EXHIBIT 1A

ECM BIOFILMS

Additives for Manufacturing Biodegradable Plastic Packaging and Products

1-888-220-2792 U.S.A. TOLL FREE

Transform any Plastic into Biodegradable Plastic!

ECM BioFilms, Inc. is a manufacturing company founded in 1998, which is dedicated to developing and revolutionizing the plastics market by offering an additive to standard plastic resins making them biodegradable. These biodegradable plastic products are priced competitively with, and have the same mechanical characteristics as, traditional non-degradable products.

The revolutionary additive technology, when combined as a one-percent load to the most widely-used plastic resins, renders the finished plastic products biodegradable while maintaining their other desired characteristics. The potential uses of this technology are limited only by the imagination.

ECM's mission is to constantly provide the best possible value to its customers and suppliers while dedicating efforts towards eliminating disposal and environmental issues surrounding the plastics industry.

Sitemap

Website design and development by 78 Design House

ECM BIOFILMS

Additives for Manufacturing Biodegradable Plastic Packaging and Products

Green Impact

Many organizations (among them, Greenpeace and The Environmental Research Foundation) have claimed that plastics and the consumer acceptance of plastics is declining...mainly because businesses and organizations don't know what to do with the plastics after use. In fact, the Society of Plastics Industries' Larry Thomas has stated:

According to the Clean Air Council:

- In the U.S., 4.39 pounds of trash per day and up to 56 ton of trash per year are created by the average person.
- Only about one-tenth of all solid garbage in the United States gets recycled.
- Every year we fill enough garbage trucks to form a line that would stretch from the earth, halfway to the moon.
- Each day the United States throws away enough trash to fill 63,000 garbage trucks.
- Almost 1/3 of the waste generated in the U.S. is packaging
- Americans throw away 2.5 million plastic bottles every hour.
- Every year, Americans make enough plastic film to shrink-wrap the state of Texas.
- Seventy percent of U.S. municipal solid waste gets buried in landfills.

READ MORE...

CLEAN AIR COUNCIL
Our waste, from paper and soda cans to old refrigerators and television. . .
read more

ECO-PLASTIC
Every year US landfills receive tens of millions of tons of plastic. . .
read more

BIODEGRADABLE CLOSE-UP
ECM is a relatively new firm that tailors a range of biodegradable. . .
read more

DOWN TO EARTH SWITCHES
The biodegradable bags from Down to Earth are made using. . .
read more

ECM BIOFILMS

Additives for Manufacturing Biodegradable Plastic Packaging and Products

1-888-220-2792 U.S.A. TOLL FREE

Contact Us

First Name*

Last Name*

Title

Company*

Email Address*

Phone number

Address One

Address Two

City

State

Zip

Country

What types of end-products & resins are you interested in for the use of ECM technology?

Additional questions or comments:

Security Code: Please enter the words you see in the box, in order and separated by a space.

reCAPTCHA™

stop spam.
read books.

*Required Fields

Send

ECM BIOFILMS

Victoria Place - Suite 225
100 South Park Place
Painesville, Ohio 44077 U.S.A

Phone: 440-350-1400
Toll Free: 888-220-2792
Fax: 440-350-1444

click here to contact by email

MASTERBATCH PELLETS

ECM BIOFILMS

Additives for Manufacturing Biodegradable Plastic Packaging and Products

1-888-220-2792 U.S.A. TOLL FREE

Big News

ECM LAUNCHES NEW WEBSITE

ECM Biofilms, Inc. is proud to announce the launch of our completely redesigned website. With a totally fresh appearance, the new website contains important information about ECM and our exclusive MasterBatch Pellets™. The clean graphics paired with our cutting edge additive technology provides an informative and visually appealing site for prospective customers.
www.ECMbiofilms.com

READ MORE...

CLEAN AIR COUNCIL
Our waste, from paper and soda cans to old refrigerators and television. . .
read more

ECO-PLASTIC
Every year US landfills receive tens of millions of tons of plastic. . .
read more

BIODEGRADABLE CLOSE-UP
ECM is a relatively new firm that tailors a range of biodegradable. . .
read more

DOWN TO EARTH SWITCHES
The biodegradable bags from Down to Earth are made using. . .
read more

ECM BIOFILMS

Additives for Manufacturing Biodegradable Plastic Packaging and Products

1-888-220-2792 U.S.A. TOLL FREE

Our Product

ECM BioFilms, Inc. markets additives to plastic product manufacturers which produce biodegradable plastic products that can be priced competitively with, and have the same mechanical characteristics as, their traditional non-degradable products.

Plastic products made with ECM additives:

- Fully biodegrade in 9 months to 5 years
- Fully biodegrade when disposed of in a biodegrading environment, either anaerobically or aerobically:
  - in landfills
  - in compost (backyard compost or commercial facilities)
  - if buried or littered in the ground
  - in agricultural and erosion-control settings
- Are recyclable
- Can be made with recycled resins
- Do not use heat, light or mechanical stress to break them down
- Do not require special handling (unlike PLA and oxodegradable products)
- Do not contain heavy metals (unlike most oxodegradable products)

MasterBatch Pellets

MasterBatch Pellets™ is a revolutionary additive, which when combined as a one-percent load to the most widely used plastic resins, renders the finished plastic products biodegradable while maintaining their other desired characteristics.

Click topic below to download PDF

- PRODUCT COMPARISON
- BIODEGRADATION MECHANISM
- OUR TECHNOLOGY
- PRODUCT LIFE EXPECTANCY

ECM BIOFILMS

Additives for Manufacturing Biodegradable Plastic Packaging and Products

1-888-220-2792 U.S.A. TOLL FREE

About ECM

ECM BioFilms is an Ohio Corporation founded in 1998 to develop and market a new technology which can be priced competitively with, and have the same mechanical characteristics as, the traditional non-degradable plastics.

The potential uses of this technology are limited only by the imagination.

ECM also nurtures and supports a healthy, creative, respectful and fun work environment where employees are fairly compensated and encouraged to respect its customers and support the continued quality of its products.

Strategic Partners

www.italcombiodegradabile.com

www.aiq.com.ar

www.return2green.com

EC M BioFilms Website Site map

HOME: ECM Biofilms Additive Makes Plastic Biodegradable - ECM BioFilms Transform any plastic into Biodegradable Plastic. We offer an additive to standard plastic resins making plastics biodegradable.

GREEN IMPACT: How ECM Biofilms is making a Green Impact - ECM BioFilms MasterBatch Pellet™ technology allows for the breakdown of plastic without the use of light, heat or some form of mechanical sensitivity.

ABOUT ECM BIOFILMS: Our history and philosophy - ECM BioFilms is an Ohio Corporation founded in 1998 to develop and market a new technology to produce biodegradable plastic products which can be priced competitively.

OUR PRODUCT: About ECM BioFilms' Additive that Creates Biodegradable Plastic - ECM BioFilms, Inc. markets additives to plastic product manufacturers which produce biodegradable plastic products that can be priced competitively with, and have the same mechanical characteristics as, their traditional non-degradable products.

- ECM MasterBatch Pellets™ - Life Expectancy - The life

Comparison of Products Produced with ECM MasterBatch Pellets™ to Alternative Products

	ECM MasterBatch™	Oxo-Degrader*	Bioplastics+
For Biodegradation			
100% Biodegradable (on land, in land, in water)	**True**	False	False
100% Biodegradable in landfill, as litter or backyard compost	**True**	False	False
For Recycling			
100% Recyclable at any time	**True**	False	False
Compatible with the recycle stream	**True**	False	False
For Properties			
No special storage conditions required	**True**	False	False
Shelf life is indefinite	**True**	False	False
Not degraded by exposure to heat, light or external stresses during storage, shipping, handling or use	**True**	False	False
Does not fragment during degradation	**True**	False	True
Degradation begins at the time of disposal - not before	**True**	False	False
For Performance			
When compared to the original material in the application, physical properties are unchanged and no redesign of end product needed	**True**	False	False
UV or anti-oxidant additives are needed, inhibiting product performance	**False**	True	False
Performance not negatively affected by over loading	**True**	False	n/a
For Processing			
Can be processed with conventional equipment	**True**	True	False
No changes to the process settings required	**True**	False	False
Biodegradable with 1% loading in PE, PP, PVC, PS and PET	**True**	False	n/a
For the Environment			
No heavy metals, ecologically safe	**True**	False	True
Degraded product returns to the environment not as small particles, but as biomass and humus	**True**	False	True°
For the Bottom Line			
Cost effective	**True**	False	False

* EPI Environmental Products Inc., Willow Ridge Plastics, Inc., Symphony Environmental, Inc., etc.
+ PLA, Mater-Bi®, PHB and combinations (NatureWorks LLC., Novamont S.p.A., et al.)
° Only in industrial/municipal composting facilities

ECM BioFilms, Inc.
Victoria Place - Suite 225, 100 South Park Place, Painesville, Ohio 44077 U.S.A.
Phone: 440.350.1400 · Toll Free in U.S.A.: 800.220.2792 · Fax: 440.350.1444
Email: biodeg@ecmbiofilms.com · Website: ecmbiofilms.com

Mechanism for the Biodegradation of Products Manufactured with ECM MasterBatch Pellets™

We have determined, through years of testing both internally and through independent laboratories, that plastic products that are manufactured with at least a one percent (1%) load, by weight, of our ECM MasterBatch Pellets will fully biodegrade once they are placed in conditions wherein they are in constant contact with other biodegrading materials.

Originally it was not known precisely what the threshold amount of our material was necessary to initiate and sustain the process. Much of the early testing was done with plastics manufactured with five percent (5%) or higher loads of the additives but it has been determined that all that is required is a minimum of a one percent (1%) load. This amount will initiate the process and any significant amount less than this amount will not permit the process to begin or be sustained.

People often wonder whether significantly greater quantities of our additive will reduce the biodegradation times. The answer is yes, but so very marginally that it is rarely worth the potential issues concerning other physical properties in the finished plastic products and cost. To explain this more fully, it will be helpful to understand the basics of the mechanism.

The presence of at least one percent of our additives in a plastic product, which is in contact with other biodegrading organic materials, structures communities of such organisms as are there present on the surfaces of the plastic in such a way that their interaction produces the ability to break down the long hydrocarbon chains of the "non-biodegradable" petrochemical plastics. As most people are aware, an example of a biofilm would be the scum that can form on the surface of a pond or on teeth, for that matter. In the cases of most pond biofilms, the surface layers with chlorophyllic, aerobic organisms can support layers of anaerobic organisms in the deeper layers and the interaction of all of the organisms makes for an ecosystem that in some cases produce byproducts that would not be formed without the interaction. The same can be said of the biofilms formed by the interaction of our additive materials and the naturally existing biota. Importantly, this structuring of communities of microorganism proceeds in anaerobic as well as aerobic conditions.

Once there are the structured communities of microorganisms interacting to produce schisms in the long hydrocarbon chains of the polymers the process continues until all the hydrocarbons are eventually transformed into the carbon dioxide and water (aerobic biodegradation) or carbon dioxide, methane and water (anaerobic biodegradation).

This leads us back to the reason why greater quantities of our additives do not significantly speed up the time for biodegradation. If you have four otherwise identical 100 kilograms of PE products, one with no ECM (100% PE), one with a half a percent of ECM (99.5% PE), one with one percent ECM (99% PE) and one with seven percent ECM (93% PE) disposed of under the same conditions you will see why this is.

The one with no ECM does not form the necessary biofilm and thereby 100-kg of PE sits in the ground in that form for hundreds or thousands of years or more. The one with a half a percent of ECM does not form the biofilm with sufficient sustainability to initiate and continue the biodegradation process so only the very surface amounts of the ECM biodegrades and you will have remaining all of the 99.5-kg of PE and most of the 0.5-kg of ECM for hundreds or thousands of years in that form. The product that has the one percent of ECM will form and sustain the biofilm that will continue to break apart the long chains of the 99-kg of PE until the entire quantity of PE is biodegraded. The sample that has 7 percent ECM will do the same thing; the only difference is that there will be only 93-kg of the difficult-to-biodegrade PE to degrade rather than 99-kg. The difference in biodegradation time is not terribly dramatic but it is less.

As a method of concluding, I think that it may be helpful to illustrate how the mechanism employed by this unique biodegradation technology is an important reason as to why the technology will continue the path it is on to become one of the world's leading technologies for the production of plastic products.

The fact that the mechanism is not based on photodegradation or thermal degradation means that the shelf life and usable life of the plastic products will be the same as they were without the ECM additives. The fact that there is a threshold quantity necessary for the initiation and sustainability of the biofilms responsible for the biodegradation means that the plastics with the ECM additive do not have to be segregated out of the plastics that might be recycled into plastic products that are not meant to biodegrade. And finally, the fact that the threshold quantity is so low (one percent by weight) means that the manufacturer is able to immediately make plastic products with all the same other properties they had when they were not biodegradable and at nearly the same cost.

ECM BioFilms, Inc.
Victoria Place - Suite 225, 100 South Park Place, Painesville, Ohio 44077 U.S.A.
Phone: 440.350.1400 · Toll Free in U.S.A.: 800.220.2792 · Fax: 440.350.1444
Email: biodeg@ecmbiofilms.com · Website: ecmbiofilms.com

Our Technology for the Biodegradation of Plastic Products

The technology is an additive which, when combined in small quantities with any of the popular plastic resins, renders the end products biodegradable while maintaining their other desired characteristics. It is sold as ECM MasterBatch Pellets and our Company has developed the technology to the point where most plastic products manufacturers can use the additive without having to modify their existing methods of production any more than if they were changing the product's color. The resulting plastic products exhibit the same desired mechanical properties, have effectively similar shelf-lives, and yet, when disposed of, are able to be metabolized into biomass by the communities of microorganisms commonly found almost everywhere on this planet.

This biodegradation process can take place aerobically and anaerobically. It can take place with or without the presence of light. These factors allow for biodegradation even in landfill conditions which are normally inconducive to any degradation of other technologies. Our technology differs significantly from other "degradable plastics" emerging in the market today because it does not attempt to replace the currently popular plastic resin formulizations but instead enhances them by rendering them biodegradable

Recognizing the environmental concerns related to plastics and the market potential, the corporate and scientific communities have long sought to develop degradable plastics. However, the Company believes that degradable plastics introduced to date possess several weaknesses that have prevented wide-spread acceptance in the marketplace. Photo-degradable products, for example, do not degrade in landfills due to the lack of sunlight (they are typically covered with another layer of trash before the degradation can occur). At the same time these photo-degradable products present difficult circumstances for storage before use due to their reactivity to light. Similarly, plastic products manufactured with PLA and such "renewable" replacement resins fail to biodegrade as litter or in a landfill, are very expensive to manufacture, and often do not achieve the requisite physical properties.

ECM's technology is a process which enables the microorganisms in the environment to metabolize the molecular structure of plastic products into humus that is beneficial to the environment. Our process utilizes several proprietary compounds that are combined into a masterbatch pellet that is easily added to plastic resins using existing technology.

ECM engaged several renowned testing laboratories to independently establish the biodegradability of plastic products made with ECM's additives. The tests concluded that the products were fully biodegradable under both aerobic and anaerobic conditions. In addition, the tests concluded that their biodegradation did not produce any toxic residue harmful to living organisms in land or water.

Technology Explanation

The plastic products made with our additives will break down in approximately 9 month to 5 years in nearly all landfills or wherever else they may end up. All sorts of factors determine the amount of microbes available in the soil and the soil conditions determine the rate of degradation. The plastic products made with ECM technology basically rely on the microbes in the soil to react with the additives and form communities, biofilms, which create the enzymes and acids that can attack the long-chain hydrocarbon molecules and break them down to the point that the microbes' natural acids and enzymes are then effective and the microbes can metabolize the simple hydrocarbons with CO2 and water or methane being the waste products. This process continues until all the plastic product is full biodegraded.

Material treated with ECM has been tested and proved as biodegradable and safe for the environment by using the following:

- ASTM D5209 "Standard Test Method for Determining the Aerobic Biodegradation of Plastic Materials in the Presence of Municipal Sewage Sludge";
- ISO 14855 / ASTM D5338 "Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials under Controlled Composting Conditions"; and
- ASTM 5511 "Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic Digestion Conditions".

Where will it biodegrade?

- Home composting
- Commercial composting
- Landfills
- Buried in, or in contact with the soil
- Erosion / Agricultural netting & film
- Litter

Where won't it degrade?

- Warehouses
- Store shelves
- Offices & Home

ECM BioFilms, Inc.
Victoria Place - Suite 225, 100 South Park Place, Painesville, Ohio 44077 U.S.A.
Phone: 440.350.1400 · Toll Free in U.S.A.: 800.220.2792 · Fax: 440.350.1444
Email: biodeg@ecmbiofilms.com · Website: ecmbiofilms.com

Life Expectancy of Products Manufactured with ECM MasterBatch Pellets™ Page 1

The life expectancy of plastic products that are manufactured with at least a one percent (1%) load, by weight, of our ECM MasterBatch Pellets can be explained through two types of life expectancies. The first type of life expectancy is the life expectancy of the plastic when it is on the warehouse or store shelf, in regular usage as packaging or other normal plastic usage. The second type of life expectancy has to do with the situation when the same plastic has been put in conditions wherein it has constant contact with other materials that are biodegrading.

Plastic products manufactured with ECM MasterBatch Pellets will have the same life expectancy as the same plastic product manufactured without our additives under all but the conditions mentioned above wherein they are placed in constant contact with other materials that are biodegrading (i.e. on or buried in the ground). This is a major reason why our technology for having biodegradable plastic products is so successful.

The principles concerned with the degradation of plastics that make use of our additive technology are truly involved with "bio"-degradation. Our technology does not rely on the use of photosensitivity or thermal sensitivity to photodegrade or thermally break down the plastics. For this reason, a blow-molded HDPE shampoo bottle or motor oil bottle manufactured with one of our additives will last in the warehouse and on the store shelf as long as it would without our additives. There is a considerable amount of interest in our additives for the plastics for the automotive and aviation industries for this reason.

There is the real concern for the technologies that make use of thermal or photodegradation that they are simply leaving smaller particles of plastic in the soil rather than having the material truly become the organic components of soil. This is especially of concern in the agricultural industry and for those needing erosion control products. Agricultural films, erosion control nettings, and other such products manufactured with our additives will last long enough to get the required use but will completely biodegrade into the soil; such plastic products completely biodegrade in a period of from 9 months to 5 years or less. It is not a "poof, it's gone" system but simply makes the plastic product biodegrade as if it were a stick or a branch off a tree rather than "sticking around" for hundreds of years.

To summarize the concept, the key to our technology is that the right conditions for biodegradation are not those found when the plastic product is in use, is on the store shelves or is being warehoused somewhere. Just like a wood bowl or a piece of wood furniture, which can be used for a lifetime or more, a plastic product with our additives can be used for essentially the same period of time as the same plastic product without our additives could be used.

Concerning the life expectancy of the plastic products manufactured with our additives once they are placed in constant contact with other biodegrading materials, we certify the full biodegradation of most all plastic products manufactured with at least a one percent load of our additives. We can certify this situation due to the internal and external studies that have cost us hundreds of thousands of dollars. Our additives have been tested in all of the types of polyolefins, EVAs, PVCs, PETs, PSs, PUs and combinations thereof, with much of the testing having been performed using the various world-standardized tests in independent laboratories by independent scientists. We have had the various test data analyzed by independent scientists and their conclusions and some of the data have been sent to you in the presentation package and are what we base our certification on.

The basic concept is that biodegradation is a natural process that occurs around the world but at various speeds due to various conditions. Plastics with our additives behave like sticks, branches or trunks of trees. Due to this fact, we do not guarantee any particular time because the time depends on the same factors that the biodegradation of woods and most other organic materials on earth depend - ambient biota and other environmental conditions - but the time frame of between nine months to five years will give a good general idea for most conditions. Under specific composting conditions with additional accelerants sprayed on them, some customers have reported biodegradation in as little as a couple of months. Under the more usual, commercial composting conditions using high heat processes, a time frame of around one year is a reasonable expectation.

Petrochemical plastics would normally take hundreds or thousands of years or even longer to "biodegrade"; with our additives, these same plastic formulas biodegrade in a hundredth of that time or less.

Do not be confused by the claims of some companies that say that their resins fully biodegrade in 2 months or 3 months. They are speaking of biodegradation under very specific conditions. This has lead to some confusion when the plastic products are in the end-consumers' hands, such as in the Kassel project in Germany when the bags and other plastic products marked with a "compostable" label were found not to be compostable by the town's citizens in their backyard compost heaps (they were only "compostable" under the very specific commercial

ECM BioFilms, Inc.
Victoria Place - Suite 225, 100 South Park Place, Painesville, Ohio 44077 U.S.A.
Phone: 440.350.1400 · Toll Free in U.S.A.: 800.220.2792 · Fax: 440.350.1444
Email: biodeg@ecmbiofilms.com · Website: ecmbiofilms.com

composting standards where there is high heat, oxygenation, moisture control and high levels of microorganisms). When I spoke at the Biodegradable Plastics Conference in Frankfurt, Germany a few years ago, I argued with the companies involved in that project that they should be careful in not trying to confiscate generic terms for too specific conditions (i.e. they should label items as "Commercially Compostable" rather than simply "Compostable" when such conditions are required). As the use of our technology continues to grow to become the world's leading technology for the production of biodegradable plastics, our viewpoint will continue to gain more and more adherents.

Plastics manufactured with our additives will fully biodegrade in home compost heaps, commercial composting operations (both high heat and low heat, or even in vermiculture, processes), buried in the ground, buried in landfills, tilled into the soil, having been littered, etc. Most importantly, our process is by far the least expensive, most widely applicable, proven technology for the biodegradation of plastics in the world.

Again, we certify the biodegradation of polyolefins (any of the polyethylenes and polypropylenes), EVAs, PVCs, PETs, PSs, PUs and any combination of these resins, manufactured with at least a 1% load of our additives. We base this certification on more than ten years of testing worldwide by us, by universities, by customers, by prospects and by competitors.

EXHIBIT 1B

Cutting-edge additives for manufacturing biodegradable* plastics

Forward-thinking, sustainable solutions for the plastics and landfill gas-to-energy industries

ECM BioFilms is leading the sustainability movement within the plastics and landfill gas-to-energy industries with an additives for manufacturing biodegradable* plastics–creating an entirely new and greatly desired end-of-life scenario for plastics–and simultaneously opening up exciting new opportunities for energy generation and recycling the hydrocarbons of old plastic products into new plastic resin.

The plastic products made with ECM BioFilms' technology are priced competitively with, and have the same mechanical characteristics as, traditional non-degradable products. Unlike **other degradable plastic technologies which require very specific conditions**, plastic products manufactured with ECM MasterBatch Pellets will biodegrade in any biologically-active environment (including most landfills) in some period greater than a year. This revolutionary additive technology, when combined as a 1% load with the most widely-used plastic resins, renders the resulting plastic products biodegradable* while maintaining their other desired characteristics.

> *"This revolutionary additive technology, when combined as a 1% load with the most widely-used plastic resins, renders the resulting plastic products biodegradable* while maintaining their other desired characteristics"*
>
> *Tweet This*

The potential uses of this technology are limited only by the imagination.

View the side-by-side **Comparison of competing degradable plastic technologies**.

BIODEGRADABLE* PLASTICS BLOG

A sustainable vision for recycling hydrocarbons from plastics

Who's winning the war on plastics? Society or plastics?

BIODEGRADABLE* PLASTICS QUALIFIER

* Plastic products manufactured with ECM BioFilms' additives will biodegrade in any biologically-active environment (including most landfills) in some period greater than a year.

THIS SITE IS ABOUT...

Biodegradable Bags Biodegradable Pellets

Biodegradable Plastics

Energy Landfills lmop Methane Gas Plastic Bags Plastic Products Plastic Resins Renewable Natural Gas Sustainable Plastics

Return to top of page

Who's winning the war on plastics? Society or plastics?

Who's winning the war on plastics? Is society winning?

Sure…, concerned citizens and activists might win a battle with a ban against plastic bags every once in awhile.

But, while there are no hard and fast numbers, it's estimated there's somewhere between 250 to 300 million tons of plastics manufactured every year. 10% of plastics get recycled; the rest of it–millions and millions of tons go to landfills, or ends up as litter in the environment.

Plastics are clearly winning the war.

Should we capitulate?

Absolutely not! We just need to rethink our approach.

Maybe we need to approach plastics as if we were practicing Judo. In Judo, you use your opponent's energy to defeat him, and/or to teach him a lesson. The question is: How do we practice Judo against plastic, and start using plastic's energy to help, instead of hurt, our society?

> *"How do we practice Judo against plastic, and start using plastic's energy to help, instead of hurt, our society?"* Tweet This

If we, as a society, had the will to manufacture biodegradable* plastics, we could. The technology exists. But it's really going to be necessary to come together, and re-frame the conversation about plastics. Is the plastics problem bad? Yes! There's entirely too much waste. But when you start start thinking about biodegradable* plastics, particularly in the context of landfill gas-to-energy, it becomes an entirely different conversation.

A formula for sustainable plastics

1. Manufacturers add specially-formulated pellets to create biodegradable* plastics

During the manufacturing process, additives to manufacture biodegradable* plastics are added to plastic products.

A simple 1% load to the most widely-used plastic resins to render the finished plastic products biodegradable* while maintaining their other desired characteristics.

[Read more...]

▪ OCTOBER 29, 2012 BY ECM BIOFILMS ▪ LEAVE A COMMENT

▪ FILED UNDER: BIODEGRADABLE* PLASTICS, LANDFILL GAS TO ENERGY, RECYCLABILITY, SUSTAINABILITY ▪ TAGGED WITH: BIODEGRADABLE PELLETS, BIODEGRADABLE PLASTICS, ENERGY, PLASTIC BAGS, PLASTIC PRODUCTS, PLASTIC RESINS, SUSTAINABLE PLASTICS

BIODEGRADABLE* PLASTICS QUALIFIER

* Plastic products manufactured with ECM BioFilms' additives will biodegrade in any biologically-active environment (including most landfills) in some period greater than a year.

THIS SITE IS ABOUT…

Biodegradable Bags Biodegradable Pellets **Biodegradable Plastics** Energy Landfills lmop Methane Gas Plastic Bags Plastic Products Plastic Resins Renewable Natural Gas Sustainable Plastics

Return to top of page

A sustainable vision for recycling hydrocarbons from plastics

Recycling hydrocarbons from discarded plastics into energy or new products would be an end-of-life scenario that could benefit everyone.

RECYCLING HYDROCARBONS FROM PLASTICS

Thinking outoud: "*What if–all the discarded plastics that were sent to landfills were biodegradable and became a source of renewable energy*?"

It's estimated there's somewhere between 250 to 300 million tons of plastics manufactured every year. 10% of plastics get recycled; the rest of it–millions and millions of tons go to landfills, or ends up as litter in the environment.

Imagine garbage trucks in communities around the world propelled by bio-diesel engines powered with renewable natural gas derived in part by no-cost degraded plastics from actively managed landfills.

> *"Imagine garbage trucks in communities around the world propelled by bio-diesel engines powered with renewable natural gas derived in part by no-cost degraded plastics from actively managed landfills. "* Tweet This

Despite the best intentions, only 10% of plastics get recycled. Practically everything else ends up in landfills or in the environment; millions and millions of tons of plastics every year.

The fact is that garbage itself emits methane gas, so if municipalities–and we, the people who live in them–desire to be good, socially responsible citizens, and do our part to reduce carbon emissions, it's important that our cities, towns, and hamlets implement modern landfills, whether public or private, to capture these gases in landfill gas-to-energy programs.

Most modern landfill environments are either moist or actively managed; which means that the landfills accelerate the biodegradation process to produce energy in the form of CO2 and methane, which can then be used to produce renewable natural gas (RNG) energy to propel biodiesel engines or other such uses.

Instead of banning bags we should be biodegrading them

With this new scenario, instead of banning bags, communities would encourage merchants to use them. The value of the energy from the biodegradable bags and other biodegradable plastics could quite possibly pay for upgrading the landfill technologies, and create new jobs for the people who manage them.

Customers would enjoy the convenience of low-cost plastic bags and bottles. *Merchants* would enjoy a low-

BIODEGRADABLE* PLASTICS BLOG

A sustainable vision for recycling hydrocarbons from plastics

Who's winning the war on plastics? Society or plastics?

cost service that is eco-friendly and sustainable. *The plastics industry* would continue to operate with a minimally disruptive technology and *municipalitie*s would expand a free source of renewable energy.

Recycle, biodegrade*, and energy capture with truly biodegradable plastics and landfill gas-to-energy

#1 Win-win-win-win (1) *Customers* would enjoy the convenience of low-cost truly biodegradable plastics (2) *Merchants* and manfucturers benefit by offering a low-cost service that is eco-friendly and sustainable (3) *The Plastics Industry* would continue to operate with a minimally disruptive technology, and (4) *Municipalities* would expand **a free source of renewable energy**.

"Waste is Food"

When it comes to truly biodegradable* plastics, it is not either/or. Biodegradable* plastics are both a technical nutrient and a biological nutrient that can be made useful or harmless under any scenario; whether recycled, landfilled, or litter.

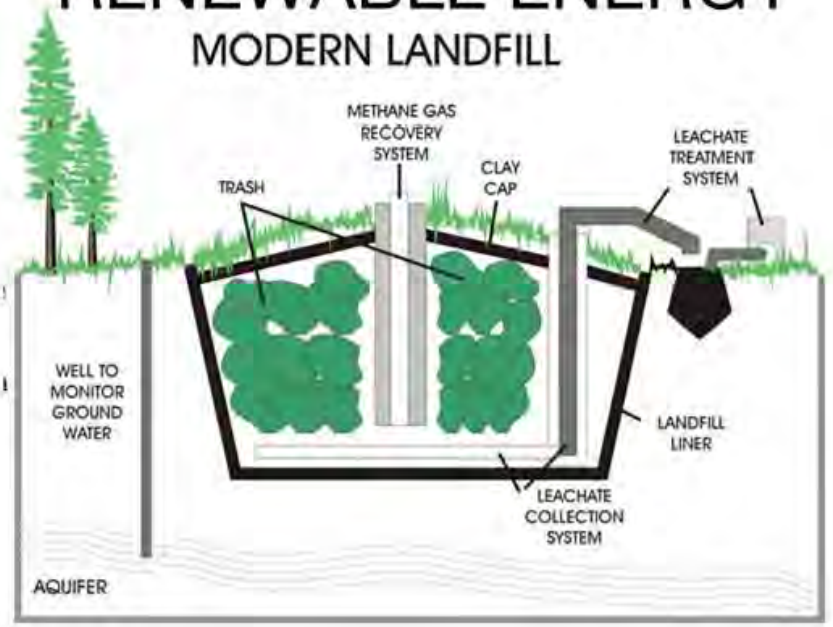
End-of-life scenarios of types of Biodegradable* plastics in the context of "Cradle to Cradle"

Nutrient cycle	ECM MasterBatch™	Oxo-Degrader	‡Bioplastics+
If recycled => technical nutrient	✓	✗	✗
If landfill => bionutrient	✓	✗	✗
If litter => bionutrient	✓	✗	✗

‡ EPI Environmental Products Inc., Symphony Environmental, Inc., etc.
+ PLA, Mater-Bi®, PHB and combinations (NatureWorks LLC., Novamont S.p.A., et al.)

RENEWABLE ENERGY

MODERN LANDFILL



- FEBRUARY 25, 2013 BY ECM BIOFILMS
- LEAVE A COMMENT
- FILED UNDER: BIODEGRADABLE* PLASTICS, LANDFILL GAS TO ENERGY
- TAGGED WITH: BIODEGRADABLE BAGS, BIODEGRADABLE PLASTICS, LANDFILLS, LMOP, METHANE GAS, RENEWABLE NATURAL GAS

Who's winning the war on plastics? Society or plastics?

Who's winning the war on plastics? Is society winning?

Sure…, concerned citizens and activists might win a battle with a ban against plastic bags every once in awhile.

But, while there are no hard and fast numbers, it's estimated there's somewhere between 250 to 300 million tons of plastics manufactured every year. 10% of plastics get recycled; the rest of it–millions and millions of tons go to landfills, or ends up as litter in the environment.

Plastics are clearly winning the war.

Should we capitulate?

Absolutely not! We just need to rethink our approach.

Maybe we need to approach plastics as if we were practicing Judo. In Judo, you use your opponent's energy to defeat him, and/or to teach him a lesson. The question is: How do we practice Judo against plastic, and start using plastic's energy to help, instead of hurt, our

> *"How do we practice Judo against plastic, and start using plastic's energy to help, instead of hurt, our*

society?

society?” [Tweet This]

If we, as a society, had the will to manufacture biodegradable* plastics, we could. The technology exists. But it’s really going to be necessary to come together, and re-frame the conversation about plastics. Is the plastics problem bad? Yes! There’s entirely too much waste. But when you start start thinking about biodegradable* plastics, particularly in the context of landfill gas-to-energy, it becomes an entirely different conversation.

A formula for sustainable plastics

1. Manufacturers add specially-formulated pellets to create biodegradable* plastics

During the manufacturing process, additives to manufacture biodegradable* plastics are added to plastic products.

A simple 1% load to the most widely-used plastic resins to render the finished plastic products biodegradable* while maintaining their other desired characteristics.

[Read more...]

- OCTOBER 29, 2012 BY ECM BIOFILMS
- LEAVE A COMMENT

- FILED UNDER: BIODEGRADABLE* PLASTICS, LANDFILL GAS TO ENERGY, RECYCLABILITY, SUSTAINABILITY
- TAGGED WITH: BIODEGRADABLE PELLETS, BIODEGRADABLE PLASTICS, ENERGY, PLASTIC BAGS, PLASTIC PRODUCTS, PLASTIC RESINS, SUSTAINABLE PLASTICS

BIODEGRADABLE* PLASTICS QUALIFIER

* Plastic products manufactured with ECM BioFilms' additives will biodegrade in any biologically-active environment (including most landfills) in some period greater than a year.

THIS SITE IS ABOUT…

Biodegradable Bags Biodegradable Pellets **Biodegradable Plastics** Energy Landfills lmop Methane Gas Plastic Bags Plastic Products Plastic Resins Renewable Natural Gas Sustainable Plastics

Additives for Manufacturing Biodegradable* Plastics

ECM MasterBatch Pellets™ are a revolutionary additive technology for manufacturing biodegradable* plastics.

This additive technology offers companies a practical way to take tangible, measurable steps towards sustainability without interrupting or impacting their current production process whatsoever.

A major step towards greater sustainability

When combined as a 1% load with the most widely-used plastic resins, they render the resulting plastic products biodegradable*. Our process enables micro-organisms in the environment to metabolize the molecular structure of plastic products into humus that is beneficial to the environment. This process utilizes several proprietary compounds that are combined into a masterbatch pellet that is easily added to plastic resins using existing technology.

> *"Our process enables micro-organisms in the environment to metabolize the molecular structure of plastic products into humus that is beneficial to the environment"*
>
> *Tweet This*

The plastic products produced with ECM MasterBatch Pellets can be priced competitively with, and have the same mechanical characteristics as, their traditional non-degradable products, but will be much more sustainable and environmentally-friendly because of their preferred end-of-life.

*THESE ADDITIVES MAKE STANDARD PLASTIC RESINS BIODEGRADABLE**

Impact on Operations

Plastic products made with ECM BioFilms' additives:

ECM MASTERBATCH PELLETS

ECM MasterBatch Pellets™, when combined as a one-percent load to the most widely used plastic resins, render the finished plastic products biodegradable while maintaining their other desired characteristics.

DETAILED INFORMATION ABOUT OUR PRODUCTS

Comparison of competing biodegradable plastic technologies

ECM Technology for the Biodegradation of Plastic Products

Mechanism for the Biodegradation of Products Manufactured with ECM MasterBatch Pellets™

Life Expectancy of Products Manufactured with ECM MasterBatch Pellets™

HAVE SOMEONE CONTACT ME!

If you'd like more information about how you can create environmentally-friendly plastic products...

Click Here

- Are recycleable
- Can be made with recycled resins
- Biodegrade* in any biologically-active environment in some period greater than a year
- Biodegrade* when disposed of in a biodegrading environment, either anaerobically or aerobically:
  - in landfills
  - in compost (backyard compost or commercial facilities)
  - if buried or littered in the ground
  - in agricultural and erosion-control settings
- Do not use heat, light or mechanical stress to break them down
- Do not require special handling (unlike PLA and oxodegradable products)
- Do not contain heavy metals (unlike most oxodegradable products)

ECM MasterBatch Pellets are used for extruding film and sheet (blown or cast), blow molding, injection molding and rotomolding products and parts. The addition of MasterBatch Pellets allows your product to retain its desired attributes without adversely effecting its integrity and cosmetics.

BIODEGRADABLE* PLASTICS QUALIFIER

* Plastic products manufactured with ECM BioFilms' additives will biodegrade in any biologically-active environment (including most landfills) in some period greater than a year.

THIS SITE IS ABOUT…

Biodegradable Bags Biodegradable Pellets

Biodegradable Plastics

Energy Landfills lmop Methane Gas Plastic Bags Plastic Products Plastic Resins Renewable Natural Gas Sustainable Plastics

Comparison of competing biodegradable plastic technologies

	ECM MasterBatch™	Oxo-Degrader‡	Bioplastics+
For Biodegradation			
• Biodegradable* (on land, in land, in water)	✓	✗	✗
• Biodegradable* in landfill, as litter or backyard compost	✓	✗	✗
For Recycling			
• 100% Recyclable at any time	✓	✗	✗
• Compatible with the recycle stream	✓	✗	✗
For Properties			
• No special storage conditions required	✓	✗	✗
• Shelf life is indefinite	✓	✗	✗
• Not degraded by exposure to heat, light or external stresses during	✓	✗	✗
storage, shipping, handling or use	✓	✗	✗
• Does not fragment during degradation	✓	✗	✗
• Degradation begins at the time of disposal – not before	✓	✗	✗
For Performance			
• Performance not negatively affected by over loading	✓	✗	✗
• No UV or anti-oxidant additives are needed, improving product performance	✓	✗	✗
• When compared to the original material in the application, physical properties are unchanged and no redesign of end product needed	✓	✗	✗
For Processing			
• Can be processed with conventional equipment	✓	✗	✗
• No changes to the process settings required	✓	✗	✗
• Biodegradable with 1% loading in PE, PP, PVC, PS and PET	✓	✗	✗
For the Environment			

• No heavy metals, ecologically safe	✓	✗	✓
• Degraded product returns to the environment not as small particles, but as biomass and humus	✓	✗	✓°
For the Bottom Line			
• Cost effective	✓	✗	✗

‡ EPI Environmental Products Inc., Symphony Environmental, Inc., etc.

+ PLA, Mater-Bi®, PHB and combinations (NatureWorks LLC., Novamont S.p.A., et al.)

° Only in industrial/municipal composting facilities

ECM BioFilms, Inc.

Victoria Place – Suite 225, 100 South Park Place, Painesville, Ohio 44077 U.S.A.

Phone: 440.350.1400 · Toll Free in U.S.A.: 888.220.2792 · Fax: 440.350.1444

Email: biodeg@ecmbiofilms.com ·Website: ecmbiofilms.com

BIODEGRADABLE* PLASTICS QUALIFIER

* Plastic products manufactured with ECM BioFilms' additives will biodegrade in any biologically-active environment (including most landfills) in some period greater than a year.

THIS SITE IS ABOUT…

Biodegradable Bags Biodegradable Pellets

Biodegradable Plastics

Energy Landfills lmop Methane Gas Plastic Bags Plastic Products Plastic Resins Renewable Natural Gas Sustainable Plastics

Return to top of page

ECM Technology for the Biodegradation of Plastic Products

The technology is an additive which, when combined in small quantities with any of the popular plastic resins, renders the end products biodegradable* while maintaining their other desired characteristics. It is sold as ECM MasterBatch Pellets and our Company has developed the technology to the point where most plastic products manufacturers can use the additive without having to modify their existing methods of production any more than if they were changing the product's color. The resulting plastic products exhibit the same desired mechanical properties, have effectively similar shelf-lives, and yet, when disposed of, are able to be metabolized into biomass by the communities of microorganisms commonly found almost everywhere on this planet.This biodegradation process can take place aerobically and anaerobically. It can take place with or without the presence of light. These factors allow for biodegradation even in landfill conditions which are normally inconducive to any degradation of other technologies. Our technology differs significantly from other "degradable plastics" emerging in the market today because it does not attempt to replace the currently popular plastic resin formulizations but instead enhances them by rendering them biodegradable*.Recognizing the environmental concerns related to plastics and the market potential, the corporate and scientific communities have long sought to develop degradable plastics. However, the Company believes that degradable plastics introduced to date possess several weaknesses that have prevented wide-spread acceptance in the marketplace. Photo-degradable products, for example, do not degrade in landfills due to the lack of sunlight (they are typically covered with another layer of trash before the degradation can occur). At the same time these photo-degradable products present difficult circumstances for storage before use due to their reactivity to light. Similarly, plastic products manufactured with PLA and such "renewable" replacement resins fail to biodegrade as litter or in a landfill, are very expensive to manufacture, and often do not achieve the requisite physical properties.ECM's technology is a process which enables the microorganisms in the environment to metabolize the molecular structure of plastic products into humus that is beneficial to the environment. Our process utilizes several

ECM engaged several renowned testing laboratories to independently establish the biodegradability of plastic products made with ECM's additives. The tests concluded that the products were biodegradable* under both aerobic and anaerobic conditions. In addition, the tests concluded that their biodegradation did not produce any toxic residue harmful to living organisms in land or water.

Technology Explanation

The plastic products made with our additives will break down in more than one year but less than a hundred plus years in nearly all landfills or wherever else they may end up. All sorts of factors determine the amount of microbes available in the soil and the soil conditions determine the rate of degradation. The plastic products made with ECM technology basically rely on the microbes in the soil to react with the additives and form communities, biofilms, which create the enzymes and acids that can attack the longchain hydrocarbon molecules and break them down to the point that the microbes' natural acids and enzymes are then effective and the microbes can metabolize the simple hydrocarbons with CO2 and water or methane being the waste products. This process continues until all the plastic product is fully biodegraded.

Material treated with ECM has been tested and proved as biodegradable* and safe for the environment by using the following:

• ASTM D5209 "Standard Test Method for Determining the Aerobic Biodegradation of Plastic Materials in the Presence of Municipal Sewage Sludge";
• ISO 14855 / ASTM D5338 "Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials under Controlled Composting Conditions"; and
• ASTM 5511 "Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic Digestion Conditions".

Where will it biodegrade*?

• Home composting
• Commercial composting
• Landfills
• Buried in, or in contact with the soil
• Erosion / Agricultural netting & film

proprietary compounds that are combined into a masterbatch pellet that is easily added to plastic resins using existing technology.

- Litter

Where won't it degrade?

- Warehouses
- Store shelves
- Offices & Home

Share this: Share

BIODEGRADABLE* PLASTICS QUALIFIER

* Plastic products manufactured with ECM BioFilms' additives will biodegrade in any biologically-active environment (including most landfills) in some period greater than a year.

THIS SITE IS ABOUT…

Biodegradable Bags Biodegradable Pellets

Biodegradable Plastics

Energy Landfills lmop Methane Gas Plastic Bags Plastic Products Plastic Resins Renewable Natural Gas Sustainable Plastics

Return to top of page

Mechanism for the Biodegradation of Products Manufactured with ECM MasterBatch Pellets™

We have determined, through years of testing both internally and through independent laboratories, that plastic products that are manufactured with at least a one percent (1%) load, by weight, of our ECM MasterBatch Pellets will biodegrade once they are placed in conditions wherein they are in constant contact with other biodegrading materials. Originally it was not known precisely what the threshold amount of our material was necessary to initiate and sustain the process. Much of the early testing was done with plastics manufactured with five percent (5%) or higher loads of the additives but it has been determined that all that is required is a minimum of a one percent (1%) load. This amount will initiate the process and any significant amount less than this amount will not permit the process to begin or be sustained.People often wonder whether significantly greater quantities of our additive will reduce the biodegradation times. The answer is yes, but so very marginally that it is rarely worth the potential issues concerning other physical properties in the finished plastic products and cost. To explain this more fully, it will be helpful to understand the basics of the mechanism.The presence of at least one percent of our additives in a plastic product, which is in contact with other biodegrading organic materials, structures communities of such organisms as are there present on the surfaces of the plastic in such a way that their interaction produces the ability to break down the long hydrocarbon chains of the “non-biodegradable” petrochemical plastics. As most people are aware, an example of a biofilm would be the scum that can form on the surface of a pond or on teeth, for that matter. In the cases of most pond biofilms, the surface layers with chlorophyllic, aerobic organisms can support layers of anaerobic organisms in the deeper layers and the interaction of all of the organisms makes for an ecosystem that in some cases produce byproducts that would not be formed without the interaction. The same can be said of the biofilms formed by the interaction of our additive materials and the naturally existing biota. Importantly, this structuring of communities of microorganism proceeds in anaerobic as well as aerobic conditions.

This leads us back to the reason why greater quantities of our additives do not significantly speed up the time for biodegradation. If you have four otherwise identical 100 kilograms of PE products, one with no ECM (100% PE), one with a half a percent of ECM (99.5% PE), one with one percent ECM (99% PE) and one with seven percent ECM (93% PE) disposed of under the same conditions you will see why this is.The one with no ECM does not form the necessary biofilm and thereby 100-kg of PE sits in the ground in that form for hundreds or thousands of years or more. The one with a half a percent of ECM does not form the biofilm with sufficient sustainability to initiate and continue the biodegradation process so only the very surface amounts of the ECM biodegrades and you will have remaining all of the 99.5-kg of PE and most of the 0.5-kg of ECM for hundreds or thousands of years in that form. The product that has the one percent of ECM will form and sustain the biofilm that will continue to break apart the long chains of the 99-kg of PE until the entire quantity of PE is biodegraded. The sample that has 7 percent ECM will do the same thing; the only difference is that there will be only 93-kg of the difficult-tobiodegrade PE to degrade rather than 99-kg. The difference in biodegradation time is not terribly dramatic but it is less.As a method of concluding, I think that it may be helpful to illustrate how the mechanism employed by this unique biodegradation technology is an important reason as to why the technology will continue the path it is on to become one of the world’s leading technologies for the production of plastic products.The fact that the mechanism is not based on photodegradation or thermal degradation means that the shelf life and usable life of the plastic products will be the same as they were without the ECM additives. The fact that there is a threshold quantity necessary for the initiation and sustainability of the biofilms responsible for the biodegradation means that the plastics with the ECM additive do not have to be segregated out of the plastics that might be recycled into plastic products that are not meant to biodegrade. And finally, the fact that the threshold quantity is so low (one percent by weight) means that the

Once there are the structured communities of microorganisms interacting to produce schisms in the long hydrocarbon chains of the polymers the process continues until all the hydrocarbons are eventually transformed into the carbon dioxide and water (aerobic biodegradation) or carbon dioxide, methane and water (anaerobic biodegradation).

manufacturer is able to immediately make plastic products with all the same other properties they had when they were not biodegradable and at nearly the same cost.

BIODEGRADABLE* PLASTICS QUALIFIER

* Plastic products manufactured with ECM BioFilms' additives will biodegrade in any biologically-active environment (including most landfills) in some period greater than a year.

THIS SITE IS ABOUT…

Biodegradable Bags Biodegradable Pellets

Biodegradable Plastics

Energy Landfills lmop Methane Gas Plastic Bags Plastic Products Plastic Resins Renewable Natural Gas Sustainable Plastics

Life Expectancy of Products Manufactured with ECM MasterBatch Pellets™

The life expectancy of plastic products that are manufactured with at least a one percent (1%) load, by weight, of our ECM MasterBatch Pellets can be explained through two types of life expectancies. The first type of life expectancy is the life expectancy of the plastic when it is on the warehouse or store shelf, in regular usage as packaging or other normal plastic usage. The second type of life expectancy has to do with the situation when the same plastic has been put in conditions wherein it has constant contact with other materials that are biodegrading.

Plastic products manufactured with ECM MasterBatch Pellets will have the same life expectancy as the same plastic product manufactured without our additives under all but the conditions mentioned above wherein they are placed in constant contact with other materials that are biodegrading (i.e. on or buried in the ground). This is a major reason why our technology for having biodegradable* plastic products is so successful.

The principles concerned with the degradation* of plastics that make use of our additive technology are truly involved with “bio”-degradation*. Our technology does not rely on the use of photosensitivity or thermal sensitivity to photodegrade or thermally break down the plastics. For this reason, a blow-molded HDPE shampoo bottle or motor oil bottle manufactured with one of our additives will last in the warehouse and on the store shelf as long as it would without our additives. There is a considerable amount of interest in our additives for the plastics for the automotive and aviation industries for this reason.

There is the real concern for the technologies that make use of thermal or photodegradation that they are simply leaving smaller particles of plastic in the soil rather than having the material truly become the organic components of soil. This is especially of concern in the agricultural industry and for those needing erosion control products. Agricultural films, erosion control nettings, and other such products manufactured with our additives will last long enough to get the required use but will completely biodegrade into the soil; such plastic products completely biodegrade in a period of from 9 months to 5 years or less. It is not a “poof, it’s gone” system but simply makes the plastic product biodegrade as if it were a stick or a branch off a tree rather than “sticking around” independent laboratories by independent scientists.We have had the various test data analyzed by independent scientists and their conclusions and some of the data have been sent to you in the presentation package and are what we base our certification on.

The basic concept is that biodegradation is a natural process that occurs around the world but at various speeds due to various conditions. Plastics with our additives behave like sticks, branches or trunks of trees. Due to this fact, we do not guarantee any particular time because the time depends on the same factors that the biodegradation of woods and most other organic materials on earth depend – ambient biota and other environmental conditions – but the time frame of between nine months to five years will give a good general idea for most conditions. Under specific composting conditions with additional accelerants sprayed on them, some customers have reported biodegradation in as little as a couple of months. Under the more usual, commercial composting conditions using high heat processes, a time frame of around one year is a reasonable expectation.

Petrochemical plastics would normally take hundreds or thousands of years or even longer to “biodegrade”; with our additives, these same plastic formulas biodegrade in a hundredth of that time or less.

Do not be confused by the claims of some companies that say that their resins fully biodegrade in 2 months or 3 months. They are speaking of biodegradation under very specific conditions. This has lead to some confusion when the plastic products are in the end-consumers’ hands, such as in the Kassel project in Germany when the bags and other plastic products marked with a “compostable” label were found not to be compostable by the town’s citizens in their backyard compost heaps (they were only “compostable” under the very specific commercial composting standards where there is high heat, oxygenation, moisture control and high levels of microorganisms).When I spoke at the Biodegradable Plastics Conference in Frankfurt, Germany a few years ago, I argued with the companies involved in that project that they should be careful in not trying to confiscate generic terms for too specific conditions (i.e. they should label items as “Commercially Compostable” rather than simply “Compostable” when such conditions are required). As the use of our technology continues to grow to become the world’s leading technology for the production of biodegradable* plastics, our viewpoint will continue to gain more and

for hundreds of years.

To summarize the concept, the key to our technology is that the right conditions for biodegradation are not those found when the plastic product is in use, is on the store shelves or is being warehoused somewhere. Just like a wood bowl or a piece of wood furniture, which can be used for a lifetime or more, a plastic product with our additives can be used for essentially the same period of time as the same plastic product without our additives could be used.

Concerning the life expectancy of the plastic products manufactured with our additives once they are placed in constant contact with other biodegrading materials, we certify the full biodegradation of most all plastic products manufactured with at least a one percent load of our additives.We can certify this situation due to the internal and external studies that have cost us hundreds of thousands of dollars. Our additives have been tested in all of the types of polyolefins, EVAs, PVCs, PETs, PSs, PUs and combinations thereof, with much of the testing having been performed using the various world-standardized tests in more adherents.

Plastics manufactured with our additives will fully biodegrade in home compost heaps, commercial composting operations (both high heat and low heat, or even in vermiculture, processes), buried in the ground, buried in landfills, tilled into the soil, having been littered, etc. Most importantly, our process is by far the least expensive, most widely applicable, proven technology for the biodegradation of plastics in the world.

Again, we certify the biodegradation* of polyolefins (any of the polyethylenes and polypropylenes), EVAs, PVCs, PETs, PSs, PUs and any combination of these resins, manufactured with at least a 1% load of our additives.We base this certification on more than ten years of testing worldwide by us, by universities, by customers, by prospects and by competitors.

BIODEGRADABLE* PLASTICS QUALIFIER

* Plastic products manufactured with ECM BioFilms' additives will biodegrade in any biologically-active environment (including most landfills) in some period greater than a year.

THIS SITE IS ABOUT…

Biodegradable Bags Biodegradable Pellets

Biodegradable Plastics

Energy Landfills lmop Methane Gas Plastic Bags Plastic Products Plastic Resins Renewable Natural Gas Sustainable Plastics

EXHIBIT 2

MASTERBATCH PELLETS

ECM BioFilms, Inc.

Manufacturer of Additives That Make Standard Plastic Resins Biodegradable

ECM BioFilms, Inc. sells additives to plastic product manufacturers which allow them to offer their customers biodegradable plastic products that can be priced competitively with, and have the same mechanical characteristics as, their traditional, non-degradable products.

The revolutionary additive technology, when combined as a one-percent load to the most widely-used plastic resins, renders the finished plastic products biodegradable while maintaining their other desired characteristics.

Additives for Manufacturing Biodegradable Plastic Packaging and Products

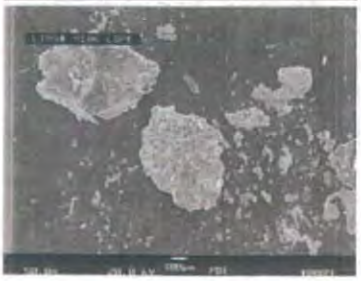
Plastic products made with ECM additives

- **Fully biodegrade in 9 months to 5 years.**
- **Fully biodegrade wherever they are disposed of where other things are biodegrading (anaerobically and aerobically):**
  - In Landfills,
  - In Compost (backyard as well as commercial facilities),
  - Buried in the ground or littered,
  - Agricultural and erosion-control settings.
- **Are recyclable.**
- **Can be made with recycled resins.**
- **Do not use heat, light or mechanical stress to break them down.**
- **Do not require special handling (unlike PLA and oxo-degradable products).**
- **Do not contain heavy metals (unlike most oxo-degradable products).**

Plastic Bag Film Samples Buried in Same Soil for a Month

Without ECM

With ECM



The process continues until the plastic products become part of the organic components of the soil just like biodegraded sticks or other pieces of wood become part of the soil..

ECM BIOFILMS

ECM BioFilms, Inc.
Victoria Place – Suite 225
100 South Park Place
Painesville, OH 44077, U.S.A.

Website: www.ecmbiofilms.com

For Sales or Information, contact:

Phone: 440-350-1400
Fax: 440-350-1444
E-mail: sales@ecmbiofilms.com
U.S. Toll Free: 888-220-2792

ECM Biodegradable

Plastic products bearing this logo are wholly biodegradable. Insist on it for the products you use.

EXHIBIT 3

ECM BIOFILMS

Are YOU thinking about SUSTAINABILITY?

www.ecmbiofilms.com

recycling cannot be the only

SOLUTION

Sustainable business, or green business, is enterprise that has no negative impact on the global or local environment, community, society or economy. It is a business that strives to meet the triple bottom line; people, planet, profit.

recycling cannot be the only

SOLUTION

Sustainable business, or green business, is enterprise that has no negative impact on the global or local environment, community, society or economy. It is a business that strives to meet the triple bottom line; people, planet, profit.

ECM BIOFILMS

Only about one-tenth of all solid garbage in the United States gets recycled.*

It's certainly no secret that over the last several years the global movement to address how the people of the world treat our planet has brought environmental issues to the forefront of public awareness. This has inspired a new term in the business world known by many as "corporate sustainability". From a business perspective, the goal of sustainability is to increase long-term company and social value, while decreasing industry's use of materials and reducing negative impacts on the environment. Many companies, large and small, are now pursuing the goal of sustainability, realizing that protecting the environment makes good business sense.

what doesn't get recycled can take over 100 years to

BIODEGRADE

what doesn't get recycled can take over 100 years to

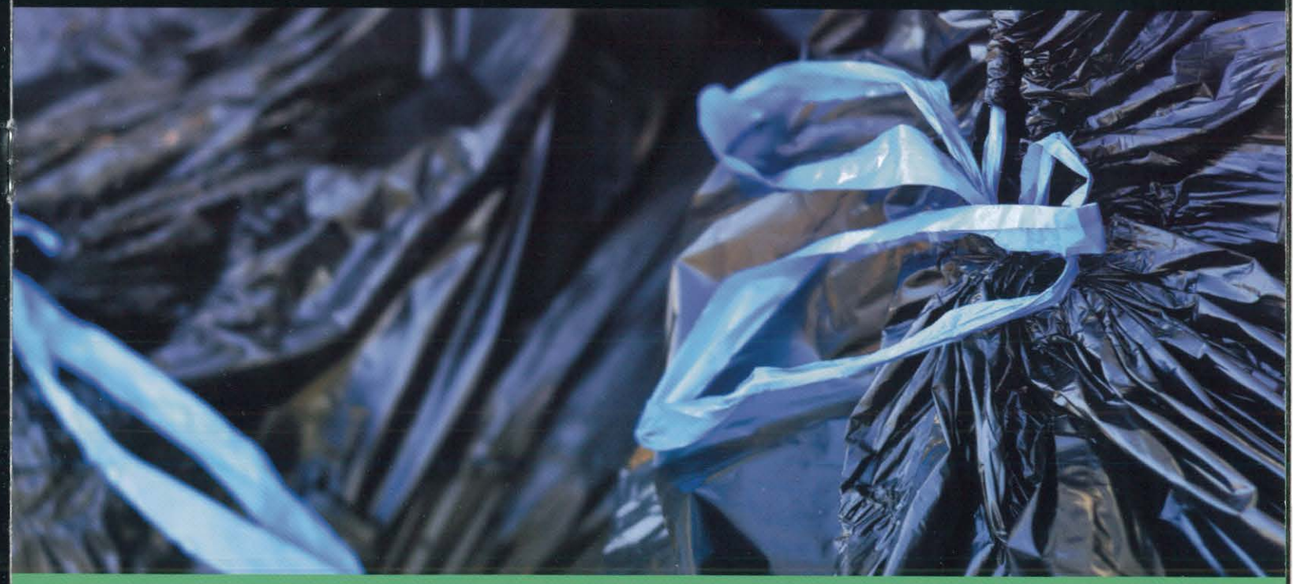
BIODEGRADE

Each day the United States throws away enough trash to fill 63,000 garbage trucks.*

ECM BioFilms, Inc. is dedicated to developing and revolutionizing the plastics market by offering an additive to standard plastic resins making them biodegradable. These biodegradable plastic products are priced competitively with, and have the same mechanical characteristics as, traditional non-degradable products. Using this additive in the plastic manufacturing process offers the unique opportunity for companies to continue efforts towards sustainability.

ECM revolutionary additive technology, when combined as a one-percent load to the most widely used plastic resins, renders the finished plastic products biodegradable while maintaining their other desired characteristics.

Our process enables the microorganisms in the environment to metabolize the molecular structure of plastic products into humus that is beneficial to the environment. This process utilizes several proprietary compounds that are combined into a masterbatch pellet that is easily added to plastic resins using existing technology.



only so much will end up HERE

Americans throw away 2.5 million plastic bottles every hour.*

This offers companies using this product a tangible, measurable effort towards corporate sustainability without interrupting or impacting current production practices whatsoever. The potential uses of this technology are limited only by the imagination.

Plastic products made with ECM additives:

- Fully biodegrade in 9 months to 5 years
- Are recyclable
- Can be made with recycled resins
- Do not use heat, light or mechanical stress to break them down
- Do not require special handling (unlike PLA and oxodegradable products)
- Do not contain heavy metals (unlike most oxodegradable products)

ECM BIOFILMS

only so much will end up HERE

Americans throw away 2.5 million plastic bottles every hour.*

This offers companies using this product a tangible, measurable effort towards corporate sustainability without interrupting or impacting current production practices whatsoever. The potential uses of this technology are limited only by the imagination.

Plastic products made with ECM additives:

- Fully biodegrade in 9 months to 5 years
- Are recyclable
- Can be made with recycled resins
- Do not use heat, light or mechanical stress to break them down
- Do not require special handling (unlike PLA and oxodegradable products)
- Do not contain heavy metals (unlike most oxodegradable products)

In the U.S., 4.39 pounds of trash per day and up to 56 tons of trash per year are created by the average person.*

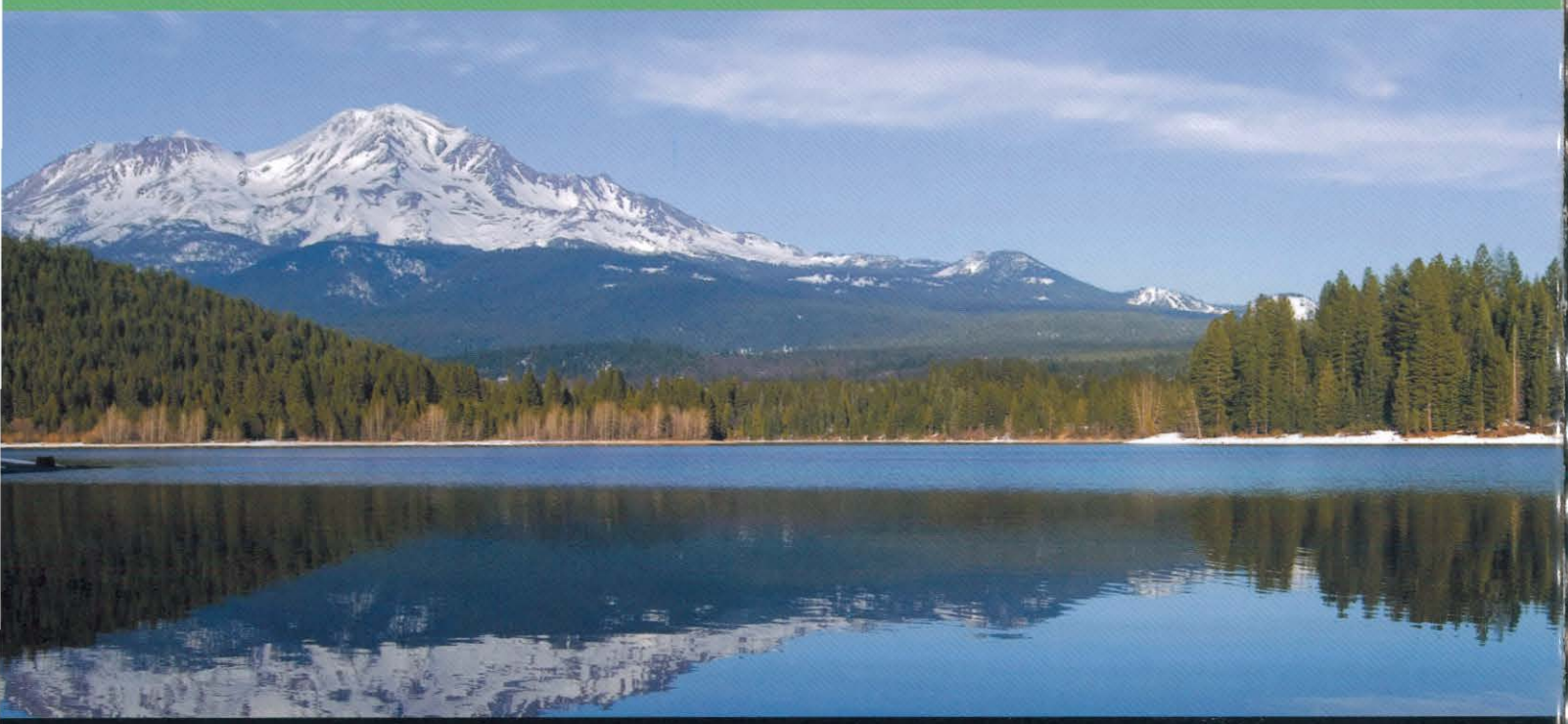
Plastic products made with ECM additives:

Fully biodegrade when disposed of in a biodegrading environment, either anaerobically or aerobically:

- in landfills
- in compost (backyard compost or commercial facilities)
- if buried or littered in the ground
- in agricultural and erosion-control settings

the rest ends up THERE

your company can be part of a bigger PLAN

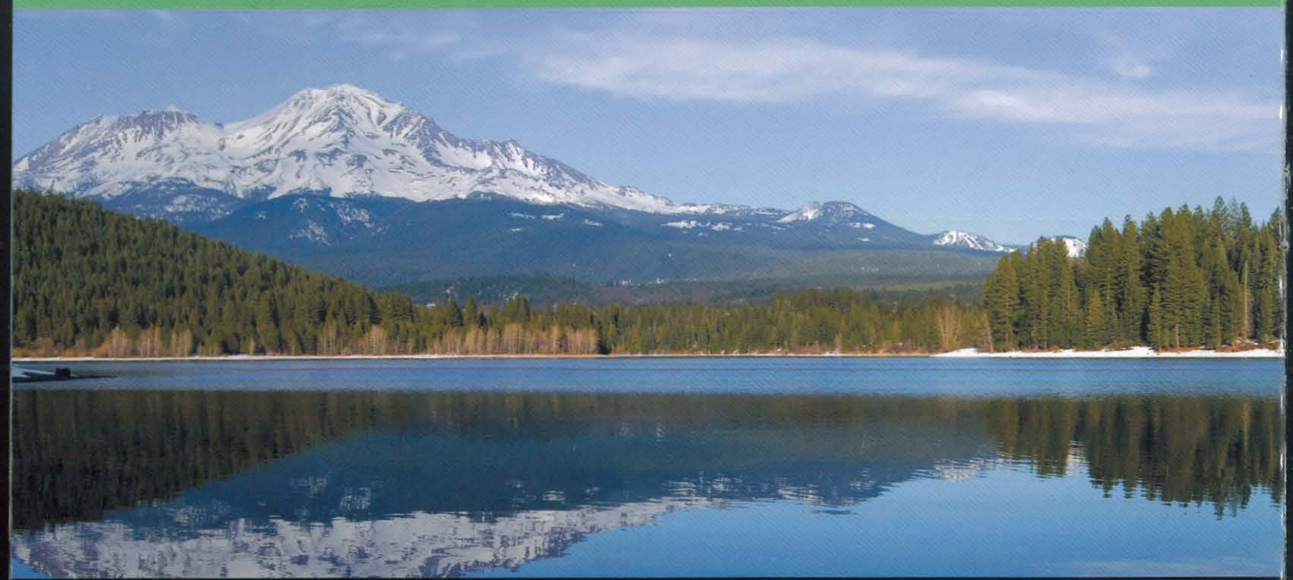


Almost 1/3 of the waste generated in the U.S. is packaging.*

Businesses often struggle to implement sustainability measures because they think it will take time and money away from current procedures. ECM BioFilms offers companies the opportunity to implement corporate sustainability seamlessly. Sustainability represents a major way companies can position themselves to thrive. It can lead to short and long-term competitive advantages.

Until ECM BioFilms MasterBatch Pellet™ technology, there has not been a product created that will allow for the breakdown of plastic without the use of light, heat or some form of mechanical sensitivity. Sustainability is not a trend - it's here to stay. ECM helps companies minimize their environmental impact and unlock innovation and creativity.

your company can be part of a bigger PLAN



Almost 1/3 of the waste generated in the U.S. is packaging.*

Businesses often struggle to implement sustainability measures because they think it will take time and money away from current procedures. ECM BioFilms offers companies the opportunity to implement corporate sustainability seamlessly. Sustainability represents a major way companies can position themselves to thrive. It can lead to short and long-term competitive advantages.

Until ECM BioFilms MasterBatch Pellet™ technology, there has not been a product created that will allow for the breakdown of plastic without the use of light, heat or some form of mechanical sensitivity. Sustainability is not a trend - it's here to stay. ECM helps companies minimize their environmental impact and unlock innovation and creativity.

so we can preserve THIS for future generations

Every year we fill enough garbage trucks to form a line that would stretch from the earth, halfway to the moon.*

ECM's mission is to constantly provide the best possible value to its customers and suppliers, while dedicating efforts toward eliminating disposal and environmental issues surrounding the plastics industry. ECM is striving to provide an avenue of sustainability to companies worldwide.

ECM BIOFILMS

*Facts as stated by the Clean Air Council

EXHIBIT 4

CERTIFICATE

of

the Biodegradability of Plastic Products Made by

SL Plastic Co. LTD

that Incorporate the

ECM MasterBatch Pellet Technology

This is to certify that numerous plastic samples, submitted by ECM BioFilms, Inc., have been tested by independent laboratories in accordance with standard test methods approved by ASTM, ISO and other such standardization bodies to determine the rate and extent of biodegradation of plastic materials.

A Degradable Plastic is defined (ASTM D1991) as a plastic that is 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. A Biodegradable Plastic is defined as a degradable plastic in which the degradation results from the action of naturally occurring microorganisms such as bacteria, fungi and algae.

The biodegradation of the submitted plastic samples were tested using ASTM D5209-91, "Standard Test Method for Determining the Aerobic Biodegradation of Plastic Materials in the Presence of Municipal Sewage Sludge", ASTM D5338-98, "Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials under Controlled Composting Conditions", which is equivalent to CEN prEN WI 261085, and the ISO 14855 method, "Evaluation of the Ultimate Aerobic Biodegradability and Disintegration of Plastics under Controlled Composting Conditions", ASTM D5511, "Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic Digestion Conditions." The results of these tests and the related biodegradation and ecological impact experiments in various environments are contained in the Ecological Assessment of ECM Plastic report dated February 16, 1999, which certifies that plastic products manufactured with ECM additives can be marketed as biodegradable, safe for the environment and complying with 94/62 EC for the EU.

This Certificate and the Ecological Assessment of ECM Plastic report, along with Scanning Electron Microscope and other studies that have been conducted since the publication of the Ecological Assessment, all of which use a one percent loading rate for the ECM MasterBatch Pellets rather than the higher additive levels used earlier, have been presented to **SL Plastic Co. LTD**, *and may be used by it to validate ts claims to the biodegradability and environmental safety of plastic products that it manufactures that are made consistent with the manufacturing guidelines for uses of ECM MasterBatch Pellets presented to it by ECM BioFilms, Inc.*

Dated: February 8, 2011

Certified by: _____

Robert Sinclair, President
ECM BioFilms, Inc.