

## Food Industry Position on OXO degradable compounds

### Background

Since a couple of years, a series of companies are marketing additives which accelerate thermo-oxidative degradation of common plastics such as polyethylene, polypropylene and polystyrene as a cheap solution to littering.

Under the influence of this industry sector, some countries, such as Pakistan have introduced legislative measures enforcing the use of these additives not only for plastic carrier bags, but also, in some cases, for plastics in direct contact with food.

This position paper shows that there is substantial scientific evidence that such measures are likely to be counterproductive and will increase problems related to littering as well as seriously jeopardize any future attempts to create comprehensive recovery and recycling schemes for such materials.

In addition to this, the use of oxo-biodegradable additives in direct contact with food may endanger human health, cause unacceptable changes in the composition of the food, as well as a deterioration in the organoleptic characteristics of products.

### Safety aspect of OXO-plastics for food contact materials:

- **Symphony documents**

In order to assess the safety of the oxo-degradable plastics, it is important to have complete information on the composition of the plastic (i.e. information on all its components). In EU, plastic food contact materials are considered safe if their components comply with - among others - the list of components included in regulation 10/2011 for plastic materials. The same principle applies with US FDA CFR 21.

For oxo-degradable products from Symphony, safety and compliance cannot be verified as their technical data sheets (annex 1) mentions "additive 93390", which is internal terminology of the supplier, and not an internationally recognized coding system for a chemical substance (as is a CAS registry number). Symphony refers, in their data sheet, to EU directives which are outdated (2002/72/EC) and do not disclose the needed information to show compliance.

Symphony submitted a RAPRA report to demonstrate compliance of its additive. The "RAPRA Technology" is often cited as the institute carrying out the testing for food contact approval of the oxo-degradable materials. However, the RAPRA report (annex 2) submitted by Symphony to authorities mentions that: "Another additive (...), is not yet listed in 2002/72/EC (outdated EU directive) but at present is permitted for use in UK Food Contact materials until the 31<sup>st</sup> December 2006 on the basis of its FDA approval for use in food contact". The compliance status for the product in 2013 should be revised by Symphony.

Moreover, additives used for oxo-plastics are known to be sensitive to temperature conditions: they should be stored in cool dry conditions away from strong sources of light and heat, and storage temperatures should not exceed 25°C (e.g. Symphony Additive 93390 data sheet). Given typical temperatures in Pakistan, it is very unlikely that the limit of 25°C can be maintained during the shelf life of a food product. Therefore the "RAPRA technology" report appears incomplete at its current stage, and cannot be used to prove that the oxo-plastics will fulfill the requirements for safe food packaging in Pakistan during all the food product shelf life.

- **Concern of Food Business Operators (Chamber of Commerce)**

Symphony documents refer very often to EU regulations for food contact materials. In EU, food contact materials need to comply with basic requirements (article 3 of EU regulation 1935/2004): under normal or foreseeable conditions of use, they do not transfer their constituents to food in quantities which could

(a) endanger human health;

or

(b) bring about an unacceptable change in the composition of the food;

or

(c) bring about a deterioration in the organoleptic characteristics thereof.

If the composition of oxo-degradable plastics remains unknown, food business operators are not in the position of assessing whether these plastics can fulfill the 3 requirements above.

Oxo-plastics are designed to be oxidized faster than standard materials. Without information on the amount of plastic migration that occurs into food after 6 or 12 months of storage at temperatures which in Pakistan are likely to be above 25°C, the food businesses operators cannot ensure food safety of these materials. In addition, if the oxo-degradation of the plastic packaging starts during the shelf life of the food product, spoilage and microbiological contamination can occur thus putting consumer health at risk.

**Consequently, the food industry believes that these products can potentially represent a serious risk for consumers.**

### **Environmental concerns of oxo-biodegradable plastics**

- **Degradation is not a solution to littering**

The primary concern is related to the use of degradability, regardless of whether it is achieved through oxo-degradation or through other forms of degradation, as a solution to the absence of a comprehensive scheme of recovery of used packaging. In addition to this, there is ample scientific evidence and expressed concern that littering begets littering [Cialdini 1990, Reiter 1980]. Therefore, the fact that a national legislation enforces the use of degradable materials without providing the infrastructure required to collect and manage this waste flow is more likely to increase littering than decrease littering when it becomes publicly known that packaging will “disappear from the streets”. This risk is clearly recognized by government authorities such as the European Commission expressed in its green paper “On a European Strategy on Plastic Waste in the Environment [EC 2013] as well as by the Indian government [Government of India 2009]. The recommended solutions to the issue of littering are: reinforcing positive attitudes, behavior, and lifestyle changes concerning consumption patterns and littering by the general public in conjunction with adequate solid waste management and supportive infrastructure [UNEP 2011].

- **Environmental impacts**

Available environmental assessments of oxo-biodegradable materials clearly show that these materials have environmental advantages only in life cycle assessment indicators related to marine littering and littering aesthetics, regardless of whether the study has been commissioned by an independent government agency [Sustainability Victoria 2007, DEFRA 2010] or an interested party [Symphony/Intertek 2012].

However, the indicators used for littering are not scientifically reliable since they do not take the true effects of littering into account. They are simply based on the quantity of littering and on unverified hypotheses concerning the degradation time of these materials in terrestrial and aquatic environments and their capacity to float in water.

Due to the uncontrolled fate of litter, it is highly likely that after packaging fragments end up in a location which does not provide the necessary criteria for further degradation. With the typical degradation time-frames communicated by oxo-degradables suppliers, such fragments will prevail in the environment for extensive periods of time during which they will not only contribute to littering but also increase other detrimental effects on wildlife, in particular in marine environments [IMSA 2011, EC 2013, p.16]. Such effects are not accounted for by the aesthetic and marine litter indicators used in the available studies [Sustainability Victoria 2007, DEFRA 2010, Symphony/Intertek 2012], which suggest that even in this category, the claimed benefits might be exaggerated.

In addition, as the scientific community as well as many government authorities agree that the key solution to littering is education and the creation of collection and recovery infrastructure, the litter indicators cannot be interpreted as an advantage for oxo-biodegradable materials. None of the remaining environmental indicators in the available assessments speak in favor of oxo-biodegradable materials as compared to the same materials without these additives.

- **Potential detrimental effects on the future establishment of recycling schemes for plastics**  
Recycling organizations in several parts of the world have expressed significant concerns over the detrimental effects of the introduction of oxo-biodegradable materials on the quality of recycled materials, even at small levels [SPI 2010, EuPR 2010]. As a response to this, the oxo-biodegradables industry has declared that their materials are perfectly compatible with recycling as they will be heavily diluted with other material. However, this dilution factor will never be achieved by an across-the-board legislation forcing all packaging items to be made using oxo-biodegradable technology. Consequently it would completely jeopardize any future attempt to establish functioning recovery and recycling schemes for these plastic packaging materials [SPI 2010, EuPR 2010].

A legal initiative such as the one presently proposed is therefore likely to be counterproductive from the standpoints of littering reduction and waste management, as well as from an environmental standpoint; it is also likely to attract very negative attention to the country from the international community currently trying to solve the issue of littering in general and marine littering in particular by other means.

#### **Conclusion:**

- **Food safety standpoint**, the food industry operators believe that there is neither enough information nor enough scientific evidence to prove that, at this stage, oxo-degradable plastics will protect adequately the food along the product shelf life, and fulfill the basic food safety requirements for packaging materials.
- **From an environmental standpoint** the food industry operators have not found any reliable evidence that the use of degradable materials such as oxo-degradable materials is a viable solution to littering for any packaging regardless of whether it is in direct contact with food or not.

On the contrary, there is substantial evidence that it is more likely to increase littering and other adverse environmental impacts on nature rather than reducing them.

In addition to this, widespread use of oxo-biodegradable plastics will also jeopardize attempts to organize comprehensive recycling schemes for these materials in the future.

#### **Position:**

- **We must refrain from using Oxo degradable material as global alternative to current plastic materials for environmental reasons ,**
- **We must not allow their use for any application in direct contact with food .**

#### **References & Annexes:**

# **POSITION PAPER ON OXO-BIODEGRADABLES AND OTHER DEGRADABLE ADDITIVES**

Society of the Plastics Industry  
Bioplastics Council

January 2010



[www.bioplasticscouncil.org](http://www.bioplasticscouncil.org)

(Add for ecology)



# Marine Litter: A Global Challenge





## Plastic Marine Litter

### **Plastics Do Not Belong In The Ocean**

Towards a roadmap for a clean North Sea



IMSA AMSTERDAM  
SUSTAINABILITY & INNOVATION

November 2011  
PML100



INTERNATIONAL  
MARINE DEBRIS CONFERENCE

# Summary Proceedings

## 5th International Marine Debris Conference



United Nations Environment Programme



20-25 March 2011  
Honolulu, HI, USA

## A Focus Theory of Normative Conduct: Recycling the Concept of Norms to Reduce Littering in Public Places

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Past research has generated mixed support among social scientists for the utility of social norms in accounting for human behavior. We argue that norms do have a substantial impact on human action; however, the impact can only be properly recognized when researchers (a) separate 2 types of norms that at times act antagonistically in a situation—injunctive norms (what most others approve or disapprove) and descriptive norms (what most others do)—and (b) focus Ss' attention principally on the type of norm being studied. In 5 natural settings, focusing Ss on either the descriptive norms or the injunctive norms regarding littering caused the Ss' littering decisions to change only in accord with the dictates of the then more salient type of norm.

Although social norms have a long history within social psychology, support for the concept as a useful explanatory and predictive device is currently quite mixed. Some researchers have used and championed the concept as important to a proper understanding of human social behavior (e.g., Berkowitz, 1972; Fishbein & Ajzen, 1975; McKirnan, 1980; Pepitone, 1976; Sherif, 1936; Staub, 1972; Triandis, 1977). Others have seen little of value in it, arguing that the concept is vague and overly general, often contradictory, and ill-suited to empirical testing (e.g., Darley & Latané, 1970; Krebs, 1970; Krebs & Miller, 1985; Marini, 1984). In addition, a parallel controversy has developed within academic sociology where ethnomethodological and constructionist critics have faulted the dominant normative paradigm of that discipline (Garfinkel, 1967; Mehan & Wood, 1975).

The effect of these criticisms has been positive in pointing out problems that must be solved before one can have confidence in the utility of normative explanations. One such problem is definitional. Both in common parlance and academic usage, *norm* has more than one meaning (Shaffer, 1983). When considering normative influence on behavior, it is crucial to discriminate between the *is* (descriptive) and the *ought* (injunctive) meaning of social norms, because each refers to a separate source of human motivation (Deutsch & Gerard, 1955). The descriptive norm describes what is typical or *normal*. It is what most people do, and it motivates by providing evidence as to what will likely be effective and adaptive action: "If everyone is doing it, it must be a sensible thing to do." Cialdini (1988) has argued that such a presumption offers an information-process-

ing advantage and a decisional shortcut when one is choosing how to behave in a given situation. By simply registering what most others are doing there and by imitating their actions, one can usually choose efficiently and well. Researchers have repeatedly found that the perception of what most others are doing influences subjects to behave similarly, even when the behaviors are as morally neutral as choosing a consumer product (Venkatesan, 1966) or looking up at the sky (Milgram, Bickman, & Berkowitz, 1969). The injunctive meaning of norms refers to rules or beliefs as to what constitutes morally approved and disapproved conduct. In contrast to descriptive norms, which specify what is done, injunctive norms specify what ought to be done. That is, rather than simply informing one's actions, these norms enjoin it through the promise of social sanctions. Because what is approved is often what is typically done, it is easy to confuse these two meanings of norms. However, they are conceptually and motivationally distinct, and it is important for a proper understanding of normative influence to keep them separate, especially in situations where both are acting simultaneously.

A second source of confusion surrounding the concept of social norms is that, although they are said to characterize and guide behavior within a society, they should not be seen as uniformly in force at all times and in all situations. That is, norms should motivate behavior primarily when they are activated (i.e., made salient or otherwise focused on); thus, persons who are dispositionally or temporarily focused on normative considerations are most likely to act in norm-consistent ways (Berkowitz, 1972; Berkowitz & Daniels, 1964; Gruder, Romer, & Korth, 1978; Miller & Grush, 1986; Rutkowski, Gruder, & Romer, 1983; Schwartz & Fleishman, 1978). Of course, salience procedures should be effective for both descriptive and injunctive norms. In fact, in situations with clear-cut descriptive and injunctive norms, focusing individuals on *is* versus *ought* information should lead to behavior change that is consistent only with the now more salient type of norm.

One purpose of this research was to test this assertion as it

We thank Lisa Cramer, Cathy Daly, Ann Hazan, Bethel Kaminski, and Kim Whiting for their help in conducting Study 5, which served as the master's thesis for Raymond R. Reno.

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## Littering as a Function of Prior Litter and The Presence or Absence of Prohibitive Signs<sup>1</sup>

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The purpose of the present study was to determine the effect on littering behavior of (1) two types of antilitter signs and (2) the condition of the environment (littered vs. unlittered). It was hypothesized that a sign with a threatening message (i.e., "Littering is Unlawful and Subject to a \$10 Fine.") would induce psychological reactance and therefore would be less effective than one emphasizing cooperation (i.e., "Pitch In!"). It was also predicted that littering would occur more frequently in littered than in nonlittered areas. The study was conducted on six levels of a city parking garage, each floor of which was exposed to a randomly selected combination of the sign and litter treatments. Relative to a no sign control condition, signs had the overall effect of reliably reducing the litter rate, but the "Pitch In" message was not found to be more effective than the "Unlawful" one. The littering rate was, as predicted, lowest in a clean environment. Finally, the impact of the signs was reliably influenced by the day of the observation. This finding was interpreted in terms of reactance theory and led to the conclusion that prior exposure is an important variable determining the effectiveness of signs.

Keep America Beautiful (1973) has reported that the annual volume of U.S. litter is 6.9 million tons and that the public bill for cleaning up this trash is about \$500 million, with an equal amount being spent on private cleanups of areas such as sports stadiums and parking lots. In a survey conducted by this

<sup>1</sup>This article is based on a thesis submitted in partial fulfillment of the requirements for an M.A. degree by the first author, who is currently studying environmental law at the McGeorge Law School of the University of the Pacific. Thanks are expressed to Professors Robert Sommer and William Westbrook who were members of the thesis committee and who made many helpful comments.

<sup>2</sup>Requests for reprints should be sent to Dr. William Samuel, Department of Psychology, California State University, Sacramento, CA 95819.



Brussels, 7.3.2013  
COM(2013) 123 final

**GREEN PAPER**

**On a European Strategy on Plastic Waste in the Environment**

**EN**

**EN**

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## Bio-degradable Plastics- Impact on Environment



CENTRAL POLLUTION CONTROL BOARD  
MINISTRY OF ENVIRONMENT & FORESTS  
GOVERNMENT OF INDIA  
OCTOBER, 2009

(Prof. S.P. Gautam)  
Chairman

# EV0422

## Assessing the Environmental Impacts of Oxo-degradable Plastics Across Their Life Cycle

Loughborough University

A research report completed for the Department for Environment, Food and Rural Affairs

(January 2010)



Sustainability Victoria

# Comparison of existing life cycle analysis of shopping bag alternatives

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Final Report

18 April 2007

Report no: 1





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Sustainability Director

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## Intertek Expert Services

# A Life Cycle Assessment of Oxo-biodegradable, Compostable and Conventional Bags

By Chris Edwards and Gary Parker

May 2012

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# **POSITION PAPER ON OXO-BIODEGRADABLES AND OTHER DEGRADABLE ADDITIVES**

Society of the Plastics Industry  
Bioplastics Council

January 2010



[www.bioplasticscouncil.org](http://www.bioplasticscouncil.org)

## Fact sheet on bioplastics

March 2009

Bioplastics are increasingly in the news in the packaging sphere as they add new features to the diverse spectrum of plastics materials. Their development is linked to several factors such as the depletion of petroleum reserves, high oil prices and increased greenhouse gas emissions.

This fact sheet is meant to give clear and concise information related to bioplastics, the terminology used and management once they become waste, based on PRO EUROPE members' expertise in the matter.

### Main conclusions:

- Under the definition of bioplastics, different aspects are covered; their composition and end-of-life.
- Misconceptions about the properties, benefits and end-of-life process of bioplastics are widespread.
- Bioplastics are not currently proved to be more sustainable than petrol-based plastics.
- Technically, bioplastics could be recycled but would then require being part of a separate collection and having enough quantity of good quality recyclable waste, recycling infrastructure and sustainable outlet.
- Composting makes less sense from an environmental point of view than the incineration or gasification of bioplastics with energy recovery.
- Tax exemptions or incentives for bioplastics are not currently justified and would lead to distortions in the internal market.
- The promotion of biodegradable plastics among consumers should be avoided as it could lead to an increase of littering behaviours.

### About bioplastics

#### Differentiating bio-based plastics from biodegradable or compostable plastics

The term bioplastics is often used as a collective term for different plastic types. Two aspects of bioplastics are generally mixed up:

- Its composition: a plastic made of renewable resources.
- Its end-of-life: a biodegradable or compostable plastic

The composition and the end-of-life are independent aspects that should not be confused. The biodegradability of plastic is independent of its composition:

- Bio-based plastics are not always biodegradable.
- Biodegradable plastics are not always made of renewable resource. Traditional petroleum based plastics can be biodegradable.

A bio-based plastic is a plastic derived from a renewable source; biomass which is a material of biological origin excluding material embedded in geological formation or transformed into fossil fuels. According to the University of Hannover, there are more than 300 types of bioplastics. For example, bio-based plastics can be made from corn, sugar cane, starch. Many biobased plastics contain also a significant amount of petroleum, often 50% (for the bags) and sometimes up to 80%.

See ANNEX 1 on bioplastics definitions

# HOW TO INCREASE THE MECHANICAL RECYCLING OF POST-CONSUMER PLASTICS

*STRATEGY PAPER OF THE EUROPEAN PLASTICS  
RECYCLERS ASSOCIATION*

*February 2010*



Position and key messages