

# The Hemp Plastics Business

*by*  
Paul Benhaim

[www.hempplastic.com](http://www.hempplastic.com)

## Introduction

Welcome to this introduction to the business world of hemp plastics. This is a subject I have been passionate about since 1998 when I created the first commercial 'hemp plastic' since Henry Ford.

In this brief introduction I will presume you have an overview of the industrial hemp market, or have read [Modern Introduction To Hemp](#).

I will give you an overview of what plastics are, and the emerging bioplastics market.

Lots of photos are included to help illustrate the natural beauty of bio plastics.

There are facts and figures that I trust make it clear that the size of the market opportunity is worthwhile investigating.

If you find an opportunity to become involved, please let me know, and as always - my services are available to assist all in taking any business related to this subject further. There is room for all in this emerging bio based economy.

Have fun, and whatever you choose, choose it for you as you are part of this Earth and all that it reflects will be you.

Hempfully yours,

Paul

## About The Author

Paul Benhaim is a recognized world-authority in hemp research and development, as well as a published author of Hemp-related books and DVDs. He manages the world's most popular Hemp web sites and advises a number of international companies.

As well as acting as an independent consultant and mentor to those interested in business, usually the hemp business, Paul is CEO and Director of a cutting edge Hemp companies involved with hemp plastic and hemp food products.

Paul continues his quest to ensure the path for the widespread use of industrial hemp is accessible to all so new and revolutionary Hemp products may become available to a worldwide audience.

Born in London, after travelling the world for a decade, Paul now lives and works from his rainforest home in coastal Australia.

For further information on some of Paul's projects enjoy:  
[www.hemp.co.uk](http://www.hemp.co.uk) and [www.hempplastic.com](http://www.hempplastic.com)

### DISCLAIMER

This book is intended to help you decide if you want to start a hemp business. This book is not intended to be the only business you receive. You are recommended in this book to write a business plan. You should check all the data and facts are up to date and relevant to your location, state and federal laws. It is also strongly recommended that you speak with your lawyer, accountant and bank manager before moving ahead with any business. You may want to consider a personal business mentor as well.

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**Hemp Plastic Pellets suitable for injection moulding**

## **What is hemp plastic?**

Plastic is defined as:

fictile: capable of being molded or modeled (especially of earth or clay or other soft material); "plastic substances such as wax or clay"

generic name for certain synthetic or semisynthetic materials that can be molded or extruded into objects

or films or filaments or used for making e.g. coatings and adhesives

capable of being influenced or formed; "the plastic minds of children"; "a pliant nature"

Therefore, we define Hemp Plastic as:

*A material containing at least 20% hemp capable of being molded or modeled*

Hemp now promises to play its part in the plastics industry as an alternative to what is the now non-sustainable petrochemicals. Various moulded products using a number of techniques can be produced from environmentally controlled biodegradable materials. Hemp seems to bring us many of the solutions required in the 21st century. From bio-composites – blends such as 50% hemp and polypropylene to a material made from 100% Hemp known as Zelfo.

These materials are used in the production of many items from musical instruments with great acoustic properties, to automotive products with light weight and recyclability to mass produced eco versions of kitchen scales, CD-cases, credit cards, car parts, furniture, musical instruments, bowls, cosmetic containers, shopping bags, surf-boards and children's toys!

The Hemp frisbee 'High Fly' (1998) modeled by Hawaiiin State Representative Cynthia Thielen was the first *commercial* Hemp plastic product realised since Henry Ford first introduced the idea.





*Going Out In Style* – **100% hemp biodegradable coffin**



## **Technical explanation**

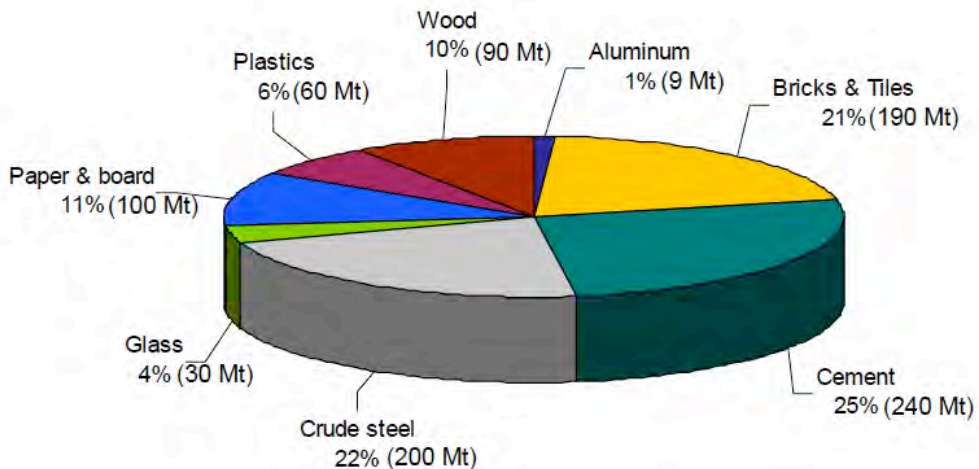
Renewable materials and bio-based products are based on the direct utilization or biotechnological conversion of starch, sugars, plant oils and cellulose/ natural fibres as well as special biomolecules like natural rubber or lignin. They all diversify the raw material base, increase the independence from crude oil price increases and typically exhibit much better CO<sub>2</sub>-balances than previous materials and products. Bioplastics, or more precisely bio-based plastics, are up to now mainly used in the packaging industry. This is true especially for bioplastics which are usually biodegradable and therefore simplify subsequent uses in certain sectors or their disposal and thus save costs and protect the environment. Next to shopping bags, catering materials, fruit and vegetable packaging more and more applications are being opened up with improved properties like packaging for all kinds of foodstuffs, shrink film as well as beverage bottles (milk and juice).

The market for durable bioplastics grows even stronger for a multitude of necessities (mobile phone cases, toys) or interior parts in the automobile industry. Newest developments are Bio-PE, Bio-PP (from sugar) and Bio-PA (from castor oil). To the group of durable bioplastics also belong plant oil based thermosets which can be found among others in foams for mattresses (castor oil) and arm- and headrests in automobiles (soybean oil). A further group are the Wood Plastic Composites (WPC) which establish themselves more and more for floor deckings and through injection-moulding have found their way into numerous consumer and industrial goods as well as furniture. In the wood sector, several modified domestic woods which attain properties of tropical woods also count as innovative

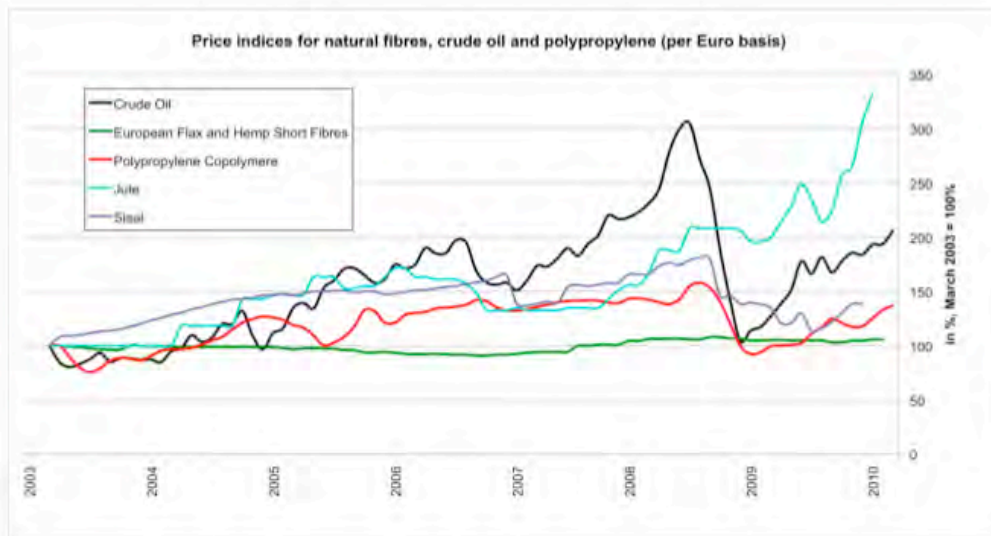
renewable materials and bio-based products.

What excites us is also another group of biomaterials: Natural fibre reinforced plastics which to date are mainly used in the automobile interior. With natural fibres, properties of plastics and bio-based plastics can be significantly improved. In many applications a substitution of glass fibre reinforced plastics or PC/ABS is possible (in relation to form stability). Since the big players in the plastics industry have started to use natural fibre reinforced plastics, two-digit annual growth rates are now expected in this sector.

### Size of the plastics market compared to other materials



## Price Indices for Natural Fibres



Growing Market

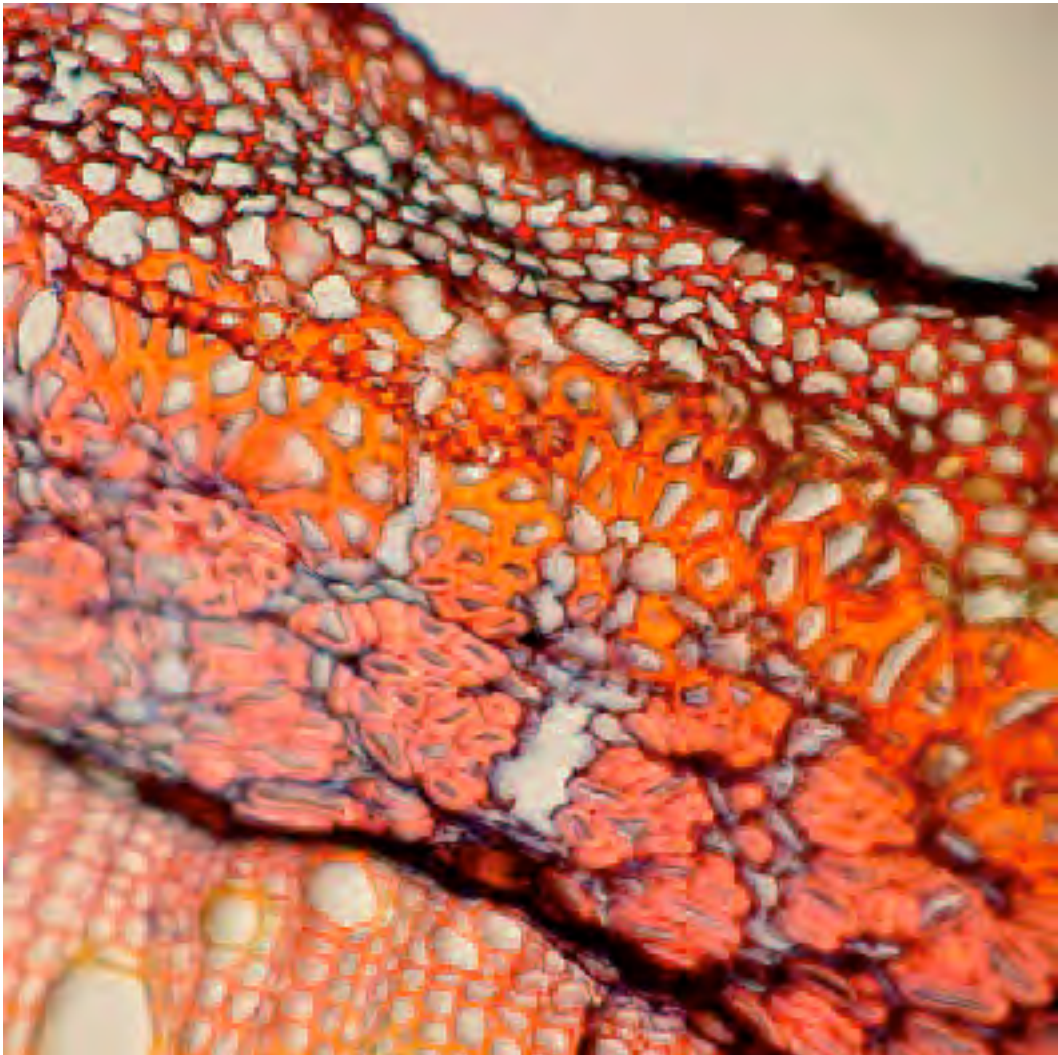
**In two years' time, Asia pacific region is expected to be the biggest bioplastics consumer [16-Nov-2009, source:Food Production Daily.]**

German based trade group European Bioplastics pointed out some of the major activities in 2009, such as US producer NatureWorks doubling its polylactic acid (PLA) production capacity to 140,000 tonnes/year; German chemical major BASF introducing new biodegradable plastics for coating paper and shrink film; and Italy-based Novamont launching its second-generation bioplastic Mater-Bi, as well as boosting capacity to 80,000 tonnes/year. 19 March 2010 [Source: ICB]

At this time, Europe continues to be the largest biodegradable polymers-consuming region, with about half of the global total. Major market drivers for biodegradable polymers in this region include legislation, depleting landfill capacities, pressure from retailers, growing consumer interest in sustainable plastic solutions, fossil oil and gas independence, and the reduction of greenhouse gas emissions.

North American and Asian consumption of biodegradable polymers have also grown significantly in recent years. Japan has enjoyed growth in biodegradable polymers use as a result of government and industry promoting their use. The rising prices for petroleum and petroleum-based products have also contributed to the replacement of petroleum-based polymers with biodegradable polymers. However, Japanese consumption of biodegradable polymers has not increased as much as expected.

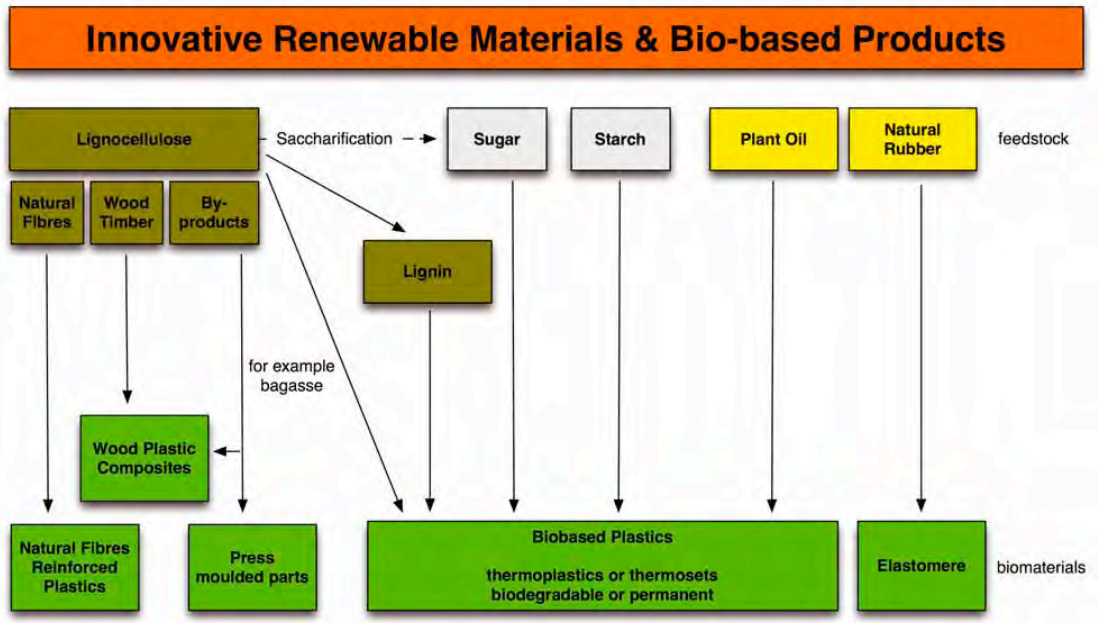
In Other Asian countries however biodegradable polymer demand is expected to increase greatly in the next several years. In China, high growth will be due to several factors: an increase in production capacity, demand for environmentally friendly products, and the government's plastic waste control legislation. (source: [SRI Consulting's new study, "Biodegradable Polymers"](#).)





***cross sectional view of a hemp stalk – the source of strength***

## Different Types of Bio Plastics.

Hemp is mainly used to reinforce natural fibre plastics of various kinds including PP, PE, ABS, PLA.



## BioBased Products in the EU 2009



### Summary: Biobased Products in the EU 2009

New Biomaterials – Technique	Quantities – Region
Biodegradable bioplastics (mostly packaging)	> 80,000 t
Bioplastics in permanent applications	> 60,000 t
NF compression moulding in the automotive industry	> 40,000 t
Wood fibre compression moulding in the automotive industry	> 50,000 t
Cotton fibre compression moulding (lorries)	> 100,000 t
WPC injection moulding and extrusion (construction, furniture, automobiles)	> 120,000 t
NF injection moulding and extrusion	> 5,000 t
<b>Total biobased products</b>	<b>&gt; 450,000 t</b>

Source: nova-Institut 2009

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### Innovative bio-based materials

Bio-Based Plastics and Composites can be, and are used already to a great extent by industry, especially by the automotive, packaging and building industries. Estimates give a figure of about 500,000 tonnes a year and a two digit growth in the European Union.

Hemp Plastics can be five times stiffer and 2.5 times stronger than polypropylene, it will not cause wear and tear to the screw and the mould like glass fibres do, and unlike glass fibres, it does not pose safety and health risks. Its recoverable component comes from these natural plants and can occupy over half of its weight, up to 80 percent. All



these features make it suitable for the production of durable products.

Hemp Plastics properties include: good insulation, dimensional stability at high temperatures, high thermal deformation temperature, flame retardant, impermeability, possessing a stiffness and strength similar to traditional glass fibre filled polypropylene, can withstand long machine resistance time, low water absorption rate, high resistance to UV radiation and demonstrates normal flow behaviour, making it the best substitute for glass-reinforced plastic.



**Basin**, Hemp fibre and thermoset, Resin Transfer Moulding (RTM) (The Netherlands).



**Natural Fibre Reinforced Drinking Cups**



Hemp Fibre reinforced **briefcase**, as used by the Author

**Lotus Eco Elise, as wanted by the Author ☺**







Natural Fibre Reinforced Plastics in a Lotus Eco Elise  
<http://www.youtube.com/watch?v=cOCm8CNsvWg> to see video  
(above) and **Mercedes** (below)





Hemp Fibre and Cashew Nut Oil **Brake Pads** – Eco Brake  
ready for launch 2010





Hemp Fibre Pellets used for granule production



## Hemp Short Fibres

### **Present and future development in plastics from biomass**

Li Shen,\* Ernst Worrell and Martin Patel, University Utrecht, the Netherlands  
Published online December 7, 2009; *Biofuels, Bioprod. Bioref.* 4:25–40 (2010)

Recommend visiting:

<http://www3.interscience.wiley.com/cgi-bin/fulltext/123204234/PDFSTART>

### **Report on Biobased Polymers**

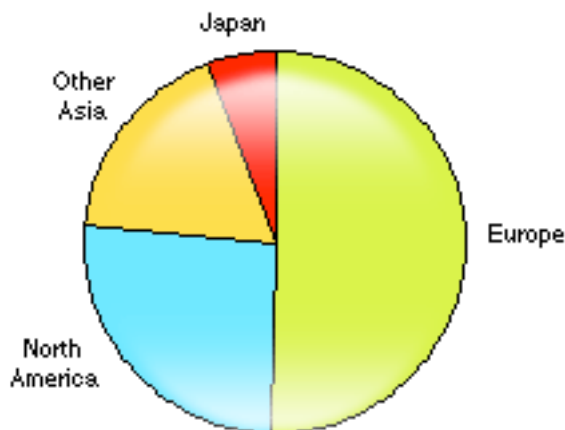
By SRI Consulting

## Michael Malveda with Uwe Löchner and Kazuteru Yokose Abstract

In 2009, demand for biodegradable polymers in North America, Europe and Asia accounted for most of the global consumption. Despite the economic crisis, which hit the chemical and plastics industry, the market for biodegradable polymers did grow in 2009 in almost all regions. In Europe, the largest global market, growth was in the range of 5–10% (depending on products and applications, compared with 2008). Total consumption of biodegradable polymers in these three regions is forecast to grow at an average annual rate of nearly 13% over the five-year period from 2009 to 2014. The food packaging, dishes and cutlery market is the single largest end use and will be the major growth driver in the future.

The following pie chart shows **world consumption of biodegradable polymers 2009**:

**World Consumption of Biodegradable Polymers—2009**



Europe continues to be the largest biodegradable polymers consuming region, with about half of the global total. Major

market drivers for biodegradable polymers in this region include legislation, depleting landfill capacities, pressure from retailers, growing consumer interest in sustainable plastic solutions, fossil oil and gas independence, and the reduction of greenhouse gas emissions.

North American consumption of biodegradable polymers has grown significantly in recent years. The following factors have contributed to and will continue to contribute to growth: biodegradable polymers have become more cost-competitive with petroleum-based products; there has been growing support at the local, state and federal levels for these products and for addressing needs about solid waste disposal; there is increasing public awareness regarding the depletion of petroleum-based raw materials; large retailers and manufacturing companies desire to develop more sustainable raw material sources as well as to impact global warming; and the properties and processing of biodegradable polymers have improved.

In Japan, there has been some growth in biodegradable polymers use as a result of government and industry promoting their use. The rising prices for petroleum and petroleum-based products have also contributed to the replacement of petroleum-based polymers with biodegradable polymers. However, Japanese consumption of biodegradable polymers has not increased as much as expected. In Other Asian countries, biodegradable polymer demand is expected to increase greatly in the next several years. In China, high growth will be due to several factors: an increase in production capacity, demand for environmentally friendly products, and the government's plastic waste control legislation.

Use of biodegradable polymers has continued to grow, even though some of their other benefits are viewed as of more longer-term interest. Their greatest impact may be in the future, when infrastructures and systems have improved. For example, in the United States, it is expected that when there is a large volume of compostable products (driven by their low carbon footprint), then it will make economic and environmental sense to compost and recycle more. In Europe, however, Western European countries have large-scale composting facilities already in place and are composting several million metric tons of source-separated organic waste.

For biodegradable materials, it is generally regarded that the product will degrade into water and carbon dioxide by virtue of a naturally occurring organism, such as microorganisms. Some industry sources have offered the term compostable in place of biodegradable. To be considered compostable, three criteria must be met: biodegradation—it has to break down into carbon dioxide, water and biomass at the same rate as cellulose; disintegration—the plastic must become indistinguishable in the compost; and nontoxicity. Most international standards (such as ISO 17088) require at least a 60% biodegradation of a product within 180 days, along with other factors, in order to be called compostable.

Biodegradable polymers are part of the larger biopolymers market. The industry defines biopolymers, or bioplastics, as polymers that are either bio-based or biodegradable (some materials like NatureWorks' Ingeo™ PLA are both). Some bio-based products are not necessarily biodegradable (e.g., polyethylene based on ethanol), while some biodegradable products are actually made from petroleum-based products

(e.g., polycaprolactone).

The issue between bio-based and biodegradable materials has continued to attract attention worldwide. In Japan, the idea of bio-based renewability is becoming more important relative to biodegradable materials. In the United States and Europe, industry sources comment that the idea of bio-based or “where it comes from” versus biodegradable, or “where it goes” is currently driving or will drive the overall biopolymers market in the future. Bio-based products have gained support as a result of the current focus on climate change and the low carbon footprint that results, as well as legislation (at the national and international levels), cap and trade issues, etc. The USDA has even set up a bio-preferred program that promotes consumer use of bio-based products through labels identifying bio-based content.

Full report available from:

<http://www.sriconsulting.com/CEH/Public/Reports/580.0280/#xml=http://10.2.0.53/cgi-bin/teXis/webinator/search/pdfhi.txt?query=Biodegradable+Polymers&pr=super&prox=page&rorder=500&rprox=500&rdfreq=500&rwfreq=500&rlead=500&sufs=0&order=r&id=4b928a397>



## **Eco Stationary Holder**

Executive Summary from the **European BioPlastics Bio-BIP 2009 study** with the University of Utrecht,

Polymers abound in nature. Wood, leaves, fruits, seeds and animal furs all contain natural polymers. Bio-based polymers have been used for food, furniture and clothing for thousands of years. The first artificial thermoplastic polymer “celluloid” was invented in the 1860s. Since then, numerous new compounds derived from renewable resources have been developed. However, many of the inventions related to bio-based polymers made in the 1930s and 1940s remained at the laboratory stage and were never used for commercial production. The main reason was the discovery of crude oil and its large-scale industrial use for synthetic polymers since the 1950s.

Today, public concern about the environment, climate change and limited fossil fuel resources are important drivers for governments, companies and scientists to find alternatives to crude oil. Bio-based plastics may offer important contributions by reducing the dependence on fossil fuels and the related environmental impacts.

In the past two decades bio-based plastics have experienced a renaissance. Many new polymers from renewable feedstocks were developed. For example, starch, i.e. a naturally occurring polymer, was re-discovered as plastic material. Other examples are PLA that can be produced via lactic acid from fermentable sugar and PHAs which can be produced from vegetable oil next to other bio-based feedstocks.



The developments in the past five years in emerging bio-based plastics are spectacular from a technological point of view. Many old processes have been revisited, such as the chemical dehydration of ethanol which leads to ethylene, an important intermediate chemical which can be subsequently converted into polyethylene (PE), polyvinyl chloride (PVC) and other plastics. Moreover, recent technology breakthroughs substantially improved the properties of novel bio-based plastics, such as heat-resistance of PLA, enabling a much wider range of applications. For numerous types of plastics, first-of-its-kind industrial plants were recently set up and the optimization of these plants is ongoing.

Hence, we are at the very beginning of the learning curve. Some of the plant capacities are still rather small when compared to petrochemical plants (e.g. the capacity of Tianan's PHA plant is only 2 kt), but others are very sizable (e.g. Dow-Crytalsev's bio-based PE plant will have a capacity of 350 kt). With growing demand for bio-based plastics, it is probably just a matter of time until turn-key plants with large capacities will be commercially available for more bio-based plastics, thereby allowing substantially accelerated growth.

Full report available at [http://www.european-bioplastics.org/media/files/docs/en-pub/PROBIP2009\\_Final\\_June\\_2009.pdf](http://www.european-bioplastics.org/media/files/docs/en-pub/PROBIP2009_Final_June_2009.pdf)





**Hemp Plastic Pellets close-up**

For a material to be genuinely environmentally friendly, its entire production process should be a closed system. The waste released by each production process should be usable in the next process, forming a cradle-to-cradle production cycle. In addition, as the raw materials of Hemp Plastic come from plants and petrochemicals, the whole product can be collected and reused.

Various forms of hemp plastics are available for use in applications that include:

automobiles, construction materials, packaging, toys and electronic products.



**Cosmetic Containers**

## **Fabrication Process Summary**

**Open Mould/Hand Lay-up fabrication** is still widely used for large area mouldings such as swimming pools and boat hulls, and for short production runs. Glass fibre reinforcement is introduced into the mould in chopped strand mat or woven fabric form, or deposited in-situ using a chopper gun. The fibres are wet out and with catalysed resin and consolidated by hand using metal or plastic rollers.

Almost all fabricators are capable of producing products via the traditional open moulding process.

**Resin Transfer Moulding (RTM)** is a closed mould process suitable for medium length production runs, and which produces articles having finished surfaces on both sides. A glass fibre preform is inserted prior to closing the mould, and catalysed resin pumped in under pressure. Both mould and resin are normally pre-warmed in order to accelerate curing cycle times.

New, longer life mould making materials and the use of program logic control (PLC) techniques to optimise resin injection parameters have considerably widened the scope of the RTM process in recent times.

The recent introduction of a vacuum assisted version of the RTM process enables the use of much lower moulding pressures, & consequently lighter construction and lower cost tooling.

**Filament Winding** is the preferred process for the production of cylindrical items such as pipes, casings, ducts, tanks and pressure vessels. Continuous rovings of glass fibre are impregnated with catalysed resin and wound onto a rotating mandrel in a machine controlled pattern in accordance with final component performance requirements.

**Pultrusion** is the process normally employed for the continuous production of rods, hollow sections and solid profiles in various configurations. Continuous strands of fibre reinforcement are impregnated with catalysed resin and then drawn through a heated metal die using a machine controlled pulling mechanism. Pultruded sections normally contain a high ratio of glass fibre reinforcement, and therefore exhibit very high strength properties.

**Vacuum Infusion** processes are being increasingly used to improve product quality, reduce labour costs, and to largely eliminate styrene vapour emissions. In this process, the reinforcement is placed in the mould and covered with a sealed plastic bag. Application of a vacuum is then used to both draw catalysed resin through the reinforcing material and to consolidate the final part.

Latest technology using sophisticated resin channeling techniques and long gel time resins can permit the manufacture of large and complex parts via this process, including those with in-built core panels.

**Bulk Casting** is mainly employed for the production of high quality appearance articles used in the building industry such as vanity tops and basins, shower slabs and

decorative bench-tops. Mineral fillers are blended into liquid catalysed resin to form a thick mixture which is then cast into moulds. Very realistic simulations of marble, onyx and granite can be achieved using specialised gel coats in combination with various mineral particles and mixtures.

**Centrifugal Casting** may be employed for the manufacture of large volumes of cylindrical pipes and tubes. A mixture of resin and aggregate is fed into a cylindrical mould which is spun at high speed to force the component mixture against the mould perimeter, resulting in a high strength/high density finished hollow component. In-process heating results in a quick cure of the resin, facilitating high volume throughput.

**Continuous Moulding** is carried out in a heated compression moulding press under elevated temperature and pressure. Glass reinforcement, often in the form of a preform is introduced into the mould, and the required charge of catalysed resin poured in, with closing of the mould bringing about impregnation of the reinforcement.

**Compression Moulding** most commonly utilises prepreg materials, in particular Sheet Moulding Compound (SMC). Sections of SMC are placed in the mould, and the press closed. This process is widely used by automotive manufacturers in North America and Europe. The need to use heated, steel dies generally means that this process is best suited to high volume production runs.

**Continuous Profile** production is mainly employed for materials used in linear sheet form by the building industry,

the most common being roofing materials in various profiles.

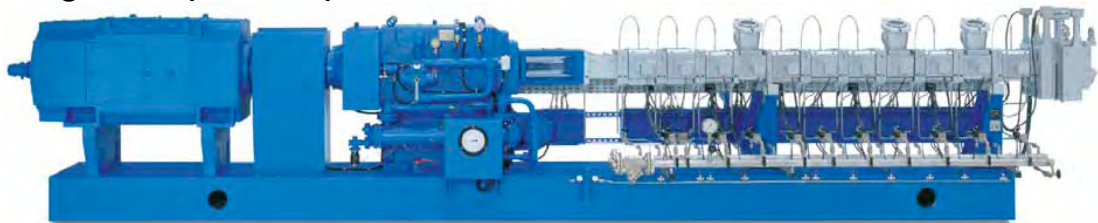
**Glass reinforcement** is wet out and sandwiched between sheets of release film on a continuous belt. The sheet is then fed into a curving oven along formers of the required profile. The fully cured sheet emerging from the oven is then cut into finished sheets of the desired length.

#### **Bioplastic film extrusion.**

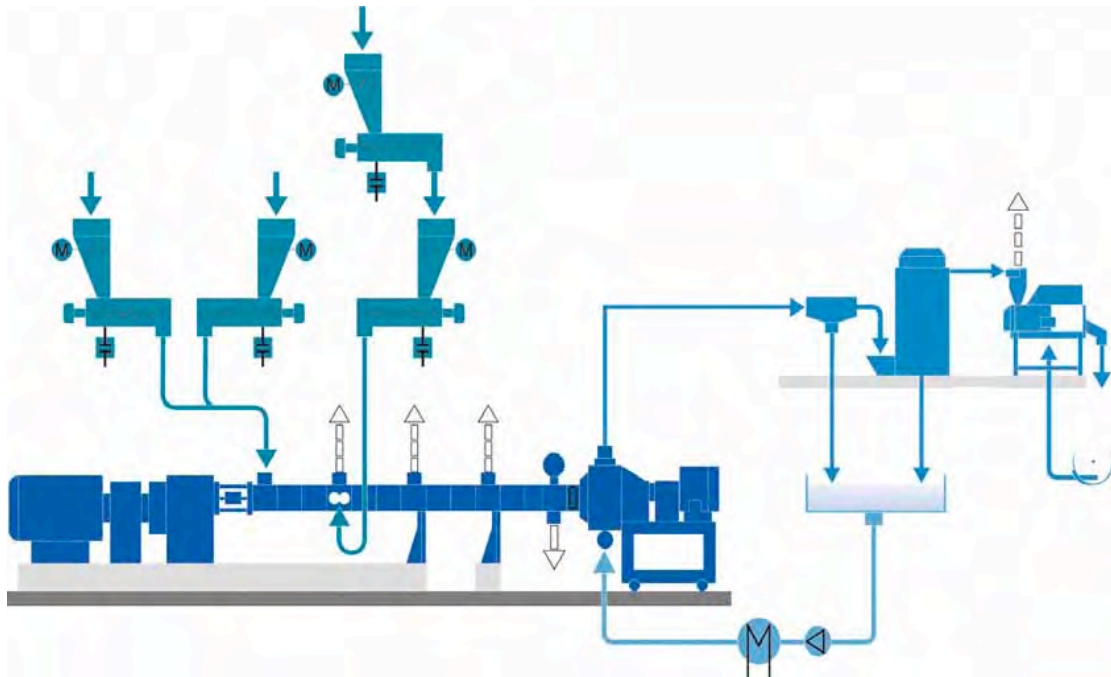
A multilayer food packaging material suitable for food production. Already used by multi-nationals this material is now tried and tested.

**XPS** and other Foam sheet extrusion of thermoplastics. Foams based on biopolymers are now available on the market for food trays or particle foams.. The rigidity in combination with a high heat resistance (approx. 111°C) and thermoformability of these cellulose acetate foams make them attractive to rigid foam applications (e.g. trays for hot contents). Furthermore, the excellent injection mouldability together with the foaming performance make this material ideal for the manufacturing of foam injection moulded compact parts with a (rigid) foam core

MegaCompunder plus twin screw extruder:







Set-up for processing biodegradable composites and wood composites.

**Cellulose Acetate based foam sheets  
and thermoformed tray**





**Inside an eco car Built by Johnson Controls**



The **Ford Mustang GT RTD** features the world's most powerful biodiesel engine and bodywork made of flax-fibre reinforced linseed-acrylate, i.e. a high performance composite made of natural fibres embedded in a resin from the same plant (flax and linseed). Advantages of the bio-composites are their lower weight compared to glass-fibre composites, they do not splinter in crashes and, most

importantly, they are better for the environment.

## **Hemp Plastic Digital-Scales**

# 200-ZH

## HEMP PLASTIC COMPOSITE



### 200-ZH Key Features

The world's first hemp plastic electronic item. As part of our commitment to weighing technology and the environment we are proud to introduce the first scale ever made from a natural composite material.

The hemp plastic for this scale was engineered and produced in Germany. The scale was manufactured at our factory in Fuzhou.

- Advanced Composite Materials resist chipping and scratches
- Weighing Tray Doubles as a Cover
- Miniature Size but designed to be more functional than scales twice its size
- Large 200 Gram capacity
- Lifetime/30 Year International Warranty
- 0.1 Gram Readability & Accuracy
- Reads in Grams, Ounces, Troy Ounces & Pennyweight.



**COMPOSITE**  
**HEMP**  
**PLASTIC**  
 Plastique De Chanvre / Hanf Plastik

Capacity	Accuracy / Readability
200 grams	0.1 grams
7.06 ounces	0.005 ounces
6.43 troy ounces	0.005 troy ounces
128.7 pennyweight	0.1 pennyweight



Variable	Specifications
scale size	2¼" x 3½" (6cm x 10cm)
Tray Size	2¼ x 3½ (6cm x 10cm)
Weight	71g

**PATENTED DESIGN**

\*long lasting Lithium batteries included

**Key Features:**

- 5000g x 1.0g Capacity
- Reads in Grams, Ounces and Pounds or Pennyweight.
- Huge, Easy to Read Backlit Display
- AAA Batteries Included
- GW/Net Weight Stability Indication
- Professional Grade 5000 division Load Cell with 4 strain Gauge Sensors
- Removable/Washable Bowl
- Full Lifetime/30 year Warranty!
- Full Memory (cumulative up to 50 items)
- Low battery Indicator
- Advanced Counting Feature with Multiple Sample Sizes
- Separate Zero and TARE features
- Compensates Temperature Changes
- Optional Bird Stand & AC Adaptor Available

**iBal 5000H**  
High Precision Professional Digital Scale

Unit	iBalance 5000H
Grams	5000g x 1.0g
Ounces/lb	11lb x 0.05oz
Pounds	11lb x 0.002lb

- 4 modes standard
- L'indicateur de pile bas
- 5000g x 0.1g Capacité
- Un grande exposition de LCD A 6 chiffres
- Les piles de AAA ont inclus

With a huge maximum capacity of up to 11 pounds / 5 kilograms and precise readings as accurate at 0.001 pound / 0.5 gram, these scales are sure to fit any weighing need.

As part of our commitment to weighing technology and the environment we are proud to introduce the first kitchen scale ever made from a natural composite material.

The hemp plastic for this scale was engineered and produced in Germany. The scale was manufactured at our factory in Fuzhou.

Please visit us at [www.hempplastic.com](http://www.hempplastic.com) for more info.

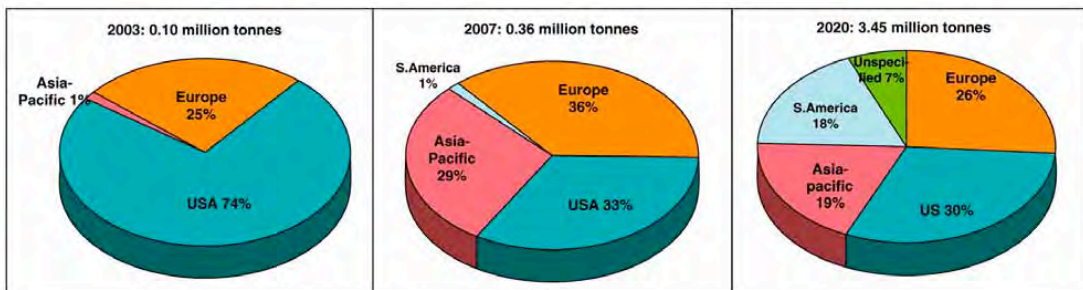
**COMPOSITE HEMP PLASTIC**  
Plastique De Chanvre / Hanf Plastik

**LIFETIME 30**  
LIFETIME/30 YEAR INTERNATIONAL WARRANTY

**COMPOSITE HEMP PLASTIC**  
Plastique De Chanvre / Hanf Plastik

## Kitchen Scales

### Breakdown of worldwide capacity of bio-based plastics by region.



Note: "Unspecified region" in the right figure means that there are no concrete plans about the location of these capacities.

The global capacity of the emerging biobased plastics was only 0.36 million tonnes in 2007. However, the market grew strongly between 2003 and 2007 (approx. 40 % per year). The technical substitution potential of biobased plastics

replacing petrochemical plastics is estimated at 90 %, demonstrating the enormous potential of biobased plastics.

In Western Europe in 2007, 43 % of all plastics are used for packaging, 21 % are used in building and construction, 8 % for automobiles, 5 % for electrical and electronic appliances, and the remaining 23 % are used for various other applications. (Simon C-J and Schnieders F)

## **Services offered**

Interested in knowing more about the hemp plastics markets or ready to get involved?

Materials suitable for injection moulding are available now  
Manufacturing of your item is possible today in Europe, USA, China or Australia.

Want to develop or formulate your own new blend of hemp plastic material for a specific use?

We offer project management to ensure you work with only the best.

Need more detailed market reports, competition analysis, marketing strategies and concepts or studies specific to your unique needs?

Technical, environmental, legal or process chain analysis?  
Hemp Plastic, Bio-Plastics, Wood Plastic Composites and wood like materials?

All available today from: [www.hempplastic.com](http://www.hempplastic.com)



# Hemp Shopping

All products available from [www.hemp.co.uk](http://www.hemp.co.uk) from September 2010

## Hemp Foods

### Hemp Protein Powder

This Hemp Protein Powder has a gourmet nutty flavor that tastes so good you can eat it straight from the jar. Use it to create delicious shakes, add it to juices, smoothies and green drinks. Buy 100% raw, cold milled Hemp Protein Powder from <http://bit.ly/cd7hCO>

### Hemp Seed Nut

Otherwise known as shelled hemp seeds – these are the tastiest and most pure way to enjoy the drug-free nutritional qualities of hemp seeds. A complete protein (35%), omega 6 and omega 3 Essential Fatty Acids (35%) and is a source of GLA (1%). These are delicious sprinkled on salads, cereals, yogurt or cooked grains. I eat it straight from the bag! This hemp seed nut is cold mechanically pressed and packaged without additives or preservatives and grown without herbicides or pesticides from Non-GMO hemp seed. So what are you waiting for? Buy now from <http://bit.ly/dmmXL6>

### Hemp Seed Nut Butter

Like peanut butter or tahini, but tastes better and is much better for you as nature's source of complete protein (35%) and Omega 6 & 3 Essential Fatty Acids (35%). May be spread on breads, bagels, crackers and croissants.. So get some from <http://bit.ly/a3dCGe>

### Hemp Seed Oil

Certified Organic Hemp Seed Oil is nature's richest source of the Essential Fatty Acids (75%) and is a rich source of GLA (3%). Hemp Seed Oil is preferable over flax seed oil as it offers a good balance of Omega 6 to Omega 3 fatty acids (3.75:1) so it is suitable for life long consumption. And you will have a long life. Tastes a lot better than fish oils with a mild nutty flavour. Can be eaten straight (I do) or added to juices, smoothies, soups and sauces. It is a great base to any salad dressings. Hemp Oil is

not ideal for frying. Also available in capsule format. Go <http://bit.ly/dBRP6F> to buy now.

### Hemp Cosmetics

Hemp oil is used as the base of cosmetic products because it helps make the skin feel young, and smooth. Hemp Oil has been shown to improve eczema and other dry skin ailments. Hemp Oil in cosmetics is absorbed by the skin and after a short while of using such products I am sure you will notice the difference yourself. A great range of hemp cosmetics is available via [www.hemp.co.uk](http://www.hemp.co.uk) - shipping worldwide.

### Hemp Jewelry

Want to share something special and let them know you care about the planet as much as you do them? You will want to tell that to yourself when you find Phat Hemp's excellent range of Hemp Necklaces, Bracelets, Jewelry for men and women. Lots of one of a kind eco friendly jewelry found <http://bit.ly/9i0i44>

### Cannabis Seeds

For growing medical marijuana – where legal only. One of the largest Dutch marijuana seed suppliers based in Amsterdam offers of 30 classic strains from the place where high quality breeding has always been an art. Don't waste your time with inferior seeds, buy from <http://bit.ly/a805ts>

### Got a problem with smoking?

The cannabis coach is here to help you stop smoking cannabis. A 100% guaranteed risk-free program is available <http://bit.ly/cyTKvR> – please share with anyone that has a problem smoking cannabis.

### Hemp Clothing

At the time of going to press we were updating our recommendations for hemp textiles and clothing. You may visit the relevant page at [www.hemp.co.uk](http://www.hemp.co.uk) for more information or email [info@hemp.co.uk](mailto:info@hemp.co.uk) to find what you are looking for.

## Hemp Plastics

From the original [www.hempplastic.com](http://www.hempplastic.com) site you will find opportunities for access to hemp plastic materials, products and more. Go there now!

## Hemp Fibre, Industrial Hemp Growing Seeds, Hemp Stalk, Hemp Mulch, Hemp Insulation, Hemp Building Products and more

All available from [www.hemp.co.uk](http://www.hemp.co.uk)

## The Hemp Network Business Opportunity

### The Time For Hemp Is Now... Join The Hemp Revolution!

**The Hemp Network** represents the first marketing distribution channel in history that will provide consumers with hemp products on a direct sales and a network marketing platform.

We are in an industry that has been around for thousands of years, with new uses for hemp being constantly developed. The use of hemp is growing dramatically and will continue as more recognized uses occur.

Over the past few years it has become apparent that with the increasing pace of new products hitting the market, there is a need to move those products throughout the world at a very fast rate.

**The Hemp Network** has been formed to provide a marketing vehicle for massive global distribution of these new products and services as they hit the market, which is imperative to capture market share.

Expectations are that our marketing team will become a major force in the exploding hemp product marketplace... and we are offering individuals like you the opportunity to capitalize on this exploding market.

**The Hemp Network** offers the winning combination of product, people, management and vision to all work together to create a very large global marketing company with our agents earning income from people spread around the world.

There has never been a more perfect time to take advantage of an industry that has been around for thousands of years, with products

derived from hemp being used by millions of people today. Over the past few years it has become apparent that with the increasing pace of new hemp products hitting the market, there is a need to move those products throughout the world at a very fast rate.

Join our very special team and get unique support for your new business! Go to <http://bit.ly/cTavt0> now.

**FIND MORE BOOKS ON DIFFERENT PARTS OF  
THE HEMP INDUSTRY AT**

**[www.hemp.co.uk](http://www.hemp.co.uk)**