PUBLIC DOCUMENT

UNITED STATES FEDERAL TRADE COMMISSION

Docket No. 9358

In the Matter of
ECM Biofilms, Inc.,
a corporation, also d/b/a
Enviroplastics International

# Motion of CALIFORNIANS AGAINST WASTE FOR LEAVE TO FILE AMICUS CURIAE BRIEF in support of the position of Complaint Counsel

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February 27, 2015

Pursuant to 16 C.F.R. 3.52(j), Californians Against Waste respectfully moves for an Order granting it leave to file the accompanying amicus curiae brief in support of the position of the Complaint Counsel.

Californians Against Waste (CAW) is an environmental non-profit advocacy organization dedicated to conserving resources, preventing pollution, and protecting the environment through the development, promotion and implementation of waste reduction and recycling policies and programs. Established in 1977, CAW works closely with the waste and recycling industries and other stakeholders on these issues. CAW has provided expert testimony, comments, and letters to local, state, and federal agencies and legislative bodies on a variety of waste and recycling topics. CAW is also an active member in American Society for Testing and Materials (ASTM), which is a collection of scientists and technical experts engaged in the international standards making process for a variety of subject matters, including plastics recycling and product end-of-life standards.

In 2011, CAW sponsored Senate Bill 567 (DeSaulnier), a California-specific law that prohibits the "biodegradable" claim on any plastic product, and limits "compostable" claims to plastic products that can meet ASTM D6400, ASTM D6868, or ASTM D7081 standard specifications. Although the law is limited to products purchased in California, it has far reaching implications. Decision makers in California have passed laws that not only change the market due to its large size, but that also create a chain reaction when other states follow suit.

In a continued effort to protect both consumers and the environment from false and misleading claims of biodegradability, CAW leads an enforcement campaign to ensure that the products are compliant with the California labeling law, and that they meet the FTC's recently revised Green Guides in markets outside of the state. (See 16 C.F.R. 260.1-260.17 [Green

Guides]) Consumers should not be misled into paying a premium for allegedly environmentally friendly products that do not follow through with their end-of-life claims or other environmental claims. Some claims, such as "biodegradable" claims, can actually encourage more consumption or littering and negatively impact the environment. Moreover, the recycling industry is negatively impacted by additives in some biodegradable products, which degrade the quality of their finished product.

CAW represents the public interest and perspective on the issue of biodegradable plastics. It is respectfully submitted that CAW's public interest, non-competitive status, and concern for reliable and honest environmental marketing claims can provide the FTC with a useful perspective in determining the level and type of substantiation required for the challenged advertising claims.

In the accompanying brief, CAW argues first that, to the extent that the Administrative Law Judge's Initial Decision may be interpreted as: (1) disapproving of the Green Guides' approach to unqualified claims of biodegradability, and (2) approving of the use of a "biodegradable" label without the need for any qualifications or scientific basis as to the length of time in which biodegradation will occur, a different conclusion should be reached. A finding that ECM's unqualified "biodegradable" claims here are not deceptive would effectively eviscerate any meaningful guidance as to how industry should advertise the biodegradable attributes of certain plastics. Second, CAW respectfully requests the FTC issue a decision that both: (1) prevents ECM's harmful use of a deceptive qualified claim of biodegradability, and (2) clears up the unnecessary ambiguity left by the ALJ's decision as to the general appropriateness of a "some period greater than a year" qualified claim. Even if it is not false on its face, a "some period greater than a year" qualified claim by ECM or any other seller of bioplastics is misleading and so broad it is meaningless.

CAW believes the issues presented in its accompanying brief are particularly pressing because of the growing population of people with eco-friendly attitudes that manufacturers are taking advantage of and targeting with advertisements. At the same time there continues to be a general unfamiliarity or lack of public awareness regarding the reliability of many environmental claims. Thus, it is important that biodegradability claims are as clear and as accurate as possible to prevent consumer confusion and resulting harm to the environment.

For the foregoing reasons, CAW respectfully requests an Order for leave to file the accompanying amicus curiae brief in support of the position of Complaint Counsel.

Respectfully submitted,

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## INTEREST OF AMICUS CURIAE

Californians Against Waste (CAW) is an environmental non-profit advocacy organization dedicated to conserving resources, preventing pollution, and protecting the environment through the development, promotion and implementation of waste reduction and recycling policies and programs. Established in 1977, CAW works closely with the waste and recycling industries and other stakeholders on these issues.

In 2011, CAW sponsored and successfully advocated for California Senate Bill 567 (DeSaulnier), a law that prohibits the use of any "biodegradable" claim on plastic products sold in California and limits "compostable" claims to those plastic products that can meet ASTM D6400, ASTM D6868, or ASTM D7081 standard specifications. During this process, CAW provided expert testimony, comments, and letters to the legislature about the importance of protecting the environment and consumers from deceptive "biodegradable" and "compostable" claims. Now, CAW manages an enforcement campaign to help remove noncompliant products from the California market and ensure that products in other state markets meet the Federal Trade Commission's (FTC's) recently revised Green Guides (16 C.F.R. 260.1-260.17).

In the present case, CAW represents the public's interest in being able to make informed choices based on "biodegradable" claims on a plastic product's labels and advertising materials. ECM's additives can end up in many different types of purportedly biodegradable plastic products, causing impacts that ripple out to consumers in many different sectors all over the country. CAW supports Complaint Counsel's Appeal and hopes that its non-competitive status and concern for truthful and clear environmental advertising can provide the FTC with a useful perspective in determining the level and type of substantiation necessary for "biodegradable" claims.

## PRELIMINARY STATEMENT

"An advertisement is deceptive if it contains a representation or omission of fact that is likely to mislead a consumer acting reasonably under the circumstances, and that representation or omission is material to a consumer's purchasing decision." (*In re POM Wonderful LLC*, No. 9344, 155 F.T.C. 1, at *6 (Jan. 10, 2013).) ECM's unqualified claim of biodegradability, and its "some period greater than one year" qualified claim, are deceptive because they are likely to mislead a reasonable consumer into paying extra money for plastic products out of an earnest desire to do something good for the environment. Both the unqualified claim and the "greater than one year" qualified claim omit important information that can influence a consumer's purchasing decision. Therefore, even if the FTC were to find that these claims do not contain an express representation that is false or deceptive, the FTC should find that it is in the public's interest to find that these claims are deceptive because of the information they hold back from consumers. More generally, CAW urges the FTC to both affirm and clarify, to the extent necessary, the guidance provided by the Green Guides.

## ARGUMENT

This case is about end-of-life claims made regarding ECM Plastics, or plastic products with additives sold and manufactured by ECM Biofilms under the trade name MasterBatch Pellets. ECM sold and marketed this additive as having the ability to make plastic products biodegradable when added to a manufacturer's base materials during production, and issued "Certificates of Biodegradability of Plastic Products" to convince its customers of this claim. While there are positive benefits for truthful end-of-life claims that can assist in waste reduction and diversion, false or confusing end-of-life claims that infiltrate the market have far-reaching negative consequences. Products with deceptive "biodegradable" claims are harmful to consumers who are misled into paying a higher price based on a certain expectation. These deceptive claims also have a negative impact on the environment because of the increased consumption and littering of plastic that occur as a result of degradability claims. Moreover, the recycling and composting industries view plastics with biodegradable additives as a contaminant that often ends up in their feedstock. The Administrative Law Judge D. Michael Chappell (ALJ) issued a cease order on certain qualified claims from ECM and prohibited ECM from making any claims of complete biodegradation in any time frame unless there is competent and reliable scientific evidence. But, as explained more fully below, the ALJ's Initial Decision and Order ("Initial Decision") create unnecessary ambiguity about what constitutes a valid unqualified "biodegradable" claim, when the claim needs to be qualified, and what form the qualifications should take.

1. The Growing Market for Products with Environmentally Friendly Claims Needs FTC's Guidance.

Over the years and in large part due to the environmental movement, consumers have changed their preferences to seek more environmentally friendly products. According to a 2011 corporate responsibility survey by Cone Communications, 94% of consumers would choose an environmentally beneficial product, and 76% recently purchased an environmentally beneficial product.[1]

[1] Bioplastics Industry Overview Guide, Society of the Plastics Industry Bioplastics Council, April 2012, at p. 1 (attached as Exhibit A).

Understandably, the market has and will continue to change to accommodate and meet consumer preferences with more eco-conscious choices, including bioplastics (plastics derived from biological sources rather than petroleum sources) and plastics that claim to be "biodegradable" or "compostable". Estimates of worldwide bioplastics production jumped 31% from 2010 to 2015.[2] In fact, the relatively small bioplastics market has already demonstrated a steady growth in production that is only expected to increase. According to CalRecycle, the state agency that oversees waste and recycling issues in California, there is expected to be an annual growth rate of 25% for all bioplastics through 2017.[3]

Some bioplastics will be accompanied by claims of degradability. As noted in the FTC Green Guides (16 C.F.R. 260.8), these claims can include "biodegradable", "oxo-degradable", "oxo-biodegradable" and "photo-degradable." Considering the expected growth of environmentally friendly bioplastics products in the market and the increasing importance consumers place on making values-based purchasing decisions, the FTC's guidance to marketers needs to be consistent with, and supportive of, current trends, regulations, and objectives related to solid waste management and other environmental issues.

For example, the marketing claim that a product is "biodegradable in landfills" is contrary to the public good and needs to be properly restricted by FTC guidance. According to the U.S. Environmental Protection Agency (EPA)[4], biodegradation in landfills typically generates methane, which contributes to global climate change, and acidic leachate, a known

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[2] Exhibit A, p. 1.
[3] Excerpts from CalRecycle, Bioplastics in California, September 30, 2013, at p. 1 (attached as Exhibit F).
[4] EPA, Wastes - Resource Conservation - Reduce, Reuse, Recycle – Composting, "Frequent Questions," available at http://www.epa.gov/composting/questions.htm (last visited Feb. 26, 2015).

groundwater pollutant. A white paper by the Sustainable Packaging Council[5] corroborates the negative impact of biodegradable materials in landfills. A United Nations' study[6] reports that methane gas from unchecked biodegradation in landfills is surpassed in emissions by only China and the United States. To prevent these serious problems, many states and communities have banned biodegradable materials (such as leaves, grass and, more recently, food waste) from being landfilled. Sanctioning the marketing claim of "biodegradable in landfills" seems ill-advised. Absent a prohibition on such claims, and in addition to requiring a scientific basis for these claims, the FTC should consider requiring marketers to advise consumers that biodegradable waste generally is not intended to go to landfills. Further, consumers should be advised (with clear labeling) to check locally to ensure that biodegradable waste is accepted at landfills in their community.

This is just one example. There is a wide array of degradability claims. Given the growing popularity and size of the environmentally friendly bioplastics market, it is important that the FTC provide clear guidance on claims of biodegradability in both adjudicative and regulatory settings.

2. The ALJ's Findings and Conclusions Could Potentially Have Broad, Negative Implications on Consumers and the Environment.

[5] Sustainable Packaging Council, Assessing the Greenhouse Gas Impacts of Biodegradation in Landfills, 2011 (attached as Exhibit B).

[6] New York Times, February 25, 2015, *Food Waste Is Becoming Serious Economic and Environmental Issue, Report Says,* available at http://www.nytimes.com/2015/02/26/us/food-waste-is-becoming-serious-economic-and-environmental-issue-report-says.html (last visited Feb. 26, 2015).

CAW supports the ALJ's decision to reaffirm the FTC's statements that environmental claims, including "biodegradable" be supported by competent science, using valid test methods. But we support Complain Counsel's Appeal because the Initial Decision creates unnecessary ambiguity about what constitutes a valid unqualified "biodegradable" claim, when the claim needs to be qualified, and what form the qualifications should take.

ECM's challenged claims fall into three categories: (1) unqualified claims that ECM Plastics are "biodegradable" (Initial Decision, p. 174); (2) qualified claims that ECM Plastics will fully biodegrade in 9 months to 5 years (*id.* at p. 176); and (3) qualified claims that EMC Plastics will biodegrade in "some period greater than a year" (*id.* at p. 178). Before 2013, ECM made claims in the first (unqualified) and second (qualified, 9 months to 5 years) categories. (*Id.* at p. 178.) After the revisions of the FTC Green Guides in 2012, ECM modified its qualified and unqualified claims to state that its plastics would "biodegrade" in "some period greater than a year." (*Ibid.*)

While the ALJ correctly concluded that ECM's original qualified claim (fully biodegradable in a landfill in 9 months to 5 years) violated the Federal Trade Commission Act, and authorized a cease and desist order for such violating acts (Initial Decision, p. 319, # 40-41), his conclusion that the Complaint Counsel could not bar ECM from making unqualified "biodegradable" claims (*id.* at pp. 318-319, # 38-39 & 46) is mistaken. Similarly, the ALJ's implied conclusion that ECM's qualified claim of biodegradability over "some period greater than a year" is appropriate will allow deceptive advertisements to mislead consumers, both in the present case and by effectively setting the standard for qualified claims so low as to make the qualifications meaningless. (See *id.* at p. 179 [explaining that it was not clear to the ALJ that

Complaint Counsel in fact challenges the "some period greater than a year" claim as false or unsubstantiated, and therefore the Decision does not decide these issues].)

When consumers are given false claims or misled by confusing or vague claims, there are several negative impacts to both the environment and consumers.

One, most bioplastics cannot be recycled with other plastics. The processes to sort out these products are time-consuming, inefficient, and expensive because bioplastics cannot be readily distinguished from more traditionally recycled plastics. Additives in the feedstock can also compromise the chemical stability[7] and the quality of a finished recycled product and are thus viewed as contaminants.[8] Plastic recyclers, including the National Association for PET Resources (NAPCOR), do not want the uncertainties that are linked to additive-based "biodegradable" products and have spoken out against additives, citing the lack of data on end-of-life performance and impact on the recycling stream.[9]

Two, every commercial composter has its own specifications about how long a product must take to compost. If consumers send bioplastic products that do not meet these specifications to composting centers, then these products are likely to contaminate the compost pile. Composting facilities that accept compostable plastics typically require the plastics to meet ASTM D6400 or equivalent standards, to verify that the plastics have been tested to completely break down in commercial composting conditions. According to CalRecycle, "Compostable

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[7] The Society of the Plastics Industry Bioplastics Council, Position Paper On Degradable Additives, January 2013, at pp. 7-8 (attached as Exhibit C).
[8] CalRecycle (formerly California Integrated Waste Management Board), June 2007, Performance Evaluation of Environmentally Degradable Plastic Packaging and Disposable Food Service Ware - Final Report, at p. 3 (attached as Exhibit E).
[9] NAPCOR press release, May 3, 2011, Degradable Additives Provide Poor End-Of-Life Option For PET Packaging, Says NAPCOR (attached as Exhibit D).

plastics are being used safely in the United States with the help of a certification program and the establishment of ASTM D6400 standards."[10]

Three, the term "biodegradable" on consumer products can also increase littering habits by reducing the barriers to littering and communicating to the consumer that the product is less harmful if littered. Degradable additives are not the solution to litter. Consumers may reasonably believe that if a product is labeled "biodegradable" it will biodegrade harmlessly in the environment. But some products that claim to ultimately biodegrade in fact only break down into fragments that continue to persist in the environment, creating a substantial risk of accumulation of pieces that never go away. These fragments can in turn attract surrounding toxic chemicals and transport those toxins to other locations, causing harm to the marine environment.[11]

Finally, consumers' financial interests are harmed. Most purportedly "biodegradable" products are more expensive than conventional petroleum-based plastics. Some consumers are willing to pay a premium if they believe they are making a difference for the environment. But advertisements that mislead consumers into purchasing products with indeterminate and variable environmental benefits rob consumers of the chance to make an informed choice. In addition, some companies are following the laws which regulate the use of environmental marketing terms, while others blatantly violate them, creating unfair market competition.

3. <u>Relevant Law and Standards for Determining Whether or Not Claims Are Deceptive.</u>

As mentioned in our motion, CAW is an active voting member of the American Society for Testing and Materials (ASTM), which is a collection of scientist and technical experts

[10] Exhibit E (CalRecycle, 2007), at p. 15.
[11] Exhibit C (The Society of the Plastics Industry Bioplastics Council, 2013), at p. 7.

engaged in the international standards making process for a variety of subject matters including plastics. CAW participates in ASTM committees on plastics recycling and end-of-life standards.

Based on CAW's experience, it is important to differentiate between biodegradation as a process and biodegradability as an attribute. Testing methods that indicate a product has inherent characteristics of biodegradability may not be able to adequately quantify the process of biodegradation. According to the initial decision, ASTM defines biodegradation as the process by which natural biota decompose a plastic product into different chemical materials.

According to ASTM D883, the following definitions exist for:

> Degradable Plastic: a plastic designed to undergo a significant change in its chemical structure under specific environmental conditions resulting in a loss of some properties that may vary as measured by standard test methods appropriate to the plastic and the application in a period of time that determines its classification.
>
> Biodegradable Plastic: a degradable plastic in which the degradation results from the action of naturally-occurring micro-organisms such as bacteria, fungi, and algae.

(Initial Decision, p. 86 ["the ASTM D883-12 definition of biodegradability"].)

The FTC Green Guides provide general guidance on degradability claims. According to the Green Guides:

> (b) A marketer making an unqualified degradable claim should have competent and reliable scientific evidence that the entire item will completely break down and return to nature (i.e., decompose into elements found in nature) within a reasonably short period of time after customary disposal.
>
> (c) It is deceptive to make an unqualified degradable claim for items entering the solid waste stream if the items do not completely decompose within one year after customary disposal. Unqualified degradable claims for items that are customarily disposed in landfills, incinerators, and recycling facilities are deceptive because these locations do not present conditions in which complete decomposition will occur within one year.

> (d) Degradable claims should be qualified clearly and prominently to the extent necessary to avoid deception about:
>
> > (1) the product or package's ability to degrade in the environment where it is customarily disposed; and
> > (2) the rate and extent of degradation.

(16 C.F.R. 260.8(b)-(d).) This guidance is publicly available and may be the basis for some consumers' expectations about the biodegradability of various plastic products.

As the ALJ recognized, there are "two analytical routes by which Complaint Counsel can prove that Respondents' ads are deceptive or misleading." (*In re POM Wonderful LLC*, No. 9344, 155 F.T.C. 1, at *19 (Jan. 10, 2013); see Initial Decision, p. 234.) First, where an ad implies a particular level of substantiation to reasonable consumers ("establishment claims"), the falsity approach requires Complaint Counsel to show by a preponderance of the evidence that Respondents lacked "clinical proof" to support the challenged claim. (*POM*, 155 F.T.C. at *19; *In re Adventist Health System/West*, No. 9234, 117 F.T.C. 224, 297 (Apr. 1, 1994) [elements of a case "must be established by a preponderance of the evidence"].) The level of proof must be "sufficient to satisfy the relevant scientific community of the claim's truth." (*In re Removatron International Corp.*, No. 9200, 111 F.T.C. 206, 1988 WL 1025512, at *9 (Nov. 4, 1988).)

Second, where the challenged claim is about a product's performance ("efficacy claims"), the reasonable basis approach requires a consideration of multiple factors known as the "*Pfizer* factors" to determine what constitutes a reasonable basis: (a) type of claim, (b) the product, (c) the consequences of a false claim, (d) the benefits of a truthful claim, (e) the cost of developing substantiation for the claim, and (f) the amount of substantiation experts in the field believe is reasonable. (*POM*, 155 F.T.C. at *19-20.)

In *POM*, the FTC disapproved of the ALJ's "consolidat[ion]" of his "analysis of the establishment and efficacy claims." (155 F.T.C. at *19 [the ALJ "appears to have applied the *Pfizer* factors to both types of claims"].)

4. <u>Standard Specifications Provide Different Information Than Testing Methods.</u>

ASTM Standard Specifications outline acceptable test methods and contain specific pass/fail tests to be met before a determination can be made. On the other hand, ASTM Test Methods act as a set of detailed instructions or a lab manual for testing or screening purposes. ASTM Standard Specifications direct users to follow an ASTM Test Method to determine whether or not it meets the specified requirements.

As with "biodegradable" claims, consumers need protection from deceptive advertisements about "compostable" claims. The Green Guides set forth the FTC's current views about "compostable" claims in the section immediately preceding its guidance about "biodegradable" claims. (16 C.F.R. 260.7.) Neither section explicitly identifies a standard or testing method that will definitively satisfy the requirements in the Green Guides. But the scientific community has reached a consensus on the adequacy and reliability of ASTM D6400, a Standard Specification used to test compostable plastics.

ASTM D6400, entitled Standard Specification for Labeling of Plastics to be Aerobically Composted in Municipal/Industrial Facilities, measures conversion of carbon to CO2 for plastics designed to go into a commercial composting facility. (CCX-91 [ASTM D6400-12].) This test includes detailed pass/fail requirements for products that may be identified as commercial compostable plastic, including disintegration during composting, biodegradation at a rate of 60-90% conversion of carbon to CO2 in 180 days, and terrestrial safety.

On the other hand, agreement on how to develop and adopt a similar Standard Specification for landfill biodegradable plastics has eluded the scientific community. Importantly, ASTM D5511, which ECM relies upon here, is not a Standard Specification but a Test Method, and thus does not require products to meet rigorous specified standards. (CCX-84 [ASTM: D5511-12].) ASTM D5511, entitled Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic-Digestion Conditions, is a test method that determines biodegradability of plastics in high-solids anaerobic conditions by measuring the conversion of carbon to CO2. In fact, the scope of the test method expressly states that any results from ASTM D5511 "shall . . . not be used for unqualified 'biodegradable' claims" and claims of performance must "be limited to the numerical result obtained in the test." (CCX-84, Section 1.4.)

5. <u>The FTC Needs to Correct the Deficiencies in the ALJ's Initial Decision.</u>

Unlike stand-alone products, ECM's additives are designed to be sold to other companies that will in turn make various claims of biodegradability on their own products. Therefore, while the ALJ chose to not apply the *Pfizer* factors to ECM's "efficacy claims" (e.g., unqualified claim of biodegradability) because he framed them in terms of the "net impression" created by ECM's Marketing Materials and its Certificate of Biodegradability that its claims of biodegradability are supported by independent laboratory testing (Initial Decision, p. 237), CAW urges the FTC to consider the three types of claims (unqualified claim, qualified - 9 months to 5 years, qualified - some period greater than one year) separately because other companies down the production and sales chain may choose to only display one of the three kinds of claims on its labels.

Here, ECM's pre-2013 unqualified claims of biodegradability included a logo of a tree that simply includes the word "Biodegradable" underneath. This would fall into the category of an "efficacy claim". In contrast, ECM's qualified claim that ECM Plastics would be fully biodegradable in 9 months to 5 years is an "establishment claim" because the claim appears on Marketing Materials that convey independent testing proved the claims. And, although not directly addressed by the ALJ, ECM's qualified claim that ECM Plastics would be biodegradable over a period greater than a year should be considered an "efficacy claim" because the qualification language is designed to appear in small print underneath the tree logo and the word "Biodegradable" without any directly adjacent language referencing scientific studies.

Similarly, while "the parties agree that, applying the *Pfizer* factors, the appropriate level of substantiation . . . is 'competent and reliable scientific evidence,'" we urge the FTC to balance the *Pfizer* factors anew and reach its own independent conclusion about the appropriate level of substantiation for the unqualified claim and the qualified claim of greater than a year. (See Initial Decision, p. 237; Complaint Counsel's Amended Post-Trial Brief, Section II(B)(1)(a), pp. 62-64 [*Pfizer* Factors Analysis].)

a. *The FTC should clear up the ambiguity left by the ALJ's Decision as to the minimum level of biodegradation necessary to support unqualified claims.*

To the extent that the ALJ's decision may be interpreted as: (1) disapproving of the Green Guides' approach to unqualified claims of biodegradability, and (2) approving of the use of a "biodegradable" label without the need for any qualifications or scientific basis as to the length of time in which biodegradation will occur, we urge the FTC to adopt different conclusions. A finding that ECM's unqualified "biodegradable" claims here are not deceptive would effectively eviscerate any meaningful guidance as to how industry should advertise the biodegradable attributes of certain plastics. Under the ALJ's interpretation, as long as a plastic is found to have some level of inherent biodegradability under ASTM D5511, a company can make an unqualified claim of biodegradability. This is misleading to consumers because products that may take hundreds of years to biodegrade could sport the same label and be put in the same category as products that would only take 10 years to biodegrade. The approval of unqualified claims of biodegradability like this would also disincentivize the use of qualified claims, which provide consumers with more information about the length of time a plastic will take to biodegrade, because the addition of fine-print qualified language would then carry with it the taint of being some sort of a "disclaimer" that lessens the validity of the "biodegradable" claim.

According to the FTC Green Guides an unqualified claim is appropriate so long as a product will completely break down and return to nature within a year of disposal. ECM products have previously been found by the Better Business Bureau's National Advertising Division (NAD) to lack sufficient evidence to support both unqualified "biodegradable" claims and a biodegradability claim within 9 to 60 months.[12] Even though the NAD's findings are not binding on the FTC, their findings should be accorded significant weight given NAD's expertise and experience in considering issues similar to the ones in the present case. The NAD Case Reports are the result of a unique, hybrid form of alternative dispute resolution that is known to provide a good forum outside of a courtroom in the industry.

As indicated by the ECM testing data, the Respondent provided data from 38 tests. Of these, 32 provided a definitive level of biodegradation. (Respondent's Pre-Trial Brief, pp. 70-73.) The data, however, showed the overwhelming number of tests generated biodegradation levels of 30% or lower, which is nowhere near complete or 100% breakdown. In fact, only 5 of the 38 tests showed biodegradation levels of 30% or more, and one of those tests took more than

[12] Complaint Counsel's Exhibit CCX-28 (FP International—Biodegradable SUPER 8 Loosefill Environmentally Friendly Packaging, NAD Case Reports No. 5256, p. 18 (closed 12/3/10).

a year. If these levels of biodegradation allow an unqualified claim, then any product will be able to make such a claim by showing low levels of biodegradation. Although the ALJ prohibited the "biodegrade in a landfill in 9 months to 5 years" claim, there needs to be additional guidance on the minimum acceptable levels of biodegradation that would be allowed for an unqualified claim, and also when a claim would need to be qualified instead.

*b. The FTC needs to provide more guidance on qualified claims.*

Because, as the ALJ admits, the current state of science prevents any study from definitively concluding that a material will be biodegradable within a year, claims of biodegradability that follow the Green Guides will have to be qualified claims in the foreseeable future. Therefore, it is critical that the FTC provide clear guidance as to what kind of qualified claims are acceptable. While additional revisions to the Green Guides or to regulations can address this issue eventually, the FTC here can issue a decision that both: (1) prevents ECM's harmful use of a deceptive qualified claim of biodegradability, and (2) clears up the unnecessary ambiguity left by the ALJ's decision as to the appropriateness of a "some period greater than a year" qualified claim. As demonstrated above, a "some period greater than a year" qualified claim by ECM or any other seller of bioplastics is misleading and so broad it is meaningless even if it is not false on its face. If the FTC puts its stamp of approval on the use of this language to qualify "biodegradable" claims, then there will be no incentives for the industry to develop better methods of testing and producing biodegradable plastics since a product that extrapolations from lab tests indicate will biodegrade in 500 years will be able to use the same label as a product that tests show will be likely to biodegrade in 5 years.

In fact, the Green Guides notes that "biodegradable" claims should be qualified "clearly and prominently" in order "to avoid deception" about a product's "ability to degrade in the environment" and the "rate and extent of degradation." (16 C.F.R. 260.8(d).) By using an open-ended claim, ECM's "some period greater than a year" qualified claim leaves no obvious instructions regarding a relevant test period, making it impossible for concerned parties to effectively verify the claim. However, the FTC has the opportunity to clear up any confusion created by the Initial Decision by requiring that qualifications should:

i. Be based on quantitative testing date, not qualitative.

ii. Clearly state the test method, the overall level of biodegradation achieved, as well as the overall timeframe.

iii. Clearly state that no additional biodegradation can be expected beyond the stated timeframe.

iv. This qualification language should be in close proximity to the primary "biodegradable" claim and in a type size that is legible. Appearing on the back of the package in small type, while the claim "biodegradable" is on the front of the package in large type is not appropriate.

For example, an appropriate claim for the product in NE Labs N0946510-01 (RX-398) would take the following form:

| Biodegradable<br>4.9% of this product biodegraded in 15 days using ASTM D5511.<br>No further biodegradation can be expected based on this testing. |
|---|

Respondent's substantiation does not meet the level demanded by the relevant scientific community.

Currently, no Standard Specification exists to determine whether or not a plastic can be considered biodegradable in a landfill. An ASTM working group is working on a proposed Test Method for determining the rate and extent of plastics biodegradation in an anaerobic laboratory environmental under accelerated conditions, but a consensus among the scientific experts at

ASTM has never been agreed upon for any Standard Specification for landfill biodegradable plastics, nor does it seem likely to happen in the near future. As testified by one of the witnesses for the Respondent, it is impractical to test for biodegradability over long periods of time (Initial Decision, p. 278), in a timeframe which would be expected for a simulated landfill condition. In addition, it would be difficult to create one single standard that can emulate the conditions found in each and every operating landfill. CAW believes that a landfill biodegradable standard could only be relevant if tested in real-world, real-time conditions.

The tests that the Respondent relies upon cannot support claims of complete biodegradation in landfills. ASTM D5511 measures biodegradation in anaerobic conditions, conditions which have been determined by the NAD as non-representative of all landfills,[13] and also which do not require a specific rate of biodegradation within a certain timeframe to be met. While scientists have used and will continue to ASTM D5511 to show some level of biodegradation, including in landfills, it is not a measurement of biodegradability, nor as noted in the scope of ASTM D5511 should it be used for unqualified claims (CCX-84).

ASTM D5511 testing does not show biodegradation to completion. Also, considering that biodegradation is a process and biodegradability is an inherent characteristic, tests that indicate a product has some level of biodegradability do not provide information about or assurances as to the length of time it takes for biodegradation to occur. The fact that the scope of ASTM D5511 specifically prohibits its use for unqualified "biodegradable" claims indicates an understanding from the scientific community that some level of qualification is necessary for the claims to be useful.

[13] CCX-28 (FP International, NAD case).

Since ASTM D5511 does not show complete biodegradation unless qualified, the Respondent's claims of scientific proof to establish biodegradability under an unqualified claim are unsubstantiated and conflict with competent and reliable scientific evidence. Therefore, it is also critical that the FTC provide guidance on the use of ASTM D5511 with unqualified claims.

6. The FTC Should Require More Transparency About Test Results.

Qualified or not, "biodegradable" claims are not always accompanied by test results to allow a consumer to examine the claims and verify the results.

Looking at the ECM tests, there is a great deal of variability of test results even amongst similar items as shown in the submitted test results. (Respondent's Pre-Trial Brief, pp. 70-73.) For example, the film samples in Eden 92511B (RX-248) achieved an overall level of biodegradation of 11.5% to 15.2% in 120 days, yet the samples in Eden 070312C (RX-839) achieved a biodegradation level of 7.9% in 154 days (22 weeks). For this reason, it is important that each manufacturer tests their own application and makes claims based only on this data.

In the spirit of transparency, the FTC should require manufacturers to publish their test data on their website or make it readily available to the public in some manner. This would discourage manufacturers from making false claims. And just as important, consumers would no longer have to guess at what the "biodegradable" claim actually means. With easy access to the test results, consumers would be empowered and able to protect themselves from deceptive "biodegradable" claims.

## CONCLUSION

For the foregoing reasons, CAW respectfully requests that the FTC grant Complaint Counsel's Appeal in regards to the issues discussed herein.

Respectfully submitted,

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Counsel for Proposed Amicus Curiae
Californians Against Waste

# Exhibit A

# BIOPLASTICS INDUSTRY OVERVIEW GUIDE

# Executive Summary

The Society of the Plastics Industry
Bioplastics Council

Published April 2012
(Executive Summary Published September 2012)

bioplastics council
a special interest group of spi

**www.bioplasticscouncil.org**

Exhibit A

## COPYRIGHT AND DISCLAIMER



## About the Council

The SPI Bioplastics Council is a special interest group focused on the support of standards development and growth of the bioplastics industry. The Bioplastics Council's mission is to:

- Educate the plastics industry, government and stakeholders.
- Articulate clear and consistent terminology, definitions and descriptions of the different bioplastics options.
- Provide strategic advice to the plastics industry, government and stakeholders and promote harmonization of environmental policies.
- Act as the go to source for information about the bioplastics industry.

Current SPI Bioplastics Council members are: *BASF, DuPont, Ecospan, Jamplast, Metabolix, NatureWorks LLC, Nypro, PolyOne, Teknor Apex and UL*.

For more detailed information about the SPI Bioplastics Council please contact the SPI Bioplastics Council staff at (202) 974-5258 or mhockstad@plasticsindustry.org.

# Introduction

Over the past century, consumers have seen a large growth in the use of plastics to provide lighter and more durable appliances, packaging for safer foods and an increased level of convenience. Over the past 25 years, bioplastics, which are plastics that contain biobased content, are biodegradable, or both, have played an important role in further advancing the industry.

Bioplastics have been of keen interest since the beginning of the 20th century when Henry Ford used corn and soybean oils to manufacture automotive parts. While the 1960s-1980s saw companies investing in bioplastics research and development on both sides of the Atlantic Ocean, in the 1990s several activities in the U.S. occurred to help address the accuracy of bioplastics claims that were being made. In 1992, the U.S Federal Trade Commission (FTC) issued the first *Guides for the Use of Environmental Marketing Claims* (also known as the "Green Guides"). The Green Guides outlined general principles intended to apply to all environmental marketing claims, as well as guidance on specific environmental claims including use of terminology such as "biodegradability." ASTM International developed the first protocol for determining the compostability of materials and products in 1996 (ASTM D6002 – *Standard Guide for Assessing the Compostability of Environmentally Degradable Plastics*) which was followed in 1999 by the ASTM D6400 standard entitled *Standard Specification for Compostable Plastics*. In addition, the Biodegradable Products Institute (BPI) was formed to promote the growth of biodegradable plastics through education and using scientifically-based standards.

In the 21st century, the continued increases in environmental awareness and emphasis on sustainability have become major drivers for bioplastics development and consumption. With the growing interest in bioplastics, the SPI Bioplastics Council was formed to further promote the industry.

# Bioplastics Trends

Many factors are leading the shift toward bioplastics. Consumers are expressing increased interest in green products, healthier lifestyles and restoring the environment. As a result, businesses are reacting to government agencies, non-governmental organizations (NGOs) and consumer demands for more eco-friendly products.

### Shift in Consumer/Corporate Behavior on Environmental Issues

According to the 2011 Cone/Echo Global Corporate Responsibility Survey, 94% of consumers would buy a product that has an environmental benefit and 76% have already purchased an environmental product in the past 12 months (1). These trends will continue to drive the adoption of bioplastics as this industry develops new monomers and polymers in addition to improvements in the overall price/performance spectrum of available products.

### Overall Growth of the Bioplastics Industry

Bioplastics today account for less than 1% of the total global plastics usage. European Bioplastics estimates that the annual global production of bioplastics will increase from 798,070 tons in 2010 to 1.85 million tons by 2015 (2). Currently, the U.S. market for biobased plastics is estimated to be worth more than $490MM (3).





Exhibit A

## Growth by Region

A recent study by European Bioplastics estimated the production capacity by region from 2010 to 2015 as follows: North America is estimated to grow from 26.7% of the total in 2010 to 32.9% in 2015; Europe is estimated to decrease from 26.7% to 18.3% for the same period; Asia is expected to grow from a total of 18.5% to 28.1%; and, South America is expected to decrease from a total of 27.6% to 20.5% (4).

## Growth by Polymer Types

European Bioplastics estimated the top five bioplastics in 2010 by production capacity: bio-polyethylene (bio-PE), biodegradable starch blends, polylactic acid (PLA), polyhydroxy-alkanoate (PHA) and biodegradable polyester. By 2015, bio-PE, PLA, PHA and biodegradable polyester are anticipated to still remain in the top five. However, bio-polyethylene terephthalate (bio-PET) will replace biodegradable starch blends as one of the top five bioplastics (5).

## Innovation of Biobased Building Blocks

One of the largest drivers for innovation in the bioplastics industry today is the use of biobased building blocks. Biobased building blocks can be used to create drop-in replacements for existing petroleum based chemicals or to create new, innovative products and chemistry. A large number of companies are making biobased building blocks. For example:

- BioAmber, a joint venture between U.S.-based DNP Green Technology and France-based ARD (Agro-industries Recherches et Développements) operates a commercial-scale biobased succinic acid plant in Canada in joint venture with Mitsui & Co. and has plans to add another in Thailand with Mitsubishi Chemical and PTT Public Co. in 2015.
- Novomer developed polypropylene carbonate (PPC) resin by combining propylene oxide with CO (carbon monoxide) or $CO_2$ (carbon dioxide).
- DuPont Tate and Lyle are producing bio-PDO (1,3-propanediol) via fermentation.
- Genomatica plans to produce biobased BDO (1,4-butanediol). This monomer is one of the key building blocks to make polyurethane, copolyester, polytetrahydrofuran (THF) fiber and rubber.

## Alternative Feedstock Developments

The current prices for petroleum and natural gas also have spurred the industry to examine alternative feedstocks for the production of various bioplastics. A significant number of companies and organizations are looking into alternative feedstocks. For example:

- NatureWorks is planning to use non-food alternative feedstock from biomass in their new plant to be located in Thailand.
- BASF is looking into replacing one of the key raw materials it uses in production of its biodegradable polyester polymer with a biobased material.

## Development of Higher Performance Bioplastics

While some companies are focused on the building blocks and feedstocks for use in creating bioplastics, other companies are developing high performance bioplastics especially focused on those that can withstand higher temperatures. For example, Teknor Apex has developed a higher heat resistant PLA for injection molding and extrusion/thermoforming. The new resin increases the heat deflection temperature (HDT) of PLA from 55°C to 125°C. PURAC also has announced making stereocomplex PLA for higher temperature performance as the company believes the new stereocomplex PLA should improve the HDT performance from 55°C to 190°C.

In addition, companies such as PolyOne, RTP, Arkema, and Teknor Apex are developing biobased engineering plastics to replace petroleum based engineering plastics such as polycarbonate (PC), acrylonitrile butadiene styrene/PC (ABS/PC) and polyamides.

## Growth Challenges

Despite growth of the bioplastics industry, several obstacles to the industry exist and can be summarized in several major areas including:

1. *Confusion with terminology*. The public at large still lacks a clear understanding of the various bioplastics-related terms and definitions. The situation is compounded by conflicting definitions used within industry. As an example, biodegradable claims are made for products that do and do not completely biodegrade when tested under ASTM or European Standards. These questionable claims may give pause to some brand owners that would have purchased bioplastics but are now hesitant to do so because of the confusion around price, performance and valid definitions.

2. *Lack of infrastructure to capitalize on the alternatives which new bioplastics offer to traditional landfill*. The slow developments of food waste diversion programs as well as a lack of a composting and other industrial biodegradation infrastructure have slowed the acceptance of compostable bioplastics. Although the infrastructure for yard waste composting is well developed nationwide, the number of sites accepting food waste remains limited and is primarily concentrated on the West Coast in states including California, Oregon and Washington. Confusion over the impact of new plastics in the plastics recycling scheme, as well as the lack of a robust recycling infrastructure for the numerous incumbent plastics which already exist in the market today (i.e., PET, HDPE, PVC, LDPE, PP, PS), create perception hurdles for new materials, which in reality are often no different in their recycle stream impact than other unique plastics long in the market.

3. *Limited amount of funding available for bioplastics*. The bioplastics industry has generated very limited public financial interest. Only a few initial public offerings were noted in the industry and few numbers of grants from state and federal agencies have been made available.

4. *Limited availability of biobased feedstocks*. The number of different biobased chemicals remains limited and the available supply is still tight.

## Bioplastics Standards and Certifications

Industry associations have long been used to create necessary safety guidelines, certifications and educational guides, to ensure the proper specification, use and disposal of materials. For the bioplastics industry, certification can be attained by meeting certain standards or requirements established by organizations such as ASTM International, DIN CERTCO in Germany, Japanese

BioPlastics Association in Japan, Vinçotte in Belgium or the Biodegradable Products Institute in the U.S.

**ASTM International**

ASTM International is a U.S. based organization that partners with industry, government, academia and NGOs to develop specific testing guides, methodologies and specifications. Tables 1 and 2 show the current specifications and test methodologies from ASTM dealing with end-of-life for plastics. Note Table 1 shows standard specifications carry pass/fail criteria and reporting, while Table 2 shows test methodologies and results reporting with no pass/fail criteria.

**Table 1: Pass/Fail Standard Specifications Currently Active**

| Test | Purpose | Duration |
|---|---|---|
| ASTM D6400 | Compostability of Plastics | 180 days |
| ASTM D6868 | Compostability of Plastic Coating on Renewable Substrates | 180 days |
| ASTM D7081 | Marine Biodegradability | Up to 365 days |

**Table 2: Test Methodologies**

| Test | Purpose | Data Obtained |
|---|---|---|
| ASTM D5338 | Aerobic Biodegradation of Plastic Materials Under Controlled Composting Conditions | Degree and Rate of Aerobic Biodegradation |
| ASTM D5511 | Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic Digestion Conditions | Test Duration, % Landfill Biodegradation |
| ASTM D5988 | Soil Biodegradability | Test Duration, % Soil Biodegradation |
| ASTM D6691 | Marine Biodegradation | Test Duration, % Marine Biodegradation |
| ASTM D6854 | Oxo-degradability of Plastic Additives | Test Duration, % Oxo-degradation |
| ASTM D6866 | Biobased Carbon Content | % Biobased Carbon Content |

**Biodegradable Product Institute (BPI)**

Certification of compostability is accomplished via the Biodegradable Product Institute's (BPI) third-party, peer review process in North America. The BPI has partnered with NSF International and through them with scientific reviewers, who render decisions on the third-party testing data supplied by companies seeking certification to the existing standard specifications of ASTM.

**Canada, Europe and Japan**

In Canada, certification of compostable products is governed in the province of Quebec by the Bureau of Normalization of Quebec. For Compostable Plastic Bag, Certification Program is BNQ 9011-911/2007 and for Compostable Products, the Certification Program is CAN/BNQ 0017-988**.**

**Certification in Europe** is governed by the European Bioplastics Association using the European Norm (EN) *13432 – Packaging – Requirements for Packaging Recoverable Through Composting and Biodegradation – Test Scheme and Evaluation Criteria for the Final Acceptance of Packaging*. The EN testing specification is similar to the protocol found in ASTM D6400 and ASTM D6868.

In addition, Vinçotte, headquartered in Belgium, developed the OK compost certification program. This program has multiple certifications: OK biodegradable SOIL since 2000; OK compost HOME since 2003; and, OK biodegradable WATER since 2005. In 2009 Vinçotte launched the OK biobased program.

In Japan, the Japanese BioPlastics Association (JBPA) governs the biodegradable standard GreenPla which is also harmonized with the EN 13432 methodologies and specifications. Certification for biodegradable products is managed by the JBPA for use in markets in Japan.

**International Organization for Standardization**
Recently, an International Organization for Standardization (ISO) standard, *ISO 17088 – Specifications for Compostable Plastics*, has been developed to act as a global standard specification for biodegradability under controlled composting conditions.

Overall, standards and certification for bioplastics in the area of renewable carbon content and compostability are well established, vetted and in use. Emerging standards and certification for marine, landfill and anaerobic digester biodegradation are in development. Global certification bodies are well harmonized and working closely to ensure future certification protocols such as ISO standards are well designed. Logo certification programs are growing and their use by municipalities, brand owners and consumers has become the standard in many communities around the world.

## Bioplastics Companies

The current bioplastics market is growing in the number of materials and products as well as manufacturers, compounders, converters and end-users.

## Bioplastics Industry Major Players in North America

**BASF –** BASF offers aliphatic-aromatic co-polyester for both compostable and biobased durable plastics.

**DuPont** – DuPont’s focus area is renewably sourced materials such as Sorona®, Hytrel® RS and Zytel® RS, Biomax® Strong modifier for PLA and Danisco plasticizer.

**Ecospan –** Ecospan is a materials science research, development, and manufacturing company focused on biobased plastics.

**Jamplast –** Jamplast, a North America plastic raw material distributor of biopolymers, engineering polymers and commodity grade thermoplastics.

**Metabolix –**Metabolix manufactures PHA biopolymer using corn, switchgrass, oilseeds and sugarcane.

**NatureWorks LLC –** NatureWorks manufactures a broad range of Ingeo® aliphatic polyesters, today it has over 15 resin grades tailored for both plastics markets and for fibers markets.

**Nypro –** Nypro, a global custom plastics injection molder manufactures plastics as well as bioplastic components for markets such as healthcare, consumer & electronics, and packaging.

**PolyOne –** PolyOne offers biobased color masterbatches, biobased additive masterbatches, compound and thermoplastics polyurethane.

**Teknor Apex –** Teknor Apex product lines consists of Biobased or Sustainable Products; Biodegradable or Compostable resins; Recycled Content and PLA Process Masterbatches.

**UL –** UL is one of the foremost testing and certification companies in the world. UL aims to provide science-based guidance for producers and consumers of biopolymers.

## Bioplastics Production

A diverse range of bioplastics are produced around the world. Bioplastics will vary in terms of production route, characteristics, end uses and applications.

### Bioplastics Classification by Production Route

One way to classify bioplastics is according to the means by which they are produced. One such category is bioplastics based on polymers which are produced directly by an organism. The polymer is then separated from the biomass and has 100% biobased content. The polymer is often compounded or further processed into a usable plastic material. Bioplastics in this group include PHA produced by microorganisms and thermoplastic starch (TPS) produced by plants.

The other grouping is bioplastics based on polymers in which the monomers or other precursors are produced by the organism, which is biobased. Then these precursors are polymerized via conventional chemical polymerization. Examples include PLA from the lactic acid monomer, bio-polyethylene from the bio-ethylene monomer or polyamide 11 from castor oil.

Alternatively, the biobased monomer may be combined with other monomers, biobased or not. One example is PTT, in which biobased propylene glycol is combined with fossil-based terephthalate. Another example is PA 6, 10 in which fossil-based hexamethyl diamine is combined with biobased sebacic acid.

Bioplastics classified by production route may also be produced through the use of biofillers, they include plant-based materials, such as bamboo, kenaf, bagasse and algae biomatter, and animal-based materials.

**Bioplastics Classified by Life Cycle**

Another method for classifying bioplastics is by noting beginning of life and end-of-life characteristics; that is biobased content and biodegradability/compostability as shown in Table 3. Table 4 provides examples of bioplastics by life cycle.

**Table 3: Bioplastics by Definition**

| | Biodegradable | Not Biodegradable |
|---|---|---|
| **Biobased** | Bioplastic | Bioplastic |
| **Non-Biobased** | Bioplastic | Not Bioplastic |

**Table 4: Examples of Bioplastics by Life Cycle**

<table>
<tr><th colspan="2"></th><th colspan="2">End-of-Life</th></tr>
<tr><th colspan="2"></th><th>Biodegradable/Compostable</th><th>Not Biodegradable or Compostable</th></tr>
<tr><th rowspan="3">Beginning of Life</th><th>High biobased content</th><td>PHA<br>PLA<br>TPS</td><td>Bio-PE<br>PA 11</td></tr>
<tr><th>Medium Biobased content</th><td>AAC/PLA blends<br>AAC/Starch blends</td><td>Conventional plastic/bioplastic blends<br>Bio-PET<br>PA 6, 10<br>PTT</td></tr>
<tr><th>Fossil</th><td>AAC, PBAT, PBS</td><td>Conventional plastics</td></tr>
</table>

## Bioplastics Market Segments

Bioplastics are making inroads into a variety of markets, from agricultural applications to medical uses to consumer goods. Below is a brief listing of current and emerging bioplastics market segments:

- *Appliance:* Air conditioning hoses and ducts, covers, filters, housings, fasteners, clips
- *Automotive:* Corrugated tubing, fluid transfer lines, fuel lines, seats materials, trim, wears
- *Bags*: Can lines, leaf bags, trash bags
- *Consumer Electronics:* Cable, connectors, earbuds, exterior housings
- *Furniture*: Arm rests, backs, caps, covers, cushions, seats
- *Lawn & Garden:* Fencing, trellis, trimmer line
- *Loose – Fill Packaging:* Foam protective packaging
- *Medical:* Bottles, containers, drug delivery, labware, packaging
- *Other Markets:* Apparel, building/construction, carpet, consumer goods
- *Other Packaging:* Blisterpacks, caps, closures, cosmetics, shipping containers
- *Pet Products:* Bowls, toys,
- *Tools:* Grips, handles

## Bioplastics Market Growth by Geography

The expected growth of bioplastics over the next few years is substantial because the industry continues to innovate, with new polymers expected to reach markets in a relatively short span of time.

### Europe

Bioplastics have been on the European market for more than two decades. Many of the available products are compostable biowaste bags and loose fill packaging. In addition, the legal framework conditions and strategies in Europe provide incentives for the use of bioplastics which helps stimulate the market.

### North America

The North American bioplastics market continues to experience significant growth due to the addition of new manufacturing facilities. Increased focus on sustainability, such as the sustainability policy, enacted by major brand owners has brought significant attention to bioplastics and the quest for more sustainability in packaging and products.

In addition, initiatives from the Obama Administration are creating a strong momentum for “green technologies.” Also the U.S. Department of Agriculture’s BioPreferred Program, has been a positive step forward in promoting bioplastics at the federal procurement level.

### Latin America

Braskem is the leading player in bio-PE. Dow and Mitsui have also announced the formation of a joint venture to establish a bio-ethanol-based feedstock and supply chain to enable biopolymer production at Dow’s existing polymer plants in Brazil. Braskem also has succeeded in lab-scale production of bio-propylene for bio-PP; a commercial-scale facility to produce bio-PP has been announced to start operation in early 2013.

### Asia Pacific

Various countries in the Asia Pacific region have also begun to implement new regulations that are promoting a move towards the increased use of biobased materials. Although legislative efforts are not intended to be a substitute for reduce, re-use and recycle practices in any country, forward progress has, at times, been limited by unclear or weak enforcement guidelines.

## Summary

The bioplastics market represents an evolution and not a revolution within the plastics marketplace. Like the fossil-based plastics before it, bioplastics will grow as new companies, new materials and new capacities enter the market. Bioplastics should be considered materials that are complementary to existing fossil-based materials, where they offer customers new options based on societal and consumer trends and demands. Bioplastics offer ‘plastic’ materials that are biodegradable, have biobased content, or both and play an exciting role in the growth of the plastics industry.

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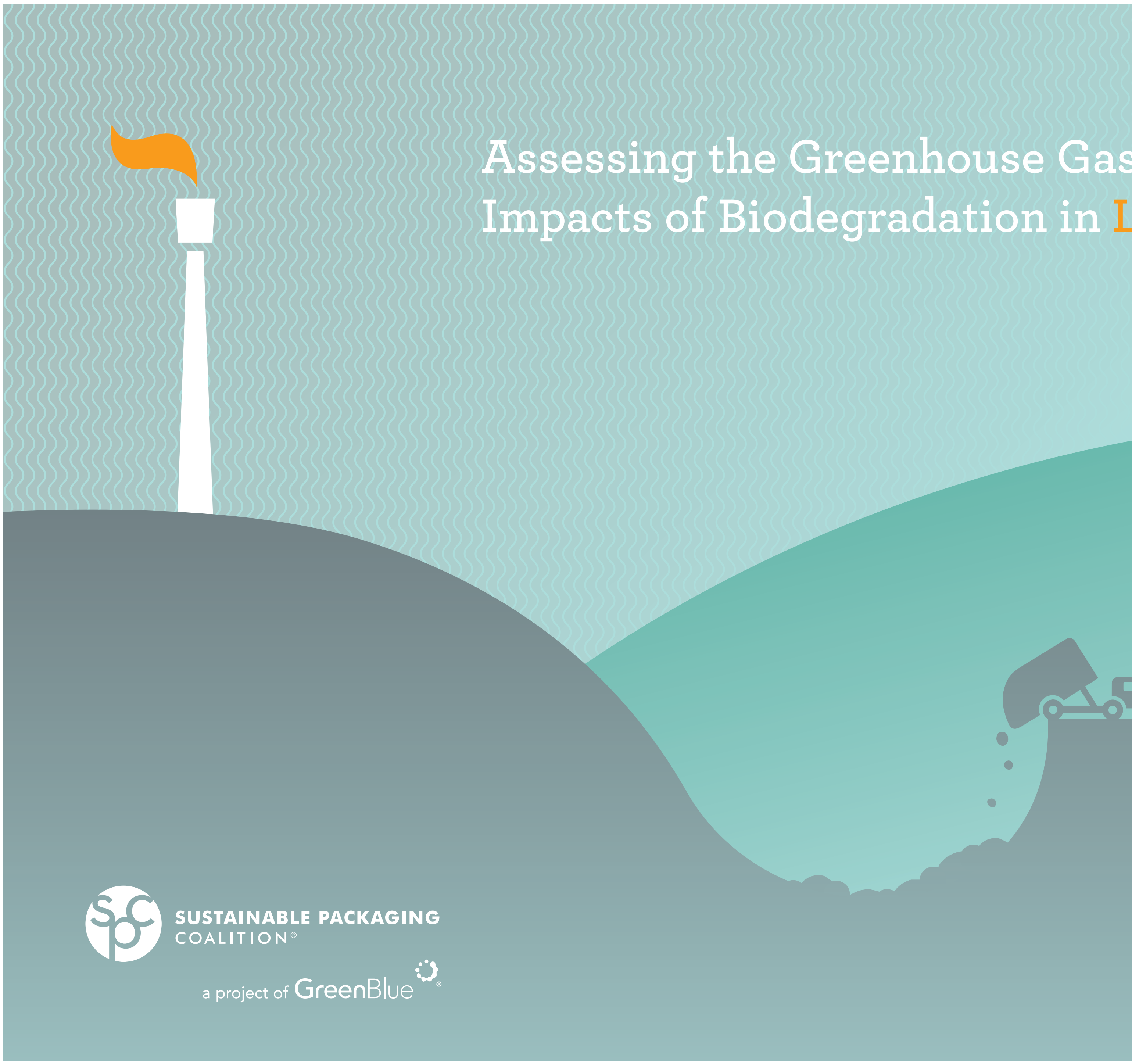
# Exhibit B

# Assessing the Greenhouse Gas Impacts of Biodegradation in L



SUSTAINABLE PACKAGING COALITION®

a project of GreenBlue®

# THE OVERALL GREENHOUSE GAS IMPACT OF BIODEGRADATION IN LANDF

Biodegradation in landfills may incur harmful, neutral, or beneficial greenhouse gas impacts, depending on the fate of the methane that is generated during the biodegradation process.

Any methane emitted to the atmosphere incurs a harmful greenhouse gas impact. Neutral greenhouse gas impacts occur when methane is converted to carbon dioxide by cover soil oxidation or flaring, since carbon dioxide emissions that result from the biodegradation of biogenic carbon are not counted as human-induced greenhouse gas emissions. The only mitigation method that causes biodegradation in landfills to result in a beneficial greenhouse gas impact is the practice of combusting collected methane with energy recovery.

The overall opportunity for biodegradation in landfills to incur a greenhouse gas benefit may be determined by examining a hypothetical scenario in which every landfill collects LFG and uses energy recovery. Assuming average climate conditions and average timeliness of installing a gas collection system for every landfill, 85% of all generated landfill methane would be collected, and 15% of all generated landfill methane would not be collected. A practical maximum limit of the percentage of all generated landfill methane that may be used for energy recovery is 72%, which takes into account the estimated 85% methane utilization ability of energy recovery systems. For this scenario to incur a greenhouse gas benefit, methane oxidation in cover soils must attenuate the uncollected methane to an amount that, once emitted, will incur harmful greenhouse gas impacts that are outweighed by the greenhouse gas benefit of energy recovery.

Assuming that the energy generated by landfill methane would offset the harmful greenhouse gas impacts of grid energy production as determined by a national average, the benefit of recovering energy from 72% of all generated landfill methane would outweigh the harmful greenhouse gas impacts of emitting 10% of all generated landfill methane. Therefore, in order for a greenhouse gas benefit to result from the methane generated by biodegradation in landfills, methane oxidation must reduce the uncollected methane (assumed to be 15% of all generated landfill methane in this scenario) to an amount that is less than 10% of all generated landfill methane. This reduction would require uncollected methane to be attenuated by 33% or more, which is on the upper end of values supported by current scientific research.

Carbon storage of the portion of biogenic carbon that cannot biodegrade anaerobically is an additional benefit of landfills. It is estimated that 18% of the biogenic carbon content of MSW will not biodegrade in landfills (EPA, 2010d). The benefit of storing this amount of carbon in landfills offsets the greenhouse gas impact of emitting 6% of all generated landfill methane. Adding this benefit to the benefit of the maximum possible amount of energy recovery creates a scenario in which biodegradation in landfills would incur a greenhouse gas benefit if methane emissions are limited to 16% or less of all generated landfill methane. Methane emissions are limited to 15% of all generated landfill methane in this hypothetical scenario, so a beneficial greenhouse gas impact is incurred. It should be emphasized that carbon storage is a benefit of the inhibition of biodegradation in landfills, and this benefit increases as the extent of biodegradation in landfills decreases.

The appropriate method of ca
considering the biodegradation
carbon. Because fossil carbon w
from the atmosphere, carbon sto
a benefit and carbon dioxide em
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carbon, such as plastic, were to b
energy recovery systems, it wou
gas benefit unless oxidation in c
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Currently, biodegradation in la
greenhouse gas impact that is ov
it was estimated that only 30% of
methane was used for energy rec
generated landfill methane was e
biodegradation in landfills curren
greenhouse gas impact and a rela
gas benefit. It is theoretically pos
in landfills could someday incur
gas impact, but it is not probable
will be outfitted with optimal ene
foreseeable future, biodegradatio
to continue resulting in a harmfu

*Biodegradation in landfills currently incu harmful greenhouse gas impact and a rel small greenhouse gas benefit.*

Exhibit C

# POSITION PAPER ON DEGRADABLE ADDITIVES

The Society of the Plastics Industry
Bioplastics Council

Published January 2013

SPI Bioplastics Council

www.bioplasticscouncil.org

Exhibit C

## COPYRIGHT AND DISCLAIMER

The SPI Bioplastics Council would like to thank the following individuals for reviewing this document:

**Dr. Morton Barlaz**, Professor and Department Head – Department of Civil, Construction, and Environmental Engineering at North Carolina State University

**Dr. Joe Greene**, Professor of Sustainable Manufacturing and Mechanical Engineering at California State University, Chico

The reviewers provided a review of this document but did not have final approval of the document and do not specifically endorse the document. This page acknowledges their contributions.

**On the topic of "degradable additives," the SPI Bioplastics Council formally updates its 2010 position paper. In this position paper, the SPI Bioplastics Council outlines the issues and questions of concern in order to support consumers, retailers and the plastics industry in identifying unsubstantiated and misleading product claims around degradability and biodegradability of plastics.**

## Definitions

For clarity, a few terms are defined here to prevent confusion.

**Bioplastic***: plastic that is biodegradable, has biobased content or both.*

**Biodegradable Plastic***: a plastic that undergoes biodegradation under specified environmental conditions (a process in which the degradation results from the action of naturally-occurring micro-organisms such as bacteria, fungi, and algae) and within specified degradation time as per accepted industry standards. As of 2013, accepted industry standard specifications include: ASTM D6400, ASTM D6868, ASTM D7081, ISO 17088 and EN 13432.*

**Degradable Plastic***: a plastic designed to undergo a significant change in its chemical structure under specific environmental conditions, resulting in a loss of some properties that may be measured by standard test methods appropriate to the plastic and the application in a period of time that determines its classification.*

**Oxo-Degradation of Plastics***: degradation identified as resulting from oxidative cleavage of macromolecules. (CEN TC249/WG9)*

**Oxo-Biodegradation of Plastics***: degradation identified as resulting from oxidative and cell-mediated phenomena, either simultaneously or successively. (CEN TC249/WG9)*

## Introduction

Terms such as "degradable," "oxo-degradable," "oxo-biodegradable," "oxo-green" and "landfill degradable" are often used to promote products made with traditional plastics supplemented with specific degradable additives. Products made with these technologies and available in the market include film applications such as trash can liners, shopping bags, agricultural mulch films, landfill daily covers and plastic bottles. There are serious concerns amongst many plastics, composting and waste management experts that these products do not meet their claimed environmental promises.

The "degradable additives" are typically incorporated in conventional plastics such as polyethylene (PE), polypropylene (PP), polystyrene (PS), polyethylene terephthalate (PET) and polyvinyl chloride (PVC) during the converting process from polymer pellets to final products. Addition rates vary by type of degradable additive and planned use but are typically below 5%.

These additives are based on chemical catalysts containing transition metals such as cobalt, manganese, iron, etc., or organic materials, which may cause fragmentation as a result of a chemical oxidation of the plastics' polymer chains triggered by ultraviolet irradiation or heat exposure, or outright biodegradation of the organic additive. In a second phase, the resulting fragments are claimed to eventually undergo biodegradation. While there is chemical theory to support a very slow biodegradation process, the absence of light and oxygen as well as the presence of moisture or very low temperatures act as dimmer switches for the process, resulting in a very slow or absent chemical process. This is similar to putting water on a fire. The chemical process is halted and the fire stops.

In addition to additives that trigger the fragmentation process, the “degradable additives” include stabilizers, which are added to limit the unwanted fragmentation of the polymer chains while the plastic is progressing along the value chain from production to warehousing to end use. However, the stabilizing effect of the additives is limited. A peer reviewed research study has concluded that “even with some content of stabilizing additives, PE film [with ‘degradable additives’] loses its mechanical properties rather fast, especially when exposed to sun-light.”[i] For this reason, different storage conditions are required in order to prevent premature ageing and loss of mechanical properties for plastics containing “degradable additives.”

The terms (i.e., “degradable,” “oxo-degradable,” “oxo-biodegradable,” “oxo-green” and “landfill degradable”) suggest that the products can undergo rapid degradation and biodegradation under many different end-of-life conditions. However, the main effect of oxidation is fragmentation, not biodegradation, into small particles, which remain in the environment for an indeterminate amount of time, becoming uncontrollable in terms of their final disposition.

The SPI Bioplastics Council considers the use of terms without reference to existing acceptable standard specifications misleading, and as such are not reproducible and verifiable. Also since no peer reviewed data has been released publicly relating to mineralization rates that support the claims of complete biodegradation for these additive technologies, the term “oxo-biodegradable,” and more specifically biodegradation in general, lacks meaning and is not supported by any recognized industry certifications or third-party peer reviewed scientific data.

In addition, the term “biodegradable” by itself is no more informative than the adjective “tasty,” used to advertise food products. The term “oxo-biodegradable” is an appealing marketing term that is very misleading because the “biodegradation” cannot be verified because of the absence of standard specifications (i.e., an explicit set of requirements to be satisfied by a product with pass/fail criteria well defined).

## Standards and Certifications

There are several internationally established and acknowledged standards and certifications that effectively substantiate claims of biodegradation under certain, specific end-of-life conditions. For compostability there are standard specifications EN 13432, ASTM D6400, ASTM D6868 and ISO 17088 (note: full titles are listed in Table 1 below). Complete biodegradation levels under industrial composting conditions in less than six months must be proven, according to these specifications. The specification of time needed for the ultimate biodegradation is an essential requirement for any third-party tested and certified biodegradability claim. For the bioplastics industry, certification of industrial compostability can be attained by meeting certain standards or requirements established by accredited organizations such as ASTM International, the International Organization for Standardization (ISO) and the European Committee for Standardization (CEN). The published standards are then used to certify materials and products by several other organizations including DIN CERTCO in Germany, the Japanese BioPlastics Association in Japan, Vinçotte in Belgium, the Bureau de normalisation du Québec (BNQ) in Canada, the Australasian Bioplastics Association in Australia/New Zealand or the Biodegradable Products Institute (BPI) in the U.S. These certification agencies use well-researched and vetted test specifications to establish third-party, peer reviewed programs to confirm the end-of-life performance of bioplastic materials following the requirements of the standard specifications.

With the ongoing development of new materials, standards and certifications for other end-of-life scenarios have or are in the process of being developed. ASTM has approved ASTM D7081 for the marine environment end-of-life and uses the term marine biodegradable. At this time the testing done on “degradable additives” often refers to ASTM D5338 and D5511, but these standard test methods are not standard specifications, do not take the material to complete biodegradation, and contain no pass or fail criteria established by the industry for rate, time or amount of biodegradation. Tables 1-3 provide examples of test specifications, guides and methodologies as well as an explanation to the proper use of each term.

**Table 1: List of Standard (Pass/Fail) Specifications Discussed in the Position Paper***

| Test Specifications | Title | Duration |
|---|---|---|
| ASTM D6400 | Standard Specification for Labeling of Plastics Designed to be Aerobically Composted in Municipal or Industrial Facilities | 84 days disintegration; 180 days mineralization |
| ASTM D6868 | Standard Specification for Biodegradable Plastics Used as Coatings on Paper and Other Compostable Substrates | 84 days disintegration; 180 days mineralization |
| ASTM D7081 | Standard Specification for Non-Floating Biodegradable Plastics in the Marine Environment | Up to 365 days |
| EN 13432 | Requirements for Packaging Recoverable Through Composting and Biodegradation – Test Scheme and Evaluation Criteria for the Final Acceptance of Packaging | 84 days disintegration; 180 days mineralization |
| ISO 17088 | Specifications for Compostable Plastics | 84 days disintegration; 180 days mineralization |

*Note: Standard specifications carry pass/fail criteria and reporting.

**Table 2: Example of Test Guides****

| Test Guides | Title |
|---|---|
| ASTM D6954 | Standard Guide for Exposing and Testing Plastics that Degrade in the Environment by a Combination of Oxidation and Biodegradation |

**Note: Test guides provide a framework or roadmap of steps, criteria, procedures or a general approach but provide no pass/fail guidance on how to qualify results of the tests.

**Table 3: Examples of Test Methodologies*****

| Test Methodologies | Purpose | Data Obtained |
|---|---|---|
| ASTM D5338 | Aerobic Biodegradation of Plastic Materials Under Controlled Composting Conditions | Degree and Rate of Aerobic Biodegradation |
| ASTM D5511 | Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic Digestion Conditions | Test Duration, % Landfill Biodegradation |
| ASTM D5988 | Soil Biodegradability | Test Duration, % Soil Biodegradation |
| ASTM D6691 | Marine Biodegradation | Test Duration, % Marine Biodegradation |
| ASTM D6866 | Biobased Carbon Content | % Biobased Carbon Content |

***Note: Test methodologies provide standardized guidelines on how to conduct testing but provide no pass/fail guidance on how to qualify results of the tests.

## Guidance on Marketing Claims for Biodegradation

The U.S. Environmental Protection Agency (EPA) notes that "municipal solid waste (MSW) landfills are the third-largest source of human-related methane emissions in the United States, releasing an estimated 27.5 million metric tons of carbon equivalent to the atmosphere in 2009 alone."[ii] In addition, EPA estimates that only about 35% of municipal solid waste goes to landfills that capture methane for energy use. EPA estimates that another 34% of landfills capture methane and burn it off on-site, while 31% allow the methane to escape.[iii]

Dr. Morton Barlaz and James Levis of North Carolina State University modeled global warming potential (GWP) of food waste disposed of and decomposed through different end-of-life means. Industrial composting was found to have a lower GWP than landfills without gas collecting and landfills with gas collecting but not energy recovery. But, anaerobic degradation (assuming energy recovery) and landfills with gas collection and energy recovery were modeled to have lower GWP than industrial composting. That is, end-of life options with energy recovery have the lowest GWP. However as noted above, only 35% of landfills utilize energy recovery at this time. It is anticipated that landfills that encourage anaerobic digestion and energy recovery will be increasingly common.

Overall, landfill biodegradation claims as a positive factor are misleading as noted in several reports. In another peer reviewed journal article by Dr. Barlaz and Mr. Levis entitled, “Is Biodegradability a Desirable Attribute for Discarded Solid Waste? Perspectives from a National Landfill Greenhouse Gas Inventory Model,”[iii] highlighted research using a life-cycle accounting of the greenhouse gas (GHG) emissions associated with discarding waste in both national-average and state-of-the-art landfills. The results of this research show that disposing of mixed municipal solid waste in a state-of-the-art landfill is carbon negative, but disposing of similar waste in a national-average landfill leads to positive GHG emissions. The results of this analysis also show that the more degradable a material is, the greater the GHG emissions it generates when disposed in a landfill. As Mr. Levis, one of the study authors, notes in a follow-up opinion letter written to industry trade publications, “the best material to have in a landfill, from a GHG emissions standpoint, is one that does not degrade at all.”[iv] In addition, using her own “landfill math,” Dr. Sally Brown of the University of Washington stated that when it comes to organics, it is clear that “keeping these [residual] organics out of the landfill is the environmentally best answer, hands down.”[v, vi]

Some companies note that while their products are intended for non-landfill end-of-life options (e.g., industrial composting), products may end up in a landfill. A recent peer-reviewed article appearing in the journal of *Polymer Degradation and Stability* concluded that Ingeo™ biopolymer (i.e., polylactic acid (PLA) biopolymer from NatureWorks LLC) is essentially stable in landfills with no statistically significant quantity of methane released. This “conclusion was reached after a series of tests to ASTM D5526 [“Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under Accelerated Landfill Conditions”] and ASTM D5511 [“Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic-Digestion Conditions”] standards that simulated a century's worth of landfill conditions.”[vii] While Ingeo™ PLA resin is not intended for disposal in a landfill, its behavior in a landfill demonstrates that one cannot broad-brush all bioplastics into one category or with the same set of performance characteristics.

In October 2012, the U.S. Federal Trade Commission (FTC) issued its revised *Guides for the Use of Environmental Marketing Claims*, also known as the “Green Guides.” The Guides’ section on “degradable claims” which the FTC notes is applicable to oxo-degradables, oxo-biodegradables and similar claims states that (a) marketers may make an unqualified degradable claim <u>only if</u> they can provide that the “entire product or package will completely break down and return to nature within a reasonably short period of time (defined as within one year) after customary disposal and (b) “unqualified degradable claims for items that are customarily disposed in landfills, incinerators and recycling facilities are deceptive because these locations do not present conditions in which complete decomposition will occur within one year.”[viii]

Additionally, the U.S. National Advertising Division (NAD) of the Council of Better Business Bureaus has recommended that advertisers discontinue claims such as “100% oxo-biodegradable or degradable” because such statements incorrectly suggest that a plastic will quickly or completely biodegrade with the help of these additives. In fact, the NAD and FTC have taken action against companies using the additive technology for “oxo-biodegradables” and using the word “biodegradable” for marketing purposes for making false and unsubstantiated claims.[ix]

## Peer Testing of Degradable Additives

Other organizations such as the BPI have tested bottles[x,xi,xii,xiii] and bags[xiv,xv] containing degradable additives, to confirm claims made about the biodegradability of the product. In the case of the bottles that were tested using ASTM D5511, BPI noted that "after 60 days, the bottle achieved an overall biodegradation total of 4.47% or 10% of the positive control. Moreover, the biodegradation process has stopped, as the gas generation curve has plateaued. Per ASTM D5511-11, the results of this test cannot be extrapolated to claim that the bottle will fully biodegrade in the future." In the case of the bags that were tested using ASTM D5511, BPI noted that "after 60 days, the bags achieved an overall biodegradation total of 0.16% or less than 1% of the positive control. Additionally, the biodegradation process has stopped, as the gas generation curve plateaued. This marks the second 60 day test showing that the overall level of biodegradation stopped before the end of the test in products made from traditional resin that incorporate 'organic' biodegradable additives."

## Fragmentation Is Not the Same as Biodegradation

Fragmentation of "degradable additives" for plastics is not the result of a biodegradation process but rather the result of a chemical reaction. The resulting fragments will remain in the environment.[xvi] Fragmentation is not a solution to the waste problem, but rather the conversion of visible contaminants (such as bags, cutlery, packaging) into invisible contaminants (plastic fragments). This is generally not considered a feasible solution to plastic waste, as the behavioral problem of pollution by discarding waste in the environment could be even stimulated by these kinds of product claims. Furthermore, while plastic products can be collected once in the environment, plastic fragments at very small levels are impossible to collect or control. A study by Woods End Laboratories and Eco-Cycle entitled "Micro-Plastics in Compost," proposed that "only products that meet ASTM D6400, EN 13432 or BPI [Biodegradable Products Institute] standards should be allowed in food waste collection programs."[xvii]

## An Answer to Littering or the Promotion of Littering?

"Degradable additives" for plastic products have been described as a solution to littering problems, whereby they supposedly fragment in the natural environment. In fact, such a concept risks increasing littering instead of reducing it. The United Nations Environment Program (UNEP) stresses that littering is a behavioral problem and must be resolved by raising environmental awareness and by the establishment of appropriate waste management systems.[xviii] "Degradable additives" for plastics are not specified as a solution by UNEP. Long standing efforts for the prevention of littering could actually be damaged by giving users of plastic items the impression that those items might vanish harmlessly if discarded into the environment. In fact, even food waste littering can be cited in many states and fined, even though the food waste is completely biodegradable.[xix]

## Accumulation of Plastic Fragments Bears Risks for the Environment

If "degrading" plastics are littered and end up in the landscape they are supposed to start to disintegrate due to the effect of the additives that trigger fragmentation and ultimately biodegradation. Consequently, plastic fragments would be spread around the surrounding area.

As ultimate biodegradability has not been demonstrated for these fragments,[xx] there is substantial risk of accumulation of persistent substances in the environment.

Through the impact of wind or precipitation the plastic fragments can drift into aquatic or marine habitat where they affect organisms and pose the risk of bioaccumulation. In addition, studies by the U.S. National Oceanic and Atmospheric Administration have shown that these degraded plastics can attract toxic chemicals such as PCB, DDE and others from the environment and act as transport medium in marine environments.[xxi] Such persistent organic pollutants in the marine environment were found to have negative effects on marine resources.[xxi]

## Organic Recovery Is Not Feasible

Collection and recovery schemes for organic waste are likely to suffer from the use of "degradable additive" containing products, if they are not biodegradable under current biological treatment processes such as composting or anaerobic digestion. These materials are reported to not meet the requirements of organic recovery via composting,[xxii] but are often selected by consumers because of misleading advertising and low cost. Reduction in quality of finished compost or digestate is likely should the degradable additive containing product not meet the requirements for biodegradation.

Regrettably, sometimes the "degradable" products have been publicized as "biodegradable" and "compostable," despite not meeting the standard specifications for organic recycling via composting. The terms oxo-biodegradable, oxo-degradable and the like can be taken by the consumers as synonyms of "biodegradable and compostable" and be erroneously recovered via organics recycling. This is why the Italian Antitrust Authority in 2005 sanctioned a retailer distributing "100% degradable" shopping bags made with PE supplemented with degradable additives.[xxiii]

This can lead to a general mistrust by consumers and composting plant managers towards the whole sector of certified biodegradable plastics and thus lead to a lack of acceptance of certified biodegradable and compostable materials. Therefore, well-developed and broadly accepted certification programs according to ASTM D6400 in the U.S. or EN 13432 in Europe or equivalent standards should be applied.

In the interest of the best recovery of organic waste such as food and yard debris, the involvement of "degradable" materials in such recovery programs should be avoided.

## Plastic Recycling Programs Are Disturbed

A further environmentally feasible option for the handling of used plastics is that of traditional recycling or repurposing. "Degradable additive" containing products often hamper recycling of post-consumer plastics. In practice, the "degradable additive" containing plastics are traditional plastics, such as PE, PP and PET. The only difference is that they incorporate additives which affect their chemical stability. Thus, they are identified and classified according to their chemical structure and finish together with the other plastic waste in the recycling streams. In this way, they bring their "degradable additives" to the recyclate feedstock. As a consequence the recyclates may be destabilized causing unexpected and premature degradation of products produced from the recyclate, which will hinder acceptance and lead to reduced value.[xxiv, xxv]

## Conclusion

The position of the SPI Bioplastics Council is that any claim, especially claims for consumers, needs to be supported by third-party vetted scientific evidence based on well-established standard specifications. In the case of "degradable additives" the problem is one of claiming "biodegradation" where there is no evidence to support those claims or prove biodegradability as per accepted, third-party vetted specifications. Allowing the brand owner, retailer or ultimately the consumer to decide what they consider a "biodegradable" product to be is risky, as this would lead to varying definitions that would only lead to greater consumer confusion. As the biodegradable and compostable "end-of-life" products continue to grow along with organic waste diversion from landfill programs, it is the duty of the industry to provide clear, substantiated scientific third-party certifications that will assure stakeholders that the products offered meet their requirements for end-of-life disposal and offer real value in their intended use.

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# Exhibit D

For Immediate Release

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# DEGRADABLE ADDITIVES PROVIDE POOR END-OF-LIFE OPTION FOR PET PACKAGING, SAYS NAPCOR

## *PET Trade Organization Opposes Their Use, Citing Continued Lack of Data*

***May 3, 2011, Sonoma, CA*** -- The National Association for PET Container Resources (NAPCOR) today reiterated its position on degradable additives, confirming its opposition to their use in all PET packaging. The PET trade organization had previously urged caution in the use of these additives (May 2009), citing lack of data about potential effects on PET recycling. NAPCOR's decision to reaffirm its public stance on this issue was prompted by continued new package introductions and related claims, without adequate new data demonstrating additives' efficacy as an end-of-life strategy, or their effects on recycling.

"There is still insufficient evidence that these additives do 'no harm' to the PET recycling stream under real-life conditions, nor is there data to confirm that the lifespan and functionality of the many next-use products made from recycled PET won't be adversely affected," said Tom Busard, NAPCOR's Chairman. "This is of serious concern to the PET packaging and recycling industries."

Degradable additives are commonly added during the production of plastic packaging in order to promote degradation of that packaging under certain circumstances. These additives are impossible to detect visually, or through any commonly used recycled material sorting technologies. NAPCOR maintains that the use of degradable additives in PET packaging not only jeopardizes PET recycling due to unknown potential consequences, but runs counter to the principles of sustainability and sound environmental stewardship, making it a poor end-of-life option:

- Increases GHGs emitted in landfills and elsewhere;
- Squanders value of the energy inherent in a plastic package that would be captured through recycling and re-converting to a new end-use application;
- Provides no nutrient value to the environment in which it decomposes;
- Endangers post consumer plastic recycling for those resins in which the additive is used;
- Solves no solid waste management problems, including litter.
  (A study recently released by NSF International indicates a biodegradation total of less than 5% after 60 days for the additive-containing bottle(s) tested. For link to full report: http://www.bpiworld.org/BPI-Public/News/Article.html?mode=PostView&bmi=513259 )



Exhibit D

Concern about the integrity and safety of products made from recycled materials containing degradable additives, and the lack of data on their potential effects on the PET recycling stream, prompted the plastics recycling trade organization, The Association of Postconsumer Plastic Recyclers (APR), to develop and publish test protocols in early 2010, "Degradable Additives and PET Recycling Technical Compatibility Testing Guidance." (Find these protocols at http://www.plasticsrecycling.org/technical-resources/testing/degradable-additives-testing-for-pet )

"Although some data have come in, they are not sufficient to remove doubt about the potential effects of these additives," said APR Technical Director David Cornell. "Since the protocols were made public about a year ago, only a very small percentage of the manufacturers that market these products have made public any data on recycling effects. We are far from assured these products do no harm. On the contrary, we have serious and legitimate concerns that continue unanswered."

In 2009, over 1.4 billion pounds of post consumer PET containers were recycled in the United States. The post consumer PET recycling infrastructure depends on the quality of the recyclate and its suitability for a variety of next-life product applications. The value of recycled materials is an important economic driver for curbside recycling programs throughout the country; successful recycling creates jobs, as well as an energy and resource-efficient source of raw material. Additives with unknown consequences put this entire system at risk – and for no practical, data-supported environmental or solid waste management gain.

NAPCOR calls upon product stewards and packaging decision makers to refrain from using degradable additives, except where specified by law, and reiterates its call for all stakeholders to fully consider the impacts behind the use of these additives, both in the context of meaningful marketing claims, and in light of the broader issues of sustainability, climate change, and resource conservation.

# # #

Founded in 1987, NAPCOR is the trade association for the PET plastic packaging industry in the United States and Canada. NAPCOR is committed to being the credible voice and champion of the PET industry; to facilitating solutions to PET recycling; and to communicating the attributes of PET, an environmentally sustainable package. For more about NAPCOR, or to contact NAPCOR staff, visit www.napcor.com.

# Exhibit E

***Contractor's Report to the Board***

# Performance Evaluation of Environmentally Degradable Plastic Packaging and Disposable Food Service Ware - Final Report

*June 2007*

**Produced under contract by:**

California State University
Chico Research Foundation

Exhibit E

# Executive Summary

As a way to conserve resources, reduce waste, and eliminate litter that harms marine life, the people of California, green businesses, environmental organizations, and local governments are increasingly interested in alternatives to the use of plastic bags and disposable food service ware. In response, a growing number of manufacturers are offering plastic products and packaging which they claim will decompose naturally in the environment or through composting. The growing presence of these new plastics raises a number of important questions for consumers and policymakers.

In response, the California Integrated Waste Management Board (CIWMB) contracted with California State University (CSU), Chico to study and report on the following:

- The designed-use performance and compostability of commercially available products and packaging that claim to be "compostable" and "degradable."
- The degradability of several commercially available compostable plastics under laboratory conditions.
- How well degradable plastic products decompose in actual composting facilities and in a simulated marine environment.
- The potential for degradable plastics to contaminate conventional recycled plastics.

### Test Products and Facilities

The researchers tested several commercially available degradable plastic products in six different composting environments and a simulated marine environment. The composting environments included a laboratory and actual facilities composting greenwaste, cow manure and straw, food waste, municipal solid waste, and an enclosed "in-vessel" facility in the absence of oxygen. The possible effects of contamination were examined by chemically and mechanically testing molded blends of degradable plastics and recycled plastics.

### Research Results

The following results are based on the experimental conditions described in this report:

1. All of the products tested, except those that degrade in sunlight or oxygen, disintegrated satisfactorily in commercial composting operations within 180 days. Specifically, a minimum of 60 percent of the organic carbon converted to carbon dioxide by the end of the test period. See Table 1.

2. For all products, the measured amounts of lead and cadmium in finished compost were less than one percent of maximum allowable levels.
3. The polylactic acid (PLA) straws, polyhydroxy alkanoate (PHA) bags, Ecoflex bags, sugar cane plates and corn starch based trash bags released no toxic materials into the compost and successfully supported the growth of tomato seedlings after ten days.
4. The PLA lids, PHA bags, Ecoflex bags, Husky bags and corn starch based trash bags degraded completely in the enclosed "in-vessel" composting facility. However, oxodegradable and uv-degradable bags, low-density polyethylene (LDPE) plastic bags, sugar cane lids, and Kraft paper did not degrade.
5. The PHA bags experienced some disintegration in ocean water; all the other products did not disintegrate at all.
6. Biodegradable plastics and plastics that degrade in oxygen or sunlight reduce the quality and impair the mechanical properties of finished products manufactured with recycled content.

# Current Standards for Biodegradable Plastics

Several worldwide organizations are involved in setting standards for biodegradable and compostable plastics, including: American Society for Testing and Materials (ASTM), European Committee for Standardization (CEN), International Standards Organization (ISO), German Institute for Standardization (DIN), Japanese Institute for Standardization (JIS), and British Plastics Federation. The standards set by these organizations have helped the industry create biodegradable and compostable products that meet the increasing worldwide demand for more environmentally friendly plastics. [32]

Germany, the United States, and Japan are cooperating in developing certification schemes to enable international cross-certification of products, so that a product certified in one of these countries would automatically be eligible for certification in another.

## *United States*

In the US, ASTM D6400 is the accepted standard for evaluating compostable plastics. The ASTM D6400 standard specifies the procedures for certifying that compostable plastics will degrade in municipal and industrial aerobic composting facilities over a 180-day time period.[33] The standard establishes the requirements for materials and product labeling, including packaging made from plastics, to be designated as "compostable in municipal and industrial composting facilities." The standard determines if plastics and products made from plastics will compost satisfactorily, including biodegrading at a rate comparable to known compostable materials. The standards assure that the degradation of the materials will not contaminate the compost site nor diminish the quality of the finished compost.

ASTM D6400 utilizes ASTM D6002 as a guide for assessing the compostability of environmentally degradable plastics, in conjunction with ASTM D5338 to determine aerobic biodegradation under controlled composting conditions. ASTM D6400 specifies that a satisfactory rate of biodegradation is the conversion of 60 percent of the organic carbon in the plastic into carbon dioxide over a time period not greater than 180 days. If a biodegradable polymer does not meet the requirements listed in ASTM D6400 or EN13433, then it is not considered compostable. It must degrade in the specified time frame without leaving any residuals in the compost. [34]

In this research, ASTM D6400 was followed when testing the compostability of several rigid packaging containers, bags, and cutlery that are made from biodegradable and compostable plastics.

Compostable plastics are being used safely in the United States with the help of a certification program and the establishment of ASTM D6400 standards. BPI and the US Composting Council (USCC) established the Compostable Logo program in the United States.[35] The BPI certification demonstrates that biodegradable plastic materials meet the specifications in ASTM D6400 and will biodegrade swiftly and safely during municipal and commercial composting. Several degradable plastics, which are available for composting, were certified "compostable" in 2002. [36] The "compostable" logo helps consumers to identify which products meet the ASTM D6400 standard. [37] To ensure objectivity, verification of the ASTM standard is accomplished through an independent third-party consultant selected by the manufacturer.

Biodegradation of biodegradable plastics in marine environment is based upon ASTM D6691 and ASTM D7081. ASTM D6691 is a test method for determining aerobic biodegradation of plastic materials by a defined microbial consortium in the marine environment. ASTM D7081 is a standard specification for non-floating biodegradable plastics in marine environments. Both standards also require measuring the amount of $CO_2$ generated during the degradation process. A test sample demonstrates satisfactory biodegradation if after 180 days, 30 percent or more of the sample is converted to carbon dioxide.

As shown in Table 8, the heavy metal limits in the European standard are more stringent that those listed in the US standards.

# Exhibit F

# Bioplastics in California

## Economic Assessment of Market Conditions for PHA/PHB Bioplastics Produced from Waste Methane

CalRecycle

California Department of Resources Recycling and Recovery

September 30, 2013

Contractor's Report
Produced Under Contract By:

David Roland-Holst
Ryan Triolo
Sam Heft-Neal
Bijan Bayrami

University of California, Berkeley

Exhibit F

# Executive Summary

In 2010, approximately 31 million tons of plastic waste was generated in the United States, which accounted for approximately 12.4 percent of total municipal solid waste in that year.[1] The environmental challenges associated with the production and disposal of conventional plastics are significant and substitution of such plastics with biobased alternatives may help mitigate some of these impacts.

Bioplastics, including biobased plastics (polymers made from renewable resources such as corn), have been introduced into the world market as an alternative to oil-based plastics. Although bioplastics currently represent a small proportion of aggregate plastic consumption worldwide, the market share of biobased polymers is increasing. According to some estimates, global bioplastic production was approximately 890,000 metric tons in 2012 and is forecasted to grow at a compound annual growth rate of 25 percent through 2017 reaching more than 2.5 million metric tons.[2]

In addition to existing production methods for manufacturing plastics from non-petroleum feedstocks, a new technology under development by Stanford University may provide yet another means of creating plastic products – from waste. This method would not rely on natural resources or food crops. Researchers at Stanford University have developed a process by which methane ($CH_4$), captured at solid waste landfills or wastewater treatment facilities (WWTFs), can be utilized as a feedstock to produce a polyhydroxybutyrate (PHB) polymer resin. The *Stanford Process*, if optimized at a commercial scale, has the potential to create a market in California for closed-loop plastic production made from waste. In this report we assess the market outlook for these plastics and the economic feasibility of a small-scale PHB production facility in the state, co-located at an existing waste treatment site.

The database and model developed for this study included 118 California solid waste landfills and 144 WWTFs. We find that of these, 49 landfills and 10 WWTFs already have, or could likely attain, sufficient methane capture to produce at least 1,000 metric tons of PHB polymer resin per year.

Certain characteristics of landfill and WWTF locations will be critical when assessing locations for the construction of a PHB production facility. The five most critical characteristics are:

- Facility size (measured in total waste in place or average dry weather flow for landfills and WWTFs, respectively).
- Current generation status (whether $CH_4$ is currently used for power production and if so, what percentage of total $CH_4$ available is used).
- Location and installed power transmission infrastructure.
- Current $CH_4$ capture and power generation contract status.
- Volume of excess $CH_4$ currently captured and flared.

Optimal sites are likely to be mid-sized facilities that may or may not currently capture $CH_{4,}$ but do not generate electricity and thus are not subject to contractual agreements with local utilities for power generation. PHB resin production may offer an alternative means by which to utilize waste methane and turn it into a value-added product that can easily be transported, for facilities that have limited access to power transmission infrastructure,

We conducted an analysis to determine the economic viability of a 1,000 metric tons annually (kt p.a.) PHB production facility located at a California landfill or WWTF. The results of our model suggest that such a facility could be economically viable within a range of conditions. Using the baseline parameters explained in this report, we find that a production facility has a positive net present worth (NPW)* for any PHB resin price above $1.17/kg ($0.53/lb). This value is highly sensitive to our modeling assumptions and we have carried out a variety of sensitivity analyses in order to determine the degree to which our assumptions will affect the NPW of a facility.

Sensitivity analyses were performed to assess the impact of the following parameters on the project NPW:

- The Stanford estimated PHB yield and energy requirements.
- Energy procurement method and landfill gas (LFG) collection status.
- Equipment capital costs and annual operating and maintenance (O&M) costs (including labor).
- Polymer extraction and nutrient costs.
- PHB price.

Our model suggests that the greatest sensitivity lies in the costs associated with PHB price and the extraction process. Researchers at Stanford University are working to determine the most economically viable method of extraction; however, within the context of this modeling methodology, we can determine the effect of extraction costs on a dollars-per-unit PHB basis. With our baseline parameters, we find that if extraction costs are below $1.68/kg PHB the production facility may be economically viable.

Subject to process assumptions included in this report we find that implementation of such a PHB production facility could potentially be economically viable. However, this analysis should not be used in the absence of a rigorous site-specific engineering assessment, which would be required to determine a detailed cost estimate of a PHB production facility.

* Net present worth is the present value of the net cash flow for each year of the project summed over the project lifetime. This calculation is sensitive to the selected discount rate. Discount rate definition and assumptions in the model created for this report are discussed below.

**CERTIFICATE OF SERVICE**

I, Rachel N. Jackson certify that on February 27, 2015, as required by FTC Rules of Practice 4.2(c) and 4.4(b), I caused the foregoing Motion of Californians Against Waste for Leave to File *Amicus Curiae* Brief in Support of the Position of Complaint Counsel to be served and filed as follows:

The original and 12 paper copies via first-class mail and one electronic copy via email to the Office of the Secretary:

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I declare under penalty of perjury that the foregoing is true and correct and that this Certificate of Service was executed on this 27th day of February, 2015, at Sacramento, California.

Rachel N. Jackson

Notice of Electronic Service for Public Filings

**I hereby certify that on February 27, 2015, I filed via hand a paper original and electronic copy of the foregoing Motion of Californias Against Waste for Leave to file Amicus Curiae Brief and Amicus Curiae Brief, with:**

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**I hereby certify that on February 27, 2015, I filed via E-Service of the foregoing Motion of Californias Against Waste for Leave to file Amicus Curiae Brief and Amicus Curiae Brief, with:**

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