

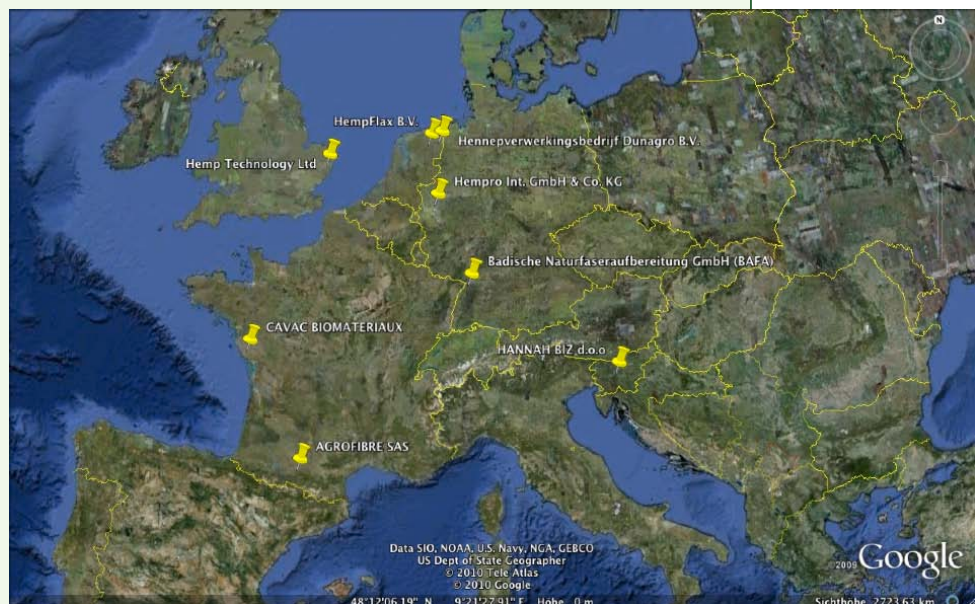
Hemp fibres for industrial applications

May 2010

Michael Carus
Managing director
EIHA & nova-Institute



Present hemp industry



Total Hemp cultivation area in the EU 15.000 ha in 2010. The European Industrial Hemp Association (EIHA) has 8 regular members (hemp processors, see pins) and 63 associate members from 24 countries (2010).

The European Industrial Hemp Association (EIHA) – Board of Directors, founded in 2005

John Hobson

President, HempTechnology Ltd. (UK), since 2005

Bernd Frank

First Deputy Chair, BaFa GmbH (Germany), since 2005

Joan Reverté

Second Deputy Chair, AGROFIBRE SAS (France), since 2007

Executive committee & managing director, since 2005

Michael Carus

Managing director, nova-Institut GmbH (Germany), member of Steering Committee of the „International Year of Natural Fibers“ FAO, Member of Steering Committee „Natural fibre reinforced Polymers“ (AVK)



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Three (Board of Director) and further five Regular Members of EIHA in April 2010

1. Dun Agro B.V. (The Netherlands)
Albert Dun



2. HANNAH BIZ d.o.o (Slovenia)
Dejab Rengeo



3. HempFlax BV (The Netherlands)
Mark Reinders



4. Hempro International GmbH (Germany)
Daniel Kruse



5. CAVAC BIOMATERIAUX (France)
Olivier Joreau

Focus of activities of EIHA in 2009 and 2010

Increasing the awareness of industry on hemp and its potential as bio-based material

- Exhibitions & advertisement**
- June 2009: German Electro-Mobility Congress, Bonn
 - October 2009: Composite Europe, Stuttgart
 - Advertisement in Business Directory BIB2010
 - April 2010: HANNOVER MESSE
 - June 2010: German Electro-Mobility Congress, Bonn

Increasing the awareness of policy on hemp and its potential in bio-based economy

- Informing, networking and lobbying in Brussels**
- Cooperation with other associations (Hemp & Flax, Natural Fibers world wide, FAO and Reinforced Plastics, Bio-based Material & Plastics, Biotechnology)
 - Visits in different DG of the EU Commission and Parliament

Support the Hemp Industry!
Join EIHA!
(www.eiha.org)

Updating the EIHA-Webpage (content, design, internal book keeping)

- EIHA publications**
- 2009: Leaflet on Hemp Fibre, Update 2010
 - 2009: Poster on Hemp Fibre & Automotive
 - 2009: Leaflet on Hemp Seeds and Oil
 - 2010: Press release "Increasing demand for EU Hemp" to 1.000 technical journals and newspapers
 - 2010: Report on Industrial Hemp (22 pages) (3.000 €) to 25.000 companies and universities
 - 2010: "Hemp - A Sustainable Raw Material for Bio-based Composites" in bioplastics MAGAZINE Vol. 5/2010
 - 2010: Leaflet on Hemp & Life Cycle Assessment (LCA)
 - 2010: One page leaflet on EIHA to put in the other leaflets
 - 2011 (?): Leaflet on modulation / second pillar

LCA Meta-Analysis on Hemp Fibre Products by nova-Institute

Yearly EIHA conference

- Sending invitation to 10.000 potential customers
- The meeting point for international hemp industry

EIHA Joint Fibre Marketing (cooperation with traders?)

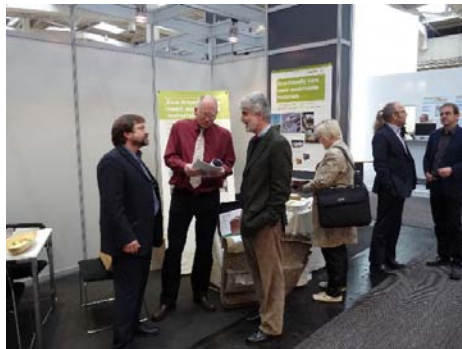
Joining EU and other Projects (UltraFibre ...)

Sustainability Certification for Hemp Fibres as the first Natural Fibre world wide!

Membership in Standardization / Certification Working Groups

- Industrial Task Force on BioBased Content of Materials and Products
- CEN Standardization programme for bio-based products

Attract new regular and associated EIHA members different services for EIHA members established (more?)



HANNOVER MESSE
April 2010



Stuttgart, Oct. 2009
Composite Europe

Bonn, June 2009
Electro-Mobility



May 2010: Update of the EIHA Fibre leaflet

The European Industrial Hemp Association (EIHA)

The European Industrial Hemp Association

European Hemp fibres for diverse bio-based products

The perfect green material

- good mechanical properties
- the perfect reinforcement for your (bio-based) plastics
- good for the environment
- good availability at a low cost
- modern industry with high social standards
- no competition with food production
- fits perfectly with your sustainable business (bio-based economy)
- reduction of CO₂ emissions

This brochure shows you many examples of hemp fibre based products, which are already introduced and established on the market, and where you can buy European Hemp Fibre.



Editor: The European Industrial Hemp Association (www.eiha.org)

Oct. 2009: Business Directory BIB2010


 European Industrial Hemp Association

European Industrial Hemp Association (EIHA)



The European Industrial Hemp Association (EIHA)

EIHA has formed itself as an association of Regular members, the Hemp primary processing companies within the EU and Associate members who are associations, national organisations, companies and individuals working in the field of Hemp or other natural fibres. Founded in 2005 EIHA today has 7 regular and over 60 associated members from 30 different countries. EIHA was formed originally to give members a voice at the European Commission in Brussels. It has grown quickly into a respected Organisation that is an excellent bank of information and a real support to the fast developing Hemp Industry. Each annual EIHA conference allows members and non members alike to exchange views and important developments with their colleagues.

European Hemp Fibres are available for your bio-based products

Today, China, Canada and Europe are the main hemp cultivation areas in the world. In 2008 the total cultivation area in the European Union was around 15.000 ha – in 2009 we expect this to increase to 18.000 ha. These areas will produce around 24.000 t Hemp fibres and 29.000 t respectively. All by products like shivs (woody part of the Hemp stem) and dust are used. Main countries for Hemp production are France, UK, Germany, The Netherlands and Poland. Hemp fibres, ready to use in your bio-based products are price competitive to other domestic and exotic fibres for technical applications. Different qualities are available.

European Hemp fibre is currently used mainly in technical applications like specialty paper (cigarette paper, technical filters), insulation material, natural fibre reinforced plastics (automotive, industrial and consumer goods), mulch and cultivation fleeces. Especially insulation and plastic reinforcement show promising market increases. China and Canada are raising their interest for hemp fibre in textile applications substituting cotton fibres.

The EIHA hemp processors produce on average each year between 10.000 and 15.000 tonnes of technical Hemp fibres. As Hemp is an annual crop this quantity can be easily increased according to demand.

Please find the hemp processors for your demand on www.eiha.org



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 European Industrial Hemp Association (EIHA)
 c/o nova-institut GmbH
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 Industriest.
 50354 Hueth, Germany

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 www.eiha.org

Contact person
 Michael Carus
 Managing Director

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April 2010: 22 Extra Pages on European Hemp

www.renewable-resources.de
 The News Portal

ISSN 1867-1217, Edition 7, April 2010

Biowerkstoff-Report

Report on Bio-based Plastics and Composites



Our Events at HANNOVER MESSE:
 20th–21st April 2010
 • Congress on Bio-based Plastics and Composites
 • Innovation Award

Visit the International Congress on Bio-based Plastics and Composites
 20th–21st April 2010
 Convention Center, Saal 2
 Page 21 to 42

Innovation Award Bio-based Material of the Year 2010 | 20th April
 The Nominated
 • GreenGrain B.V. | GreenGrain
 • Henkel AG | ECOMFORT
 • Propper GmbH & Co. KG | Proganic
 Page 21

Report on Industrial Hemp
 22 Extra Pages
 Page 43



Eco-friendly cars need sustainable materials

Use European Hemp Fibres for bio-composites in light weight construction



St Natural fibre parts for Mercedes E-Class (Germany).
Picture: Daimler AG



Sports car Lotus Evija. In the main made from different natural fibre, composite, hand lay-up, vacuum bagging and RTM (UK). Picture: Lotus Cars



Natural fibre door panel for BMW 5 Series, composite, moulded part (Germany). Picture: BMW



To car, natural fibre and Polypropylene, vacuum-moulding (The Netherlands). Picture: GreenGrain

June 2009: EIHA poster

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History

In the Middle Age until the end of the sailing ship period Hemp was an important crop in many European Countries like UK, France, The Netherlands, Germany, Spain and Italy.



Thread
Sacks
Ropes
Water hose



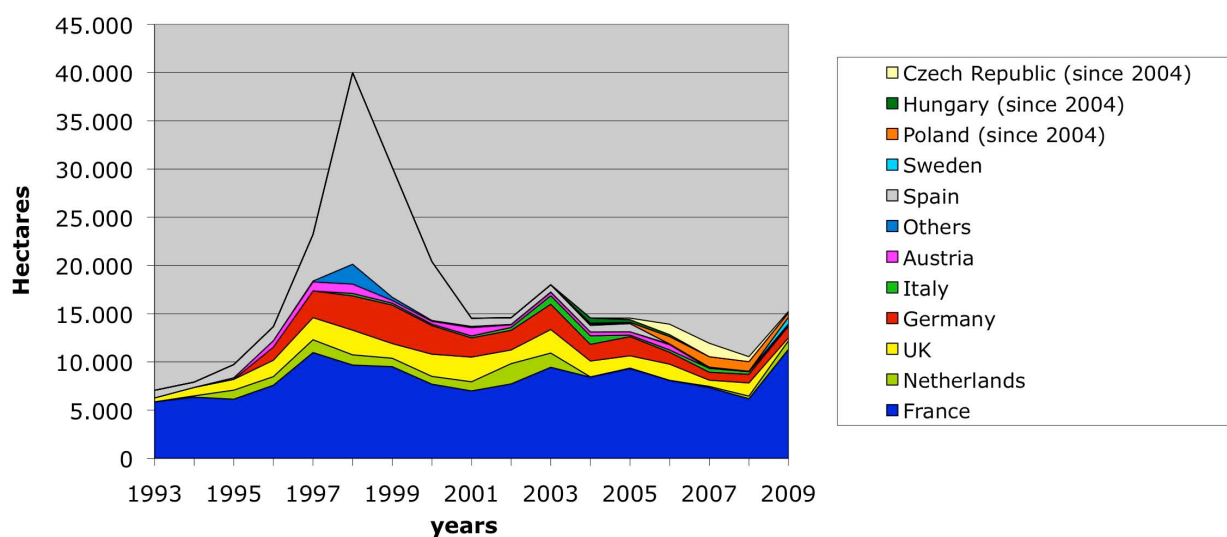
Canvas



Ropes

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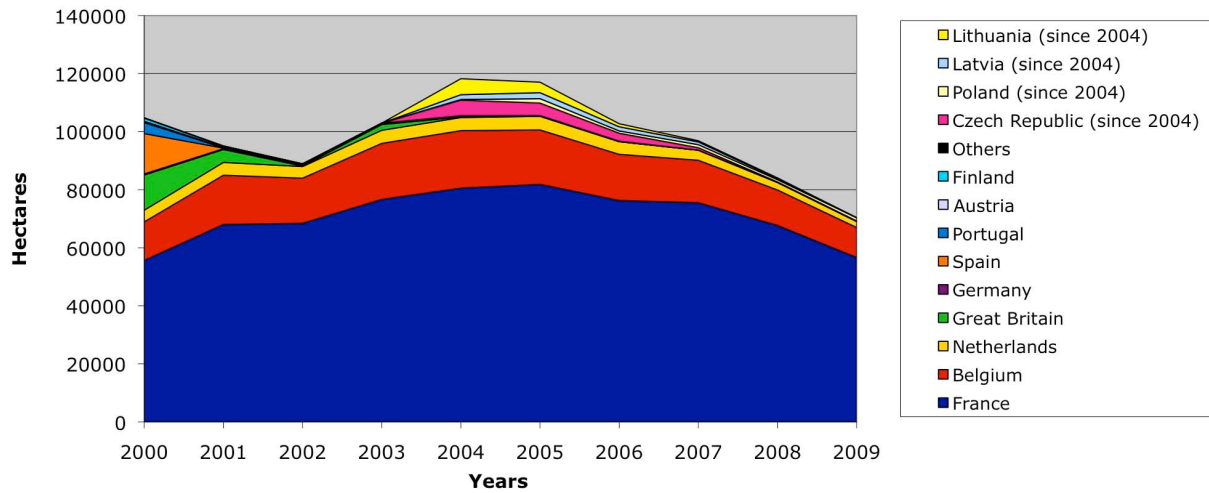
Hemp Cultivation Area in the EU (ha)



2009: ca. 15.000 ha – increasing areas in 2009 and 2010 (?)
All data for fibre production only, hemp for bioenergy is NOT included!

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Flax Cultivation Area in the EU (ha)



2009: Decreasing cultivation areas for European Flax
 Reasons: Lower imports from China (long fibre) and competition to bioenergy crops

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Decortication and fibre separation: From straw to dust, fibre and shives – a zero waste process



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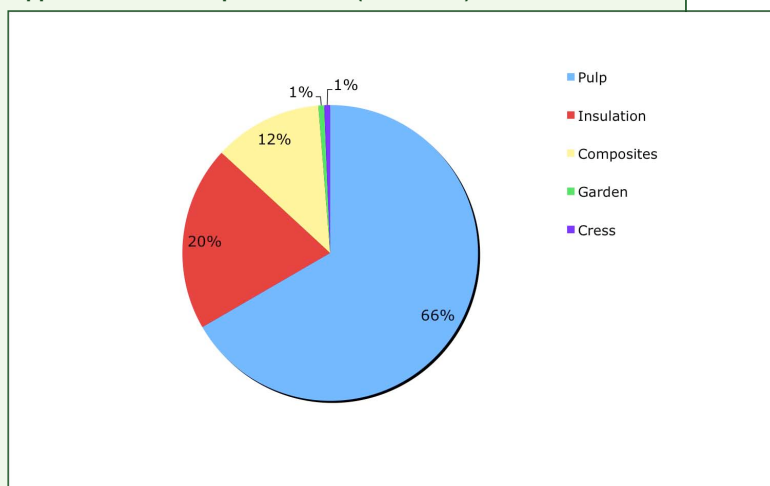
Applications and markets for hemp fibres



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Hemp

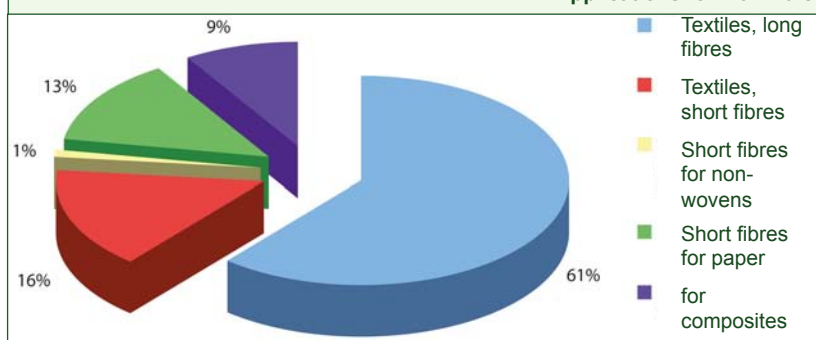
Applications for Hemp fibres 2006 (EIHA 2007)



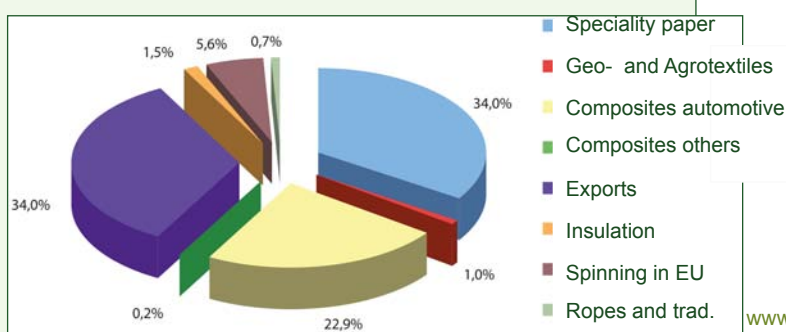
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Flax

Applications for Flax fibres

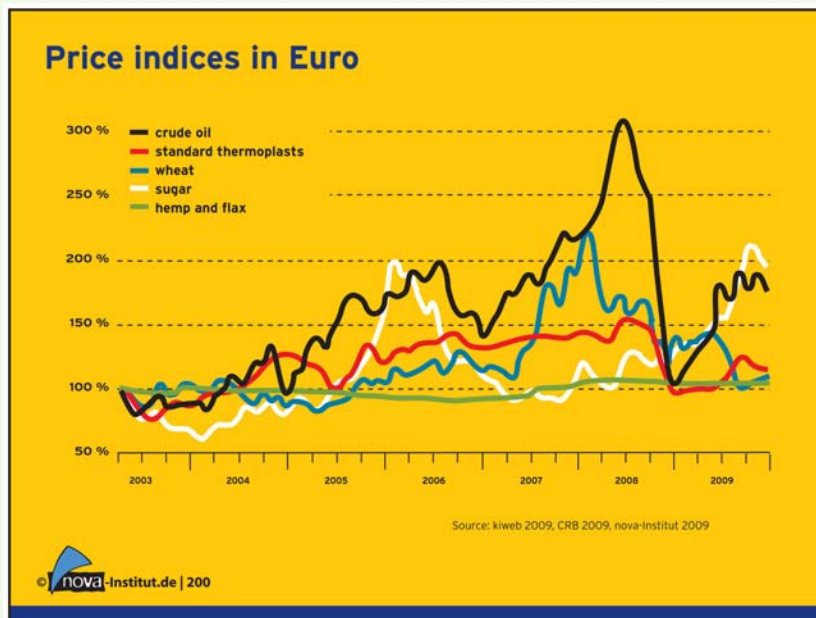


Applications for Flax short fibres



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Price development agricultural raw materials and Hemp & Flax Short Fibres (nova 2010)



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Price index for hemp and flax technical short fibres

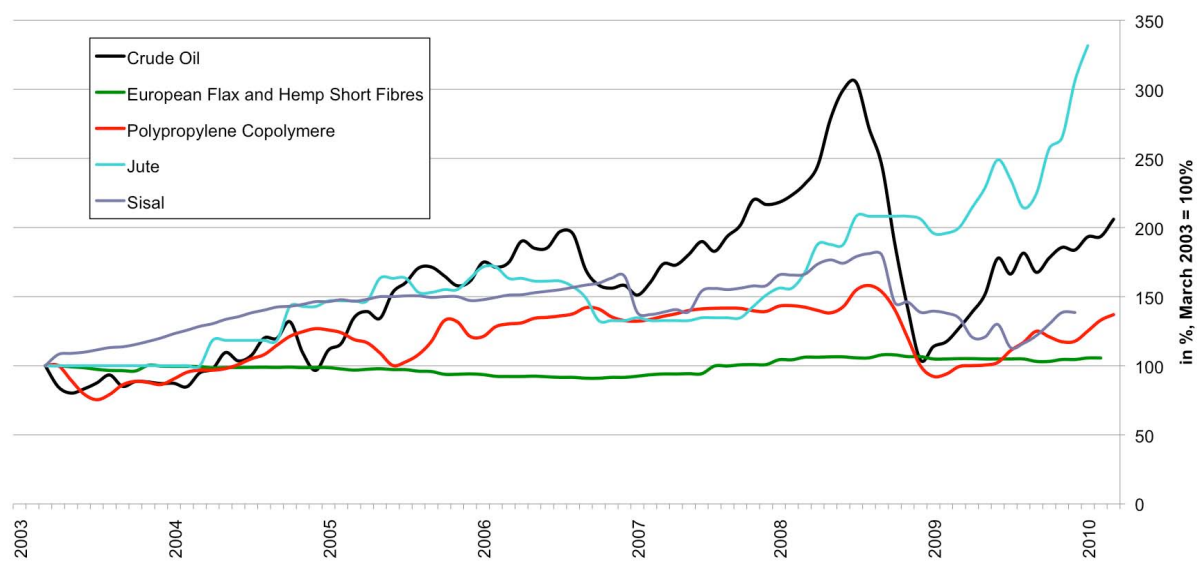


100% equal the price of technical hemp short fibres in March 2003. Basis: Supply of 100 t per year.

Sources: nova-Institut GmbH on the basis of bi-monthly price reports from: Agrofibre (F, since 2009), Badische Naturfaseraufbereitung BaFa GmbH (D), Hemcore Ltd. (UK, since 2010 Hemp Technology Ltd.), HempFlax B.V. (NL), Holstein Flachs GmbH (D), Linolitas (LT, until 2007-12), NAFGO GmbH (D, until 2009), Procotex S.A. Corporation (B, until 2005-10), Sachsen-Leinen GmbH (D, since 2003-10), SANECO (F).

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Price indices for natural fibres, crude oil and polypropylene (per Euro basis)



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EU 2009/10: Production of 35.000 t hemp fibres – main applications



Non-automotive



Insulation

Automotive



Pulp & Paper

Agrotexiles

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Valuable and innovative biomaterials

- Along with a high yield, Hemp produces **natural fibres of the highest quality**. Their mechanical properties are equal to the best natural fibres available.
- Along with biopolymers and wood, Hemp and other natural fibres constitute the “**new material generation – bio-based materials**”. Hemp can be used in many ways with new and innovative material concepts. In particular when natural fibres are mixed with plastics they add and extend the properties of the material.
- Hemp, along with wood and polymers and other natural fibres can play an important part in **reducing plastic components and metallic materials** – and improve the profile of **bio-based plastics** for durable applications.

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Technical properties

	Density	Fineness	Young's Modulus	Elongation at break	Breaking force
Sisal	++	-	-	++	++
Hemp	+	-	+	+	++
Flax	+	+ / -	+	+	+
Jute	++	+	+	+ / -	+ / -
Ramie	+	++	++	+ / -	-
E-Glass	--	adjustable	+++	--	++

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Natural fibre composites (1) – innovative technology for the automobile industry

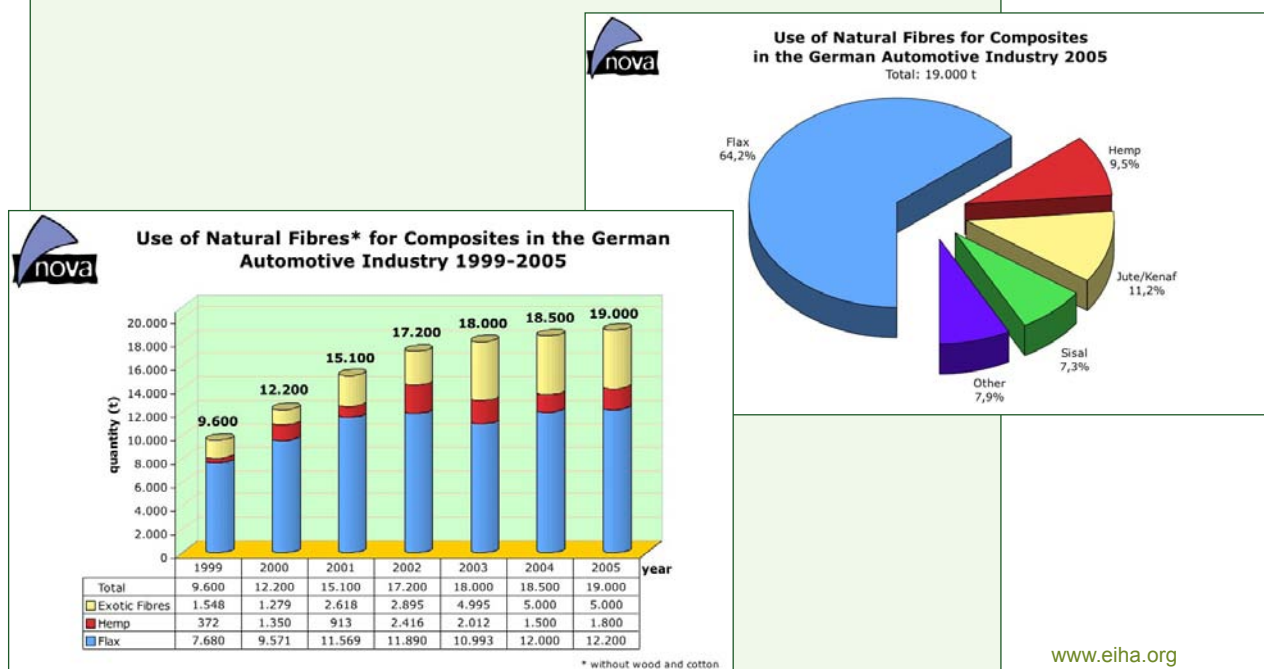


BMW 5 Series



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German Automotive Industry – ca. 30.000 t Natural Fibre Composites (2005)



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Natural fibre composites (2) – wide range of application possibilities



Scale



Urn from Hemp Fibre and PLA



Toy Cars
Made by Injection Moulding

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Natural fibre composites (3) – wide range of application possibilities



Innovation



Cases, natural fibre and polypropylen, compress moulding (Germany). Pictures: Hempro International, Winter & Linotech



Urn, hemp fibre and bioplastics, compress moulding or injection moulding (Germany). Picture: nova-Institut

Natural fibre composites (4) – Ironing board (Domena, France)



Ironing board
(Domena, France)
 Hemp Fibre Injection
 Moulding



BioCharger
(GreenGran, NL & China)
 JuteFibre Injection
 Moulding

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Insulation – CO₂ emission and cost reducing application for construction



Application



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Pulp and paper – special utilization of hemp



Pulp

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Agrotextiles (1), garden – easy to handle base for agricultural use



Tree planting

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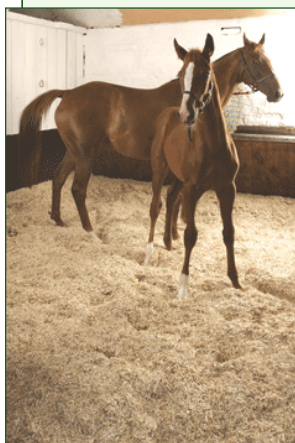
Agrotextiles (2), cress – an environment friendly, annual renewable base layer for the plant industry replacing peat



Cress production

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EU 2009: 50.000 t production of Hemp Shives – main applications



Animal Bedding

Particle Boards



Construction



Garden

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Animal bedding – implementation for the comfort of your animal



Horse stable ground



Chicken farming

Garden – decorative alternative to barkmulch



Particle boards – alternative to wood-based particle boards with half the weight



**KOSCHE (Germany)
stopped (all particle
board) production in
2009;
Chinese Hemp
particle boards are
available.**



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Construction (1) – easy to handle construction material with great qualities



Spraying



Finished Wall

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Construction (2) – applicable for large constructions as well



Beer Distribution Centre



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EU 2007: Production of 6.000 t, consumption of 12.000 t hemp seeds – main applications



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Hemp seeds – food applications



Hemp oil



Snacks



Hemp nuts

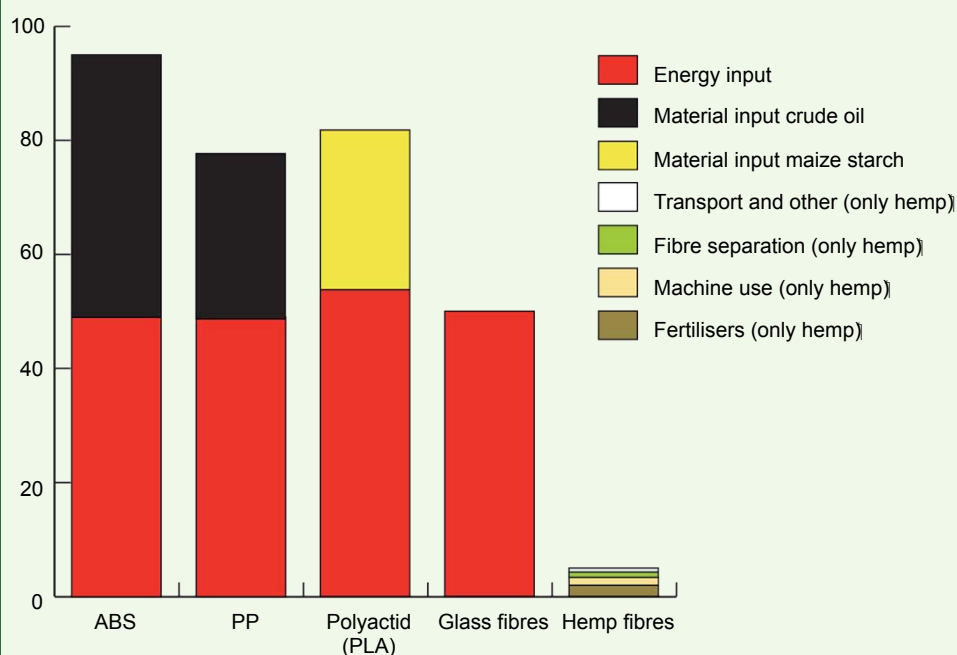
Ecology



- Hemp exhibits **excellent ecological credentials in its cultivation**. Virtually all Agrochemicals are completely eliminated. Hemp is also well suited to growing under an organic regime.
- The Ernst and Young study (2005) reported that Hemp is associated with “**an environmentally conscious cultivation**”. It requires considerably less input in terms of water, fertilisers and does not require Agrochemicals.
- Analysis that have been made in several European Countries and North America have studied **life cycle, eco and energy balances for various product lines**. Where Hemp has been used in applications it has yielded **definite ecological advantages**. These product lines include amongst others, Hemp **replacing glass fibres in composites and insulation**, Hemp fibres **instead of Cotton** in the Textile Industry and Hemp Shives **replacing conventional materials in the construction industry**.

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Cumulated Energy Demand (MJ/kg) Production

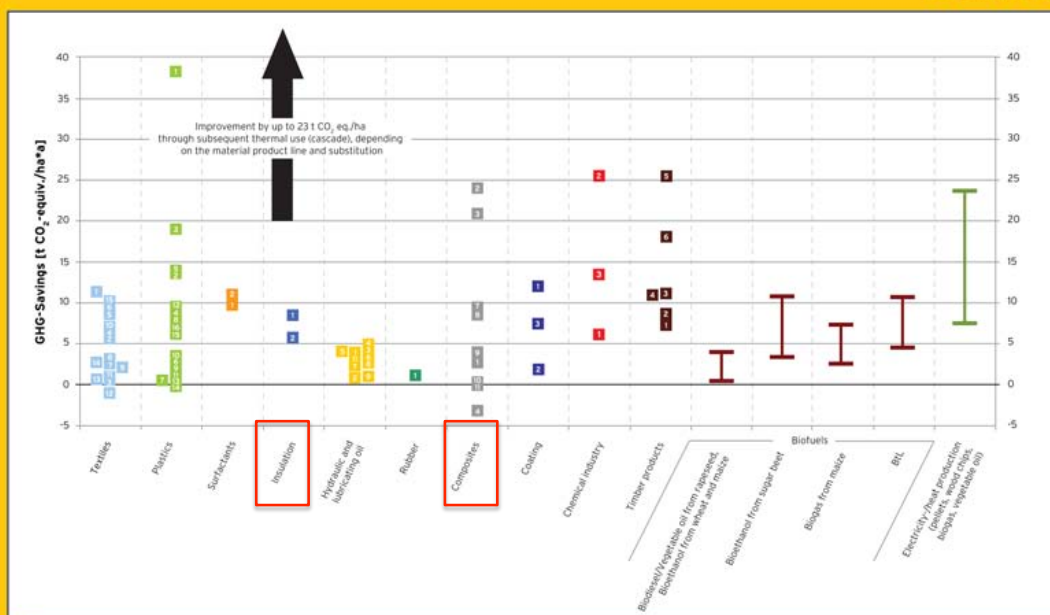


Source: nova-Institut u.a. 2007, new PLA production shows lower energy demand.

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Avoided CO₂-Equivalents per Hectare




 nova-Institut 2010

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LCA Meta-Analysis on Hemp Fibre Products

- Conducted by LCA experts from nova-Institute (Juliane Haufe)
- Analyzing and evaluating all existing LCAs on Hemp Fibre Products (also Hemp Shives Products)
- Summary and conclusions
- Leaflet on Hemp & Life Cycle Assessment (LCA) for industrial customers (end of 2010)
- We need your help:
 - Do You know about LCAs on Hemp? Please send them to michael.carus@eiha.org
 - Could You support the study financially? We have only a very limited budget!

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- In the Karus et al. (2006) study on **natural fibre reinforced plastics**, the summary stated that: "**Finite resources were spared, there was less pressure on the environment and CO₂ emissions were reduced. If biopolymers were used these benefits are of course further enhanced.**"
- Murphy & Norton 2008: "All **insulation** materials are beneficial to the environment because they save energy and reduce global warming potential. However, **NFIs (Natural Fibre Insulation)** have the added benefit that they **sequester CO₂, making a further contribution to reducing global warming potential.** The authors therefore consider it worthwhile to take advantage of the scope to develop **the environmental profile of the NFI materials and to boost their market presence.**"

R. Murphy, A. Norton (Imperial College): Life Cycle Assessments of Natural Fibre Insulation Materials. (PDF-document, 2.2 MB) Final Report, published on 2008-02-27. This study was undertaken at the instigation of the National Non-Food Crops Centre (the NNFCC), with funding provided by the UK Department for Environment, Food and Rural Affairs (Defra).

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Summary

Hemp is **good for agriculture, the environment and enhances regional development.**

Hemp will and is playing an important role in the production of **innovative bio-based materials** like natural fibres **reinforced plastics, insulation and construction materials.** Hemp fibre can improve the technical profile of **bio-based plastics** for use in durable applications.

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