial composting. Paras. A.2.2.1 and A2.2.2 of EN13432 require 90% of the plastic to convert into CO_2 gas within 180 days, and para. 6.3 of ASTM D6400 requires 60% conversion in 180 days.

However, Controlled-life plastic is designed to safely biodegrade if it gets into the open environment, and to do so in the natural conditions found there. Controlled-life plastic is not designed for composting, and can be designed for many different applications, each with a different programmable service life.

It is not possible to provide a timescale in a general standard for Controlled-life plastic, because the conditions found in industrial composting are specific and the conditions found in the open environment are variable. Moreover, the time taken for Controlled-life plastic to commence and complete the processes of degradation and biodegradation is also variable and will depend on a number of factors.

In particular, a Controlled-life plastic product can be designed to commence the abiotic degradation phase at a pre-determined time, which is not possible with compostable plastics. For example, a bread wrapper may be designed for a service life of 6 months, and a plastic shopping bag could have a service life of 18 months, before abiotic degradation starts. Accordingly a "one size fits all" timescale set in a general Standard is wholly inappropriate.

There is therefore no pass/fail timescale in BS8472, although para. 8.2 does provide that at least 50% carbon evolution must be achieved before completing the test. No doubt 50% would eventually be achieved by any conventional plastic but this would take decades, and has no relevance to the purposes for which BS8472 is designed.

The question whether the sample has “passed” or “failed” the tests depends upon the report required by para. 10 of the Standard. The report will show whether the material has degraded/biodegraded to a degree and within a timescale acceptable to the customer (or to the government in countries with relevant legislation), and that it is not toxic.

There is an urgent need for a European standard by which the degradation, biodegradation and eco-toxicity of plastics in the open environment can be tested, These plastics have now been on the market in Europe for more than five years and we were surprised to hear the Commission say in answer to a Parliamentary Question, that they have no solid evidence. The Commission has spent quite enough public money on consultants investigating bio-based plastics, and ought to have investigated oxo-biodegradable plastic as well. We are not aware that any scientist conversant with oxo-biodegradable plastic has ever been consulted by them. Foremost among these experts are Professor. Ignacy Jakubowicz of the SP Technical Research Institute, Sweden; Prof. Emo Chiellini of the University of Pisa, Italy; Prof. Emeritus Gerald Scott of Aston University UK; Prof. Jacques Lemaire of Université Blaise Pascal, France; Prof. Norman Billingham of the University of Sussex UK; and Prof. Telmo Ojeda of Instituto Federal de Educação Ciência e Tecnologia Sul-Rio-Grandense, Brasil.

It is necessary to know whether an oxo-biodegradable plastic product will naturally biodegrade in the environment in an adequate timeframe and without releasing toxic residues that would harm the environment. Therefore a set of laboratory tests is needed, by reference to which those questions can be answered. In view of the failure of CEN to discharge its responsibilities in this respect and the failure of the Commission to mandate them to do so, the British Standards Institute has proceeded unilaterally to write a suitable standard, which was published in June 2011 as BS8472.

The Commission should mandate CEN without further delay to write a European Standard, using as a basis the new British Standard 8472 “Methods for the assessment of the oxo-biodegradation of plastics and of the phyto-toxicity of the residues in controlled laboratory conditions”. It provides tests for biodegradation in soil, and simulates the real-world behaviour of plastic products which get into the open environment.

The next step is to build on BS 8472 by writing Specifications containing timescales for specific applications, eg shopping bags, bread wrappers, bottles, agricultural mulching films, recycling etc. This work should be commenced in BSI and CEN without delay.

Art 9(2)(a) of the Packaging Waste Directive should be amended to make it clear that the relevant standard for biodegradability in natural conditions in the environment is not EN13432, and that no presumption of compliance with para 3(d) of Annex II arises from compliance with EN13432.

COMPOSTABLE PLASTIC

Composting of organic waste makes sense, but compostable plastic for shopping bags, food packaging, shrink-wrap etc does not. The packaging technical manager of Tesco (Britain’s largest supermarket) said on 20th October 2009 that the supermarket *“does not see the value in packaging that can only be industrially composted” and that “local authorities do not want to touch it, as it can contaminate existing recycling schemes.”*

Many industrial composters of organic waste around the world do not want plastic of any kind in their feedstock, because it is difficult to separate compostable plastic from ordinary plastic.

Bio-based plastics attracted public attention about ten years ago because they are made wholly or partly from vegetable resources and were thought to be “renewable.” However,

they are not really "renewable" because large amounts of fossil-fuels are burned and CO_2 emitted in the production process.[2]

Many governments wish to reduce oil imports but they will not do so by preferring hydro-biodegradable or "compostable" plastic, and as indicated above normal plastics and Controlled-life plastics do not cause oil-depletion. By contrast the consumption of fossil fuels in the agricultural production of bio-based plastics does impact upon fossil resources. Oil-based plastics can actually reduce the amount of oil and gas imported because they can be incinerated after their useful life to release the stored energy, which can be used to generate electricity or to heat buildings.

Compostable plastic is up to 400% more expensive than ordinary plastic; it is thicker and heavier and requires more trucks to transport it; recycling with oil-based plastics is impossible; it uses scarce land and water resources to produce the raw material, and substantial amounts of hydro-carbons are burned and CO_2 emitted, by the tractors, trucks, and other machines employed. If buried in landfill, compostable plastic will emit methane (a greenhouse gas 23 times more powerful than CO_2) in anaerobic conditions.

The UK Environment Agency LCA says[3] "Starch-polyester blend bags have a higher global warming potential than conventional polymer bags, due to the increased weight of material in a bag, higher material-production impacts and a higher end-of-life impact in landfill."

The LCA confirms that bio-based polymer bags emit methane,[4] which is a greenhouse gas 23 times more powerful than CO_2 and that these bags have impacts upon photo-chemical oxidation (smog formation).

The LCA also confirms that bio-based plastics (except for a small proportion made from vegetable wastes) are in competition with food for the use of scarce land and water resources.

Although EN 13432 is designed for plastic which is intended to be composted in municipal or industrial biological waste treatment facilities, it is not an appropriate standard even for compostable plastic. The requirement in EN13432 for 90% of the plastic to be converted to CO_2 gas within 180 days is not useful - it is in fact wasting the carbon in the plastic by emission to atmosphere, instead of retaining it for the benefit of plants.

This is not "recovery" - it contributes to climate change instead of contributing to the fertility of the soil. 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 carbon.

The 180 day timescale may be appropriate for industrial composting, but not for biodegradation in the environment.

Para. 3(c) of Annex II of the Packaging Waste Directive says *"Packaging **recoverable** in the form of composting: Packaging waste processed for the purpose of composting shall be of such a biodegradable nature that it should not hinder the separate collection and the composting process or activity into which it is introduced."*

EN13432 needs to be revised so that if plastic is to be composted at all it should provide benefit to the soil and so that it can properly be described as recovery. In the meantime compliance with EN13432 should not raise a presumption that the plastic is "recoverable" for the purposes of para 3(c) of Annex II to the Packaging Waste Directive.

[2] See http://www.biodeg.org/files/uploaded/biodeg/Hydro-biodegradable_Plastic_Production_Process.pdf
[3] 8.2
[4] P 13, 39, 52 See also Report from Univ of N Carolina USA 10 May 2011. Compostable plastics should not be sent to landfill.

EN13432 needs to be further revised to distinguish between the conditions found in home composting and the conditions found in industrial composting. Indeed plastic is not suitable for home composting at all. Home composting of plastic packaging is not a controlled process. It can be dangerous and should be prohibited, as the plastic is often contaminated with meat, fish, or poultry residues, which will attract rats and other vermin. Also, temperatures may not rise high enough to kill the pathogens.

EN13432 needs to be further revised to distinguish between the conditions found in low-temperature "windrow" composting and composting in an "in-vessel" unit.

Although Controlled-life plastic is not designed for low-temperature windrow composting, it can be composted in an "in-vessel" unit at the higher temperatures required by the Animal By-products regulations.

VISIBILITY OF BIODEGRADABLE PACKAGING TO CONSUMERS

In the consultation document the Commission says *"Presently there are no labelling or marking requirements at EU level to provide information on the compostable and/or biodegradable nature of products and the materials they are made of.*

(a) Controlled-life packaging which has been tested according to BS8472 should be clearly labelled as follows:

This packaging is made with Controlled-life technology, to last a much shorter time in the open environment than ordinary plastic. Timescale depends on climatic and other factors, and it will not necessarily have completely biodegraded within one year. Not for windrow composting or anaerobic digestion. Can be safely incinerated in suitable facilities. Works in landfill if oxygen is present. Can be recycled as recommended by the manufacturer.

(b) Compostable plastic which complies with a revised EN13432 should be clearly labeled as suitable only for industrial composting. It should also be made clear that it will not degrade in the open environment. Further, the actual plastic bag or other product must be tested, not just the hydro-biodegradable material used in its manufacture. Often such material is mixed with other materials, in order to make the product serviceable, which do not meet the criteria for composting.

LITTER

It is often said that that people dispose more carelessly of biodegradable plastics, and this is an argument which would if true apply to hydro-biodegradable ("compostable") as well as Controlled-life plastics. It is not however true.

Bio-degradable plastic bags have now been dispensed by supermarkets for more than five years, but there is no evidence that people dispose more carelessly of them, and they have not been encouraged to do so. Pick up any piece of plastic litter and you are most unlikely to find the word "biodegradable" on it.

An apple-core is obviously biodegradable, but a person could not tell the difference between an ordinary plastic bag and a Controlled-life one. It is unrealistic to think that such a person will take the trouble to read the label (if there is one) to see whether it is biodegradable, before deciding to throw it away. In any event a lot of litter is accidentally released into the environment, without any conscious decision by anyone.

But suppose for the sake of argument that 10% more were discarded. If 1,000 conventional and 1,100 Controlled-life bags were left uncollected in the environment, 1,000 conventional bags would

remain in the rivers, streets and fields for decades, but none of the Controlled-life bags would be left at the end of the short life programmed into them at manufacture.

Education may have some effect, but there will always be people who will deliberately or accidentally discard their plastic waste. What will happen to all the plastic waste that will not be recycled or will not be incinerated, and instead will litter the countryside - would it not be better if the discarded plastic were all Controlled-life?

Q. But the landfills are filling up, and we need to reduce the amount of plastic bags going to landfill.

A. Plastic shopping bags occupy a tiny proportion of the space in landfill.

It is wasteful to send plastics of any kind to landfill. Instead they should be sent to modern incinerators which will capture the energy stored in the plastic, which can be used to generate electricity or to heat buildings without any harmful emissions.

"0.2% of the average household dustbin is plastic carrier bags … hence a tax on plastic carrier bags alone would be unlikely to have any significant impact on volumes of waste" (Plastic Bag Tax Assessment, HM Treasury, UK, December 2002).

The fraction of landfill represented by plastic shopping bags is 0.05%. This is based on domestic waste being 17% of landfill and plastic bags being 0.2% of the average dustbin. (Packaging and Films Association 2007).

A far greater impact on landfill space would be made by diverting away from landfill bricks, concrete, wood, glass and other building materials and other items such as household appliances, which occupy much more space.

Surely long-term re-usable shopping bags are the answer?
A. Certainly not.

The findings of the UK Environment Agency LCA of February 2011 suggested that, in order to balance out the tiny impact of each lightweight plastic bag, consumers would have to use the same cotton bag every working day for a year.

They are much thicker and more expensive, and a large number of them would be required for the weekly shopping of an average family.

30,000 jute or cotton bags can be packed into a 20-foot container, but the same container will accommodate 2.5 million plastic carrier-bags. Therefore, to transport the same number of jute or cotton bags 80x more ships and trucks would be required than for plastic bags, using 80x more fuel, using 80x more road space and emitting 80x more CO2.

Cloth bags are not hygienic[5] if a tomato is squashed or milk is spilled. Research by Guelph Chemical Laboratories in Canada in 2008 Microbiological Study of Reusable

[5] www.cpia.ca/epic/media/default.php?ID=2054

Grocery Bags[6] has shown that “re-usable grocery bags can become an active microbial habitat and a breeding-ground for bacteria, yeast, mold, and coliforms. …. The unacceptable presence of coliforms - ie intestinal bacteria, in some of the bags tested, suggests that forms of E.Coli associated with severe disease could be present in a small but significant proportion of the bags.”

Whilst sometimes called "Bags for Life" they have a limited life, depending on the treatment they receive, and become a very durable form of litter when discarded.

Shoppers do not always go to the shop from home, where the re-usable bags would normally be kept, and consumers are unlikely to have a re-usable bag with them when buying on impulse items such as clothing, groceries, CDs, magazines, stationery etc. Research conducted for the Scottish Executive[7] carrier bag case studies showed that 92 per cent of people think re-using carrier bags is good for the environment but 59 per cent forget their re-usable bags and have to take new ones at the checkout!

As durable bags are a cost to the consumer and carrier-bags are a cost to the supermarket, one can understand why supermarkets are in favour of reducing the number of carrier bags and increasing the number of durable bags.

However, for those who believe in long-term re-usable bags, they can be made from washable extended-life Controlled-life plastic which will last for 3-5 years before they will harmlessly self-destruct, leaving no harmful residues.

Q Can Controlled-life plastics be safely recycled?
A. Yes. See the Position Paper on Recycling at www.biodeg.org

Q. Isn't it better to use paper bags?
A. No.

The findings of the UK Environment Agency LCA of February 2011 suggested that, in order to balance out the tiny impact of each lightweight plastic bag it would be necessary to use paper bags at least three times rather than putting them in the bin or recycling.

The process of making paper bags causes 70% more atmospheric pollution than plastic bags. Paper bags use 300% more energy to produce, and the process uses huge amounts of water and creates very unpleasant organic waste. When they degrade paper bags emit carbon dioxide, and will emit methane in anaerobic conditions.

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 transport pollution and road congestion. Also, because paper bags are not as strong as plastic, people may use two or three bags inside each other. Paper bags cannot normally be re-used, and will disintegrate if wet.

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www.cpia.ca/files/files/A_Microbiological_Study_of_Reusable_Grocery_Bags_May20_09.pdf http://network.nationalpost.com/np/blogs/theappetizer/archive/2009/05/20/back-to-plastic-reusable-grocery-bags-may-pose-public-health-risk.aspx

[7] http://www.scotland.gov.uk/Topics/Environment/funding-and-grants/carrier-bag-case-studies/Q/EditMode/on

"*There have been unforeseen consequences in the Irish Experience … increase in the use of paper bags which are actually worse for the environment …"* … Ben Bradshaw, UK Environment Minister, 4 August 2006.

In summary therefore it is not a good idea to ban plastic bags – it is a very bad idea

Plastic products are so useful that for the foreseeable future millions of them will be used every day all around the world, but in no country will it be possible to collect and dispose responsibly of all the plastic. So all short-life plastic goods should be made with Controlled-life technology, which makes them harmlessly self-destruct within a short time after their useful life if they do get into the open environment (see www.biodeg.org).

Controlled-life plastic is entirely consistent with a policy of educating people not to litter, and with a policy of minimisation, recycling, incineration, landfilling or composting.