



World-wide market data on hemp and other bast fibres - status and outlook

12th EIHA-Conference
Wesseling, 20 May 2015

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Bio-based Economy – Bio-based Chemistry and Materials

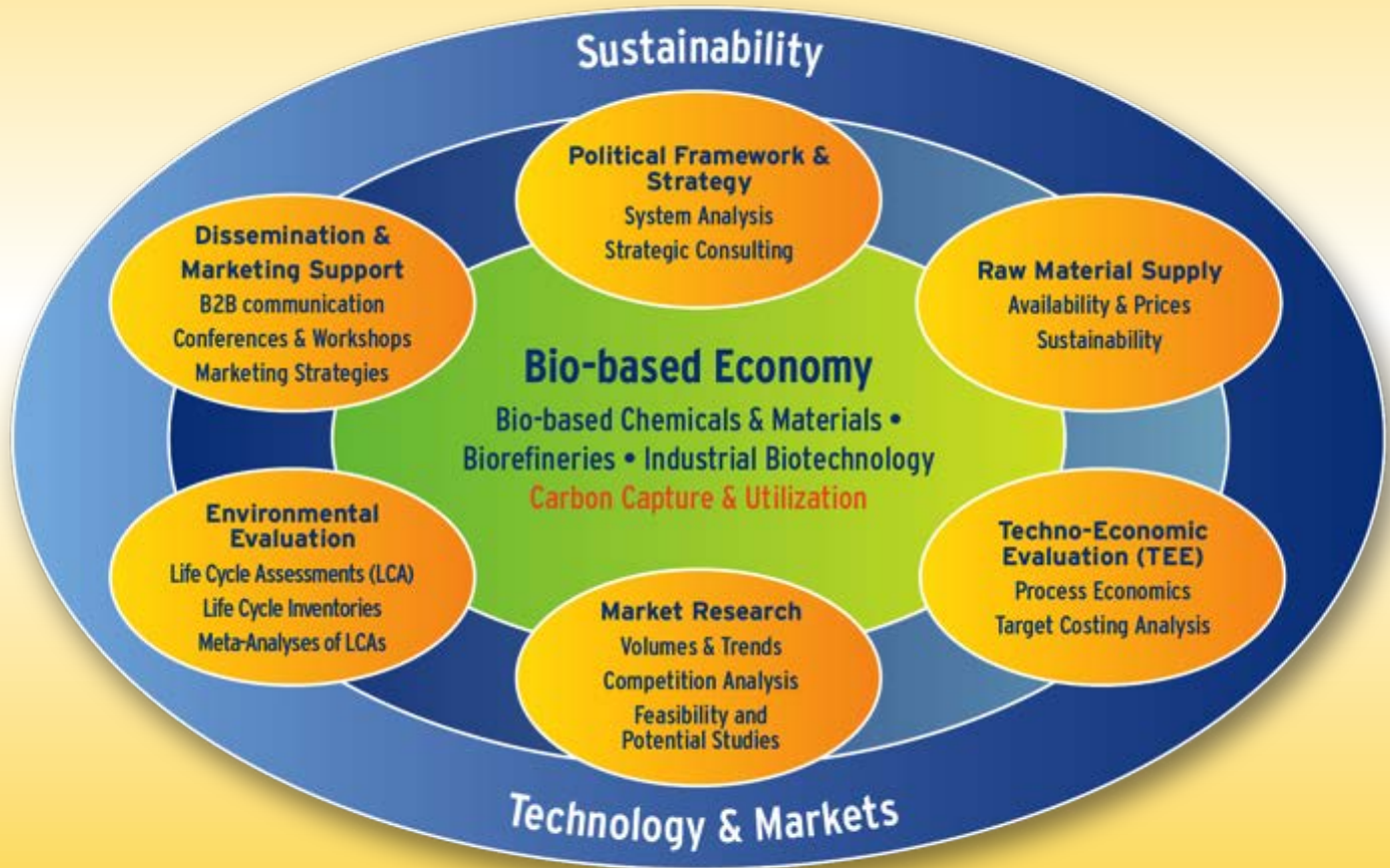
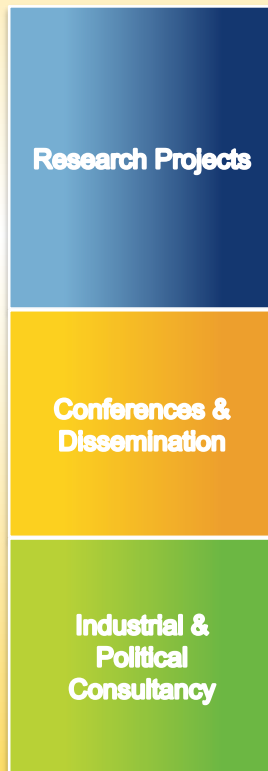
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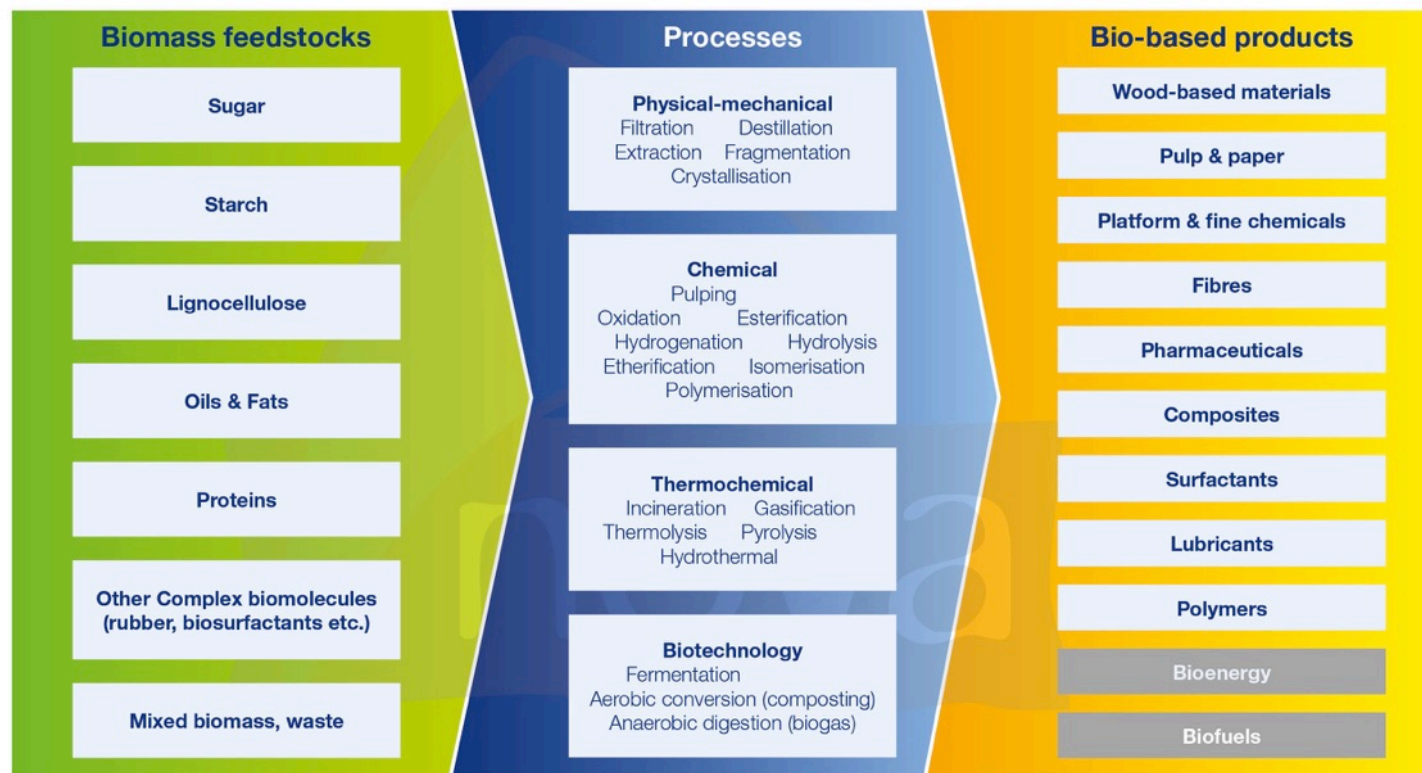
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Revenue shares





Bio-based Economy: feedstocks, processes and products (without food & feed)





Facts and Figures about nova-Institute

- Founded 1994 as a private and independent research institute
- 25 employees – interdisciplinary, international team
- Turnover of over 2 Mio. € / year
- Member of various associations & committees

CEN/TC 411, “Bio-based Expert Group” in DG Enterprise & Industry, technical group of the “bio-based panel” and advisory board of CLIB2021

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-  **8th International Conference on Bio-based Materials
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Maternushaus, Cologne, 13 - 15 April 2015
-  **Open-Bio Workshop on Instruments for the Public
Procurement of Bio-based Products (Side event to the 8th
International Conference on Bio-based Materials)**
Maternushaus, Cologne, Germany, 14 April 2015
-  **12th International Conference of the European Industrial
Hemp Association**
Rheinforum, Wesseling, 20 - 21 May 2015
-  **Open-Bio Mid-term Advisory Workshop**
CEN-CENELEC, Brussels, Belgium, 26 May 2015
-  **KBBPPS Final Advisory Workshop**
The King's Manor, University of York, York, UK, 2 June 2015



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Michael Carus +++ Achim Raschka +++ Barbara Dommermuth +++ Marian Kupfer



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5th edition

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- ☐ Colours / Pigments
- ☐ Denesting aids
- ☐ Flame retardant
- ☐ Impact modifiers
- ☐ Plasticizer
- ☐ Processing aid
- ☐ Protection against biological infestation
- ☐ Stabilizers
- ☐ Other

Special Properties

- ☐ Antistatic

☐ Household articles and toys

☐ Packaging

☐ Personal hygiene

☐ Other

Products

- ☐ Precursor
- ☐ Granules
- ☐ Semi-finished goods
- ☐ Finished goods
- ☐ After treatment
- ☐ Other

Renewable Raw Materials

- ☐ Base chemicals
- ☐ Building blocks
- ☐ Natural fibres
- ☐ Wood and other cellulosic material
- ☐ Other

Plastic types

Thermoplastics

- ☐ Cellulose based
- ☐ Lignin based
- ☐ Polybutylene Adipate Terephthalate (Bio-PBAT)
- ☐ Polybutylene Succinate (Bio-PBS)
- ☐ Polyethylene / Polypropylene (Bio-PE / PP)
- ☐ Polyvinylchlorid (Bio-PVC)

☐ Breathability

☐ Bio-degradable (DIN EN 14851/2)

☐ Compostable (DIN EN 13432)

☐ Flame retardant

☐ Food safe

☐ Insulating

☐ Odour free

☐ Thermostable (over 100 °C)

☐ Vibration- and sound-isolating

☐ Water resistant

☐ Other

Processing types

- ☐ Blow moulding
- ☐ Blown film extrusion
- ☐ Calendering
- ☐ Compounding
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- ☐ Extrusion
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- ☐ Thermoforming
- ☐ Other

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- ☐ Chemical research



Composites Europe 2015 in Stuttgart



<http://www.composites-europe.com>

- **22-24 September 2015**
- **Joint "Bio-based composites" stand**
- This year COMPOSITES EUROPE will be joining forces for the second time with nova-Institut GmbH to arrange a joint stand devoted to "Bio-based composites". You likewise could play a pioneering role here, as "bio composites" are being singled out and presented separately for the second time.
- Only 4 from 15 stands available.
- EcoTechnilin, Fachagentur Nachwachsende Rohstoffe (FNR), FIMALIN, JRS, TransFurans, Biowert and EIHA have booked already!
- **New event at Composites Europe:**





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Partner Events



Sixth WPC Conference, Cologne

Wood and Natural Fibre Composites

16 - 17 December 2015, Maritim Hotel, Germany

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Welcome to the Sixth WPC Conference, Cologne

Wood and Natural Fibre Composites

++ New press release: Sixth WPC Conference, Cologne: Call for Papers and Innovation Award ++

NEW Newsticker on Wood-plastic composites (WPC)!

From 16 - 17 December 2015, the largest WPC Conference worldwide will take place for the sixth time in Cologne, Germany. While the conference originally focused on the German market, it is now becoming more and more international, therefore taking place in English this year. The range of topics that previously covered only WPC, will for the first time be expanded to also address natural fibre composites (NFC) and bio-based plastics as matrix for bio-composites. All these markets are overlapping more and more and are growing as a whole.



date picture of the granulate market and its current trends.

At the centre of the conference are innovative WPC and NFC solutions in construction (decking for terraces, fencing, facades and interior flooring), furniture, automotive applications as well as consumer goods. In 2012, European WPC production reached 260,000 tonnes, while production of NFC reached 92,000 tonnes. By now, more than 60 companies offer WPC and NFC granulates for injection moulding and extrusion. The conference will provide an up-to-

During the Sixth WPC Conference, international experts will discuss topical developments and growth areas for WPC and NFC. The largest European WPC trade fair is the ideal opportunity to present and become familiar with new products and inventions.

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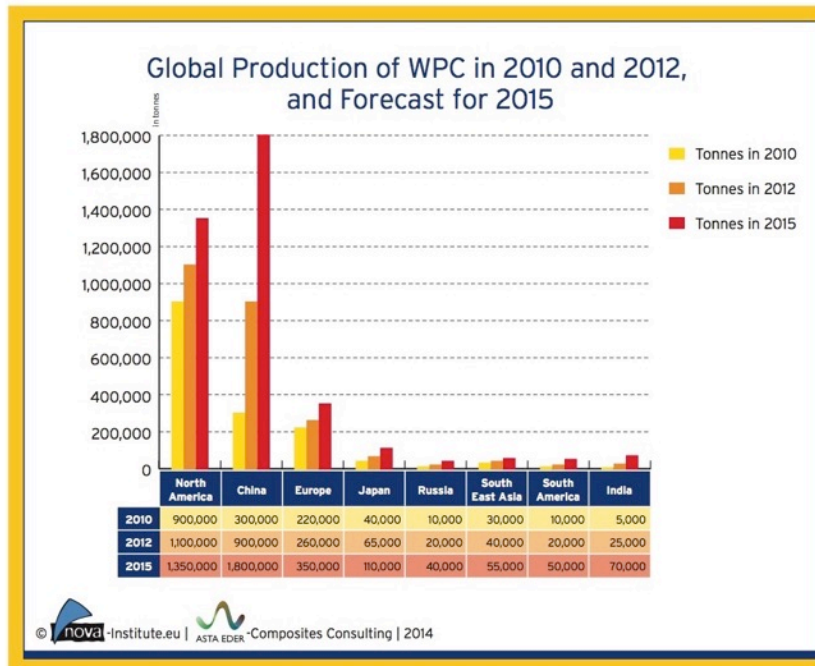
The background of the slide is a composite image. On the left, there is a forest with tall, thin trees and a path covered in fallen leaves. In the center, several large, green bamboo stalks are shown in a close-up, slightly blurred view. On the right, there is a field of golden-brown hemp plants with green leaves in the foreground. A semi-transparent blue rectangle is overlaid in the center, containing the title text.

World Fibre Markets

WPC/NFC Market Study 2014-03

Wood-Plastic Composites (WPC) and Natural Fibre Composites (NFC):

European and Global Markets 2012
and Future Trends



Authors: Michael Carus, Dr. Asta Eder, Lara Dammer, Dr. Hans Korte, Lena Scholz, Roland Essel, Elke Breitmayer

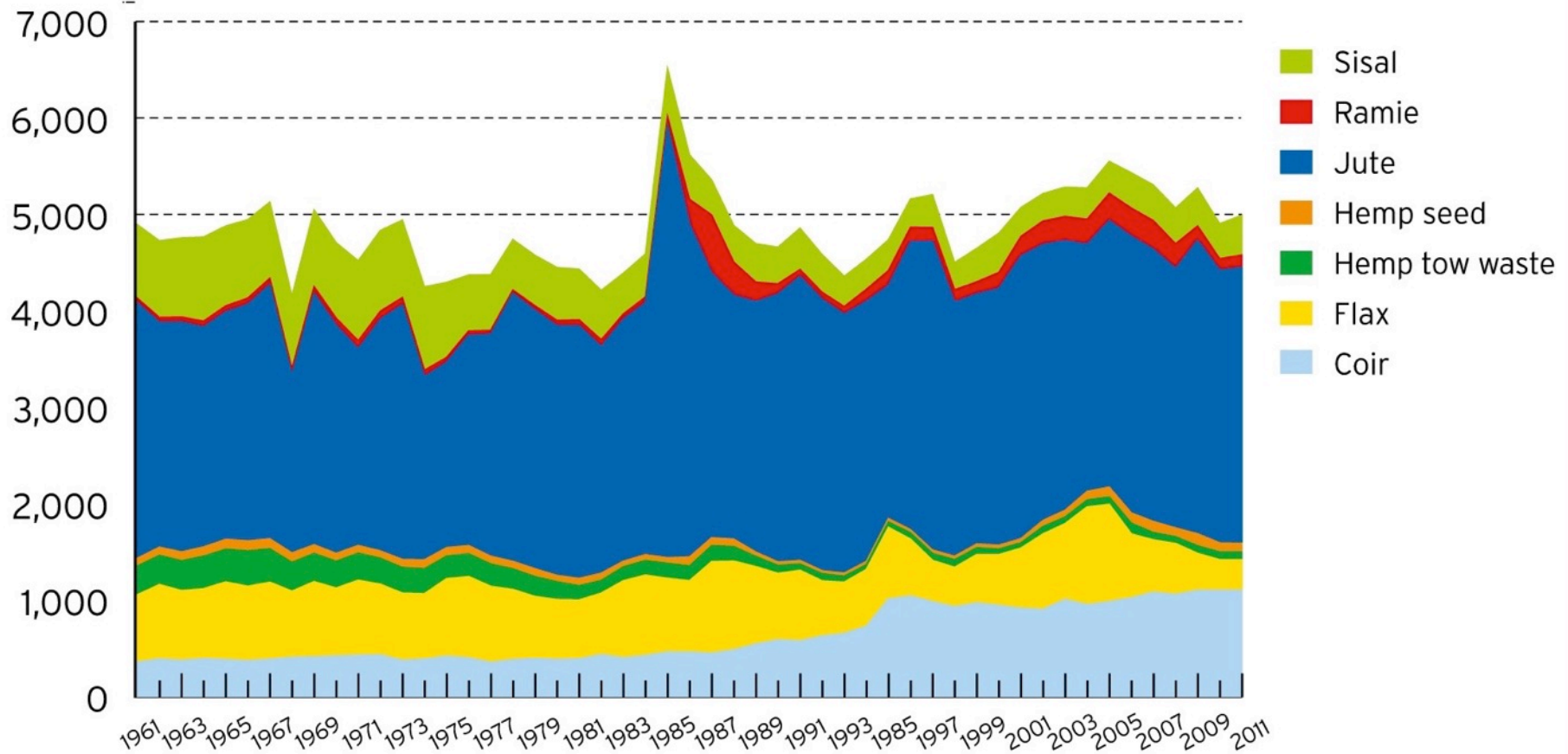
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Most of the following
figures coming from
this market study

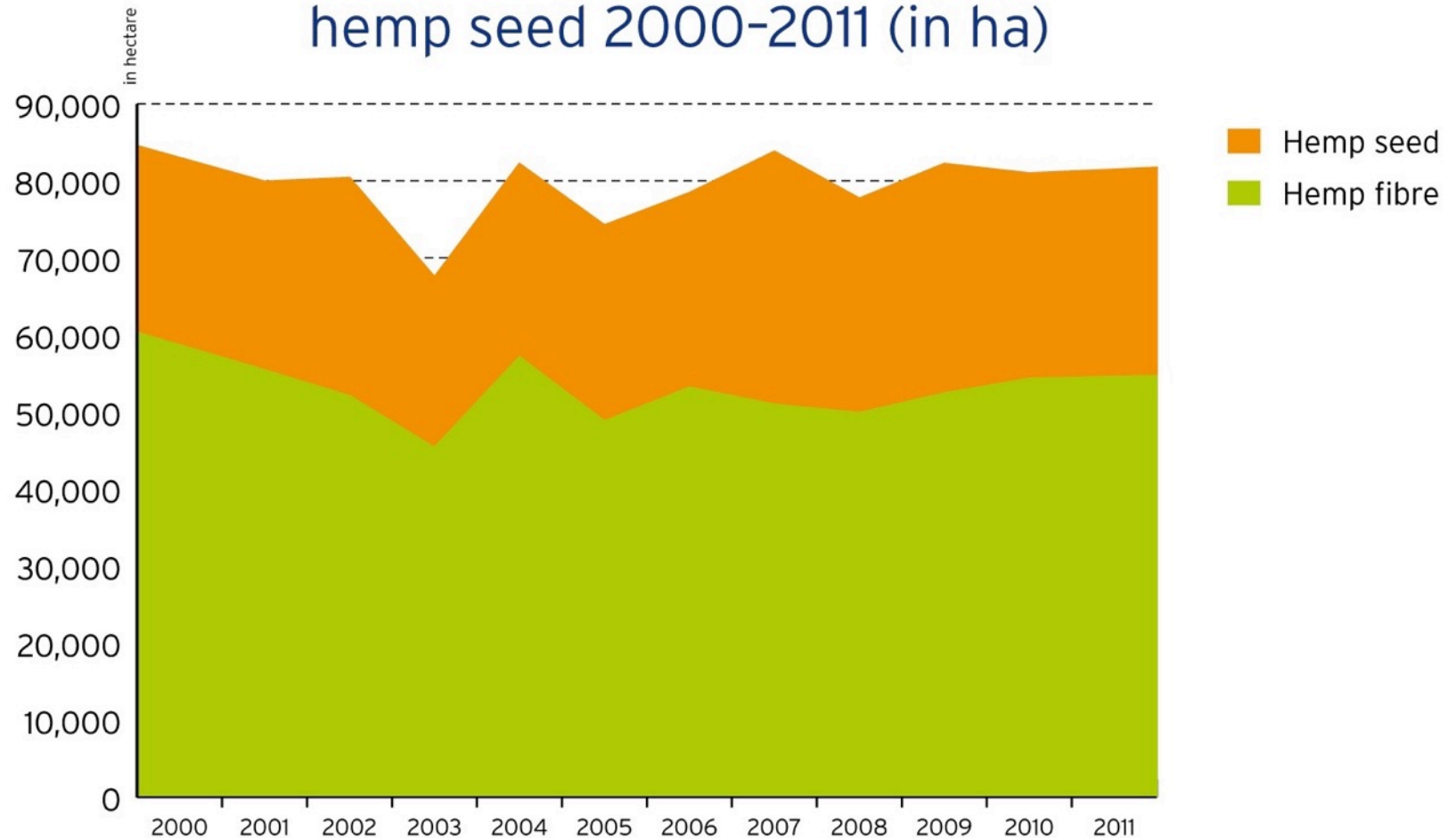
An update will be
published in June 2015

Main authors:
Michael Carus and Dr.
Asta Eder

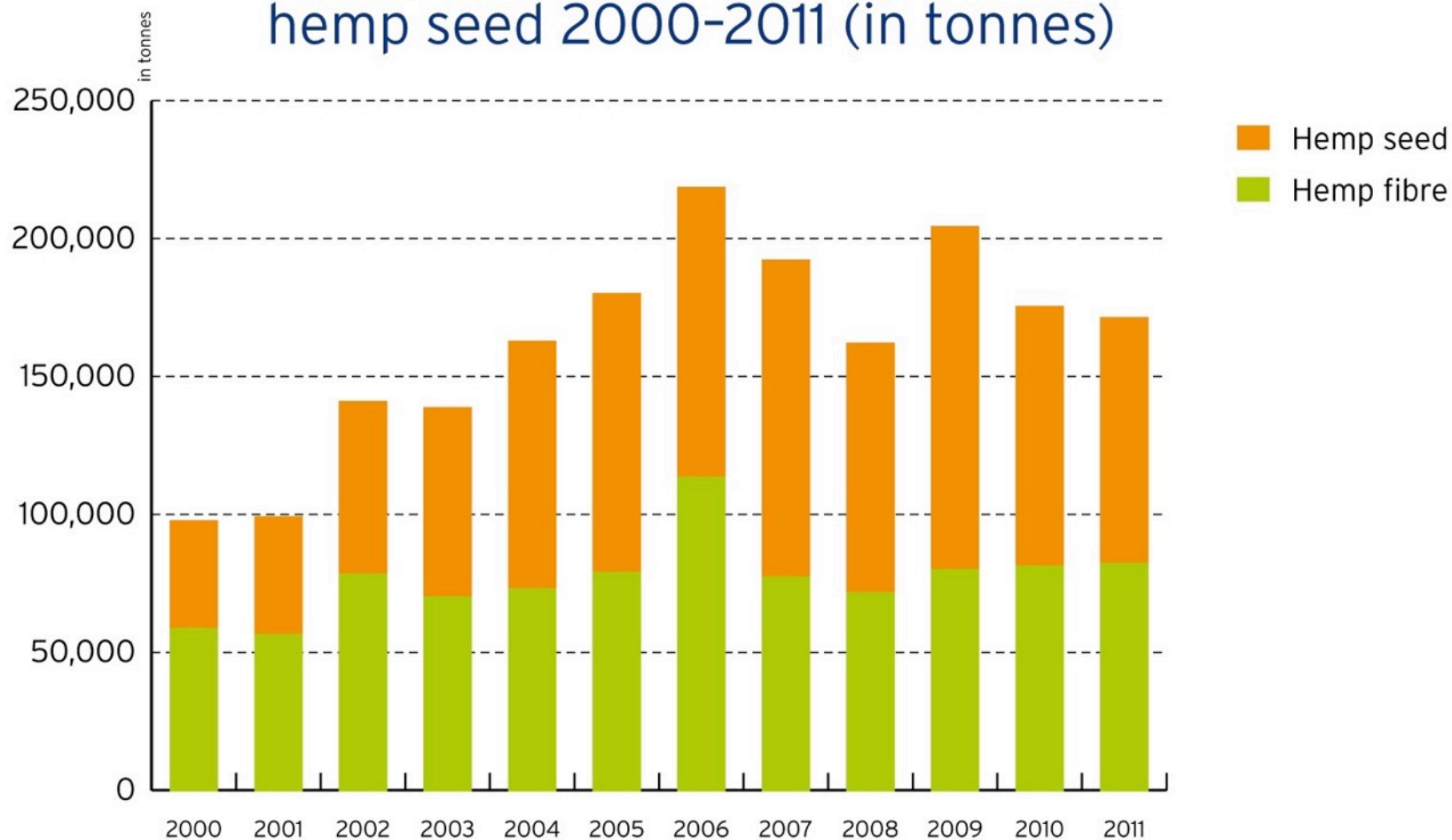
Worldwide production of natural fibres 1961-2011 (in 1,000 tonnes)



Global harvested area for hemp fibre and hemp seed 2000-2011 (in ha)



Global production of hemp fibre and hemp seed 2000-2011 (in tonnes)





Cultivation area 2014: 18,286 ha

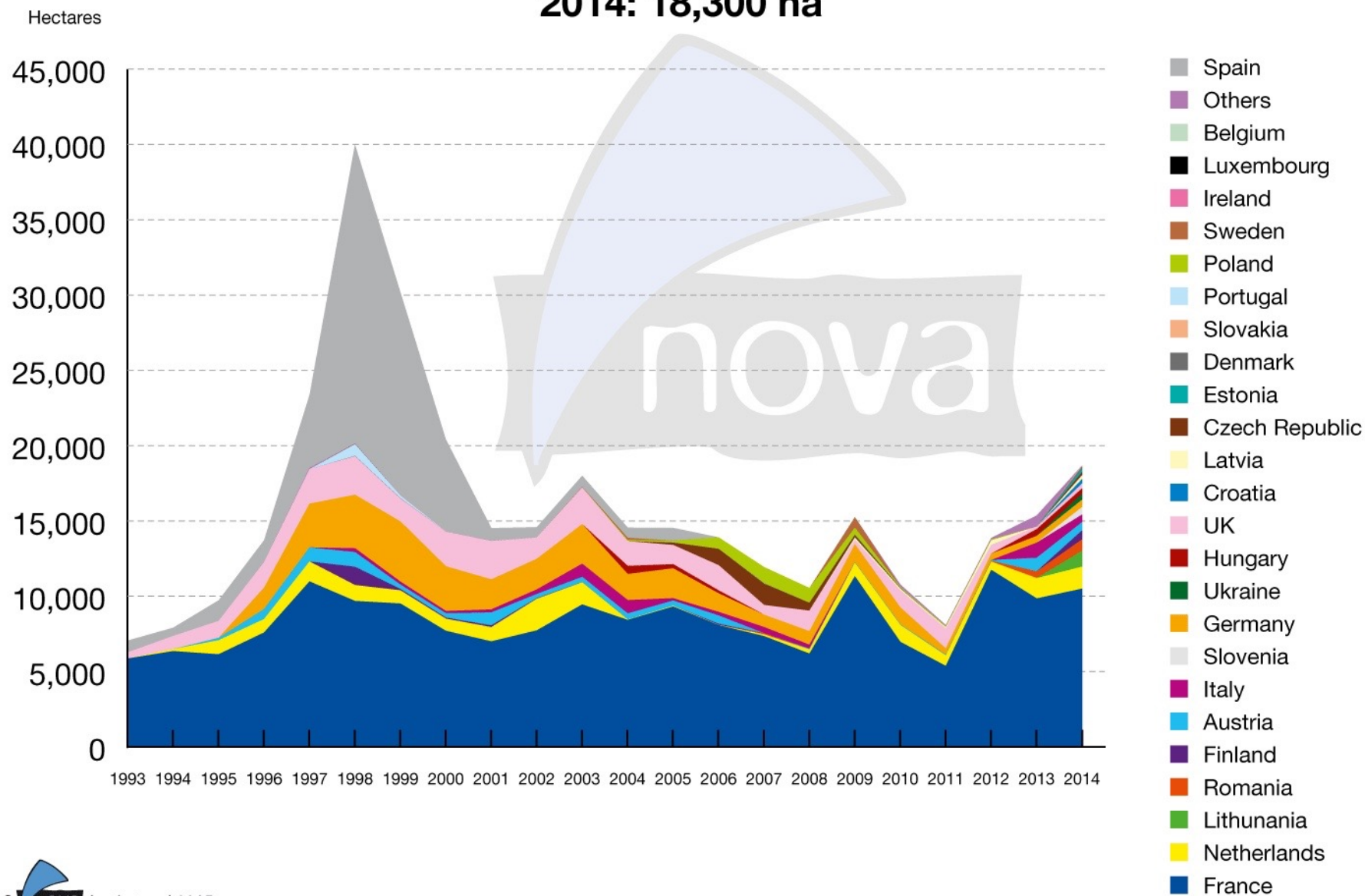


Country	Company	Area (ha)	Country total
The Netherlands	HempFlax	534	
	Dun Agro	928	
			1.462
Germany	HempFlax (west)	209	
	HempFlax/BaFa (east)	127	
	Hanf Farm	150	
			486
Austria	BaFa	550	
			550
United Kingdom	Different small growers	160	
	Yorkshire	163	
			323
France	LCDA	5400	
	Internal Eurochanvre	1700	
	Planet Chanvre	850	
	Cavac	1100	
	CCPSC	730	
	Est Chanvre	120	
	All others (independent farmers)	600	
			10.500
Italy	Assocanapa	500	
			500
Romania	HempFlax Europe S.R.L.	650	
	Agraficient S.R.L.	100	
			750
Hungary	Hempro Int. GmbH & Co KG	250	
	Hemp Factory	100	
			350

Denmark	Dun Agro	162	
			162
Czech Republic	Different small growers	210	
			210
Slovenia	Different small growers	500	
			500
Slovakia	Different small growers	67	
			67
Croatia	Different small growers	300	
			300
Finland	HempRefine Oy (Ltd)	200	
	Different small growers	400	
			600
Lithuania	Different small growers	1061	
			1.061
Latvia	Different small growers	250	
			250
Estonia	Different small growers	210	
			210
Portugal	CANAPOR	5	
			5
TOTAL			18.286

Hemp Cultivation Area in the EU 1993–2014

2014: 18,300 ha

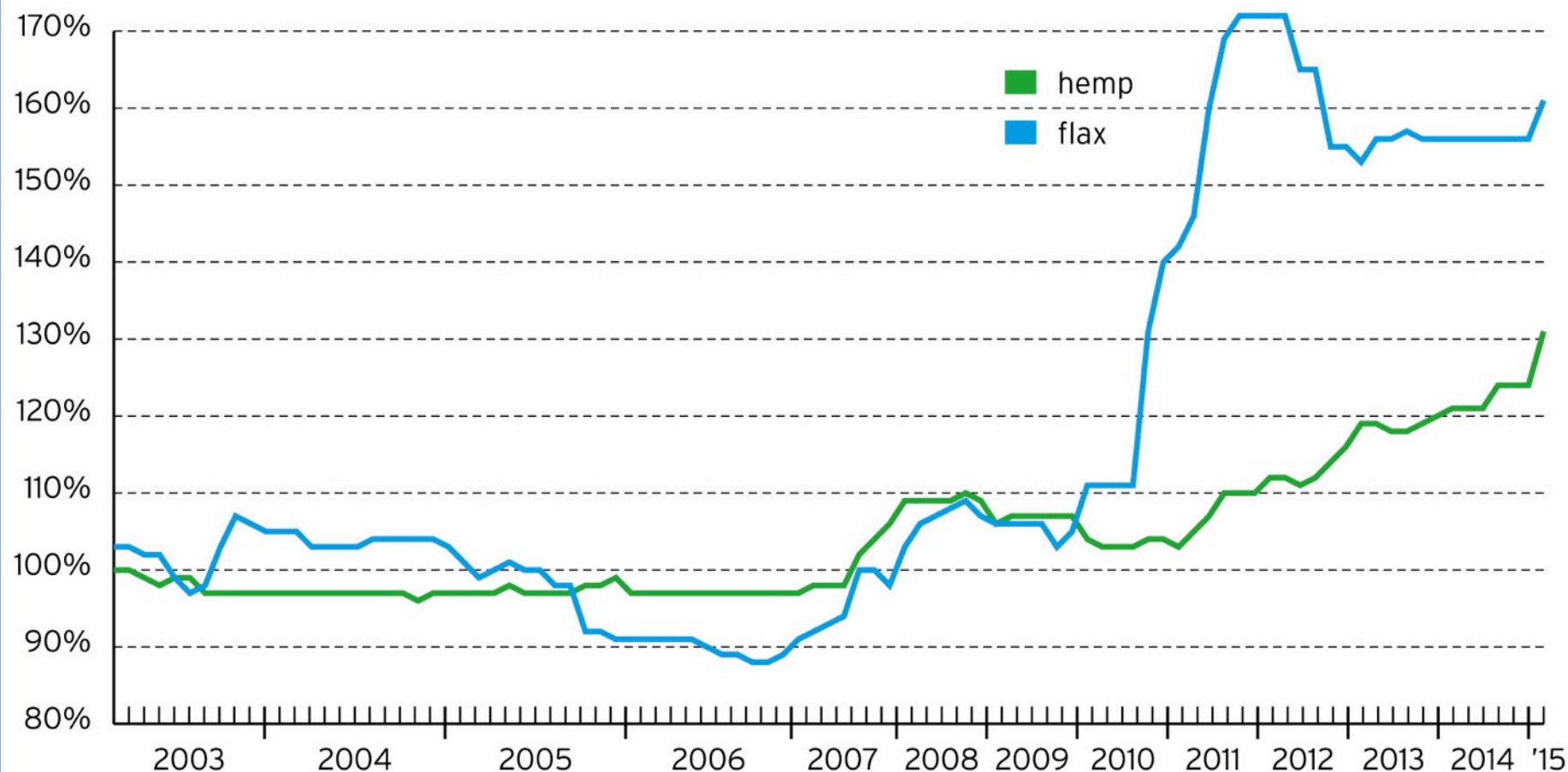


Cultivation area 2015: ca. 20,000 ha (first draft)

Country	Company	Area (ha)	Country total
The Netherlands	HempFlax	572	1.744
	Dun Agro	1172	
Germany	HempFlax (west)	541	1.261
	HempFlax/BaFa (east)	120	
	HANF FARM	200	
	Hempro Int	100	
	HempFactory	50	
	HempConsult	50	
	Vofa	200	
Austria	BaFa	150	150
	HempConsult		
United Kingdom	Different small growers Yorkshire		
France	LCDA	5500	11.450
	Internal Eurochanvre	1800	
	Planet Chanvre	800	
	Cavac	1800	
	CCPSC	700	
	AgroChanvre	500	
	Est Chanvre	100	
	All others (independent farmers)	250	
Italy	Assocanapa	2000	2000
Romania	HempFlax Europe S.R.L.	467	817
	Other small growers	350	
Hungary	HANFFARM	150	150
Denmark	Dun Agro	228	228
Czech Republic	Different small growers		
Slovenia	Different small growers		
Slovakia	Different small growers		

Croatia	Different small growers		
Finland	HempRefine Oy (Ltd) Different small growers		
Lithuania	Agropro Different small growers	1500	1500
Latvia	Different small growers		
Estonia	Different small growers		
Portugal	CANAPOR		
Norway	Different small growers		
Ukraine	Linen of Desna	400	400
TOTAL			19.700

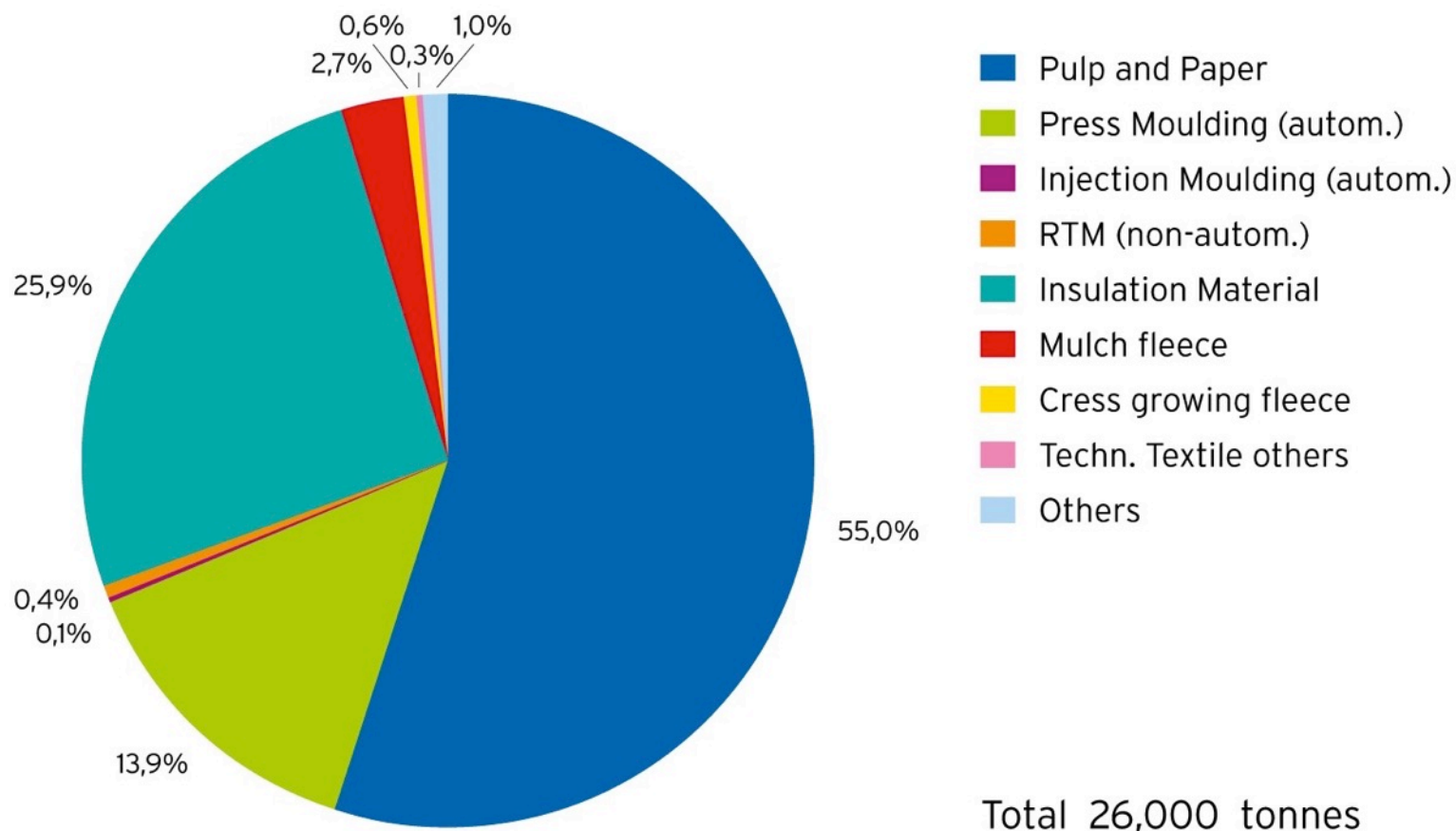
Price index: Hemp and flax technical short fibres



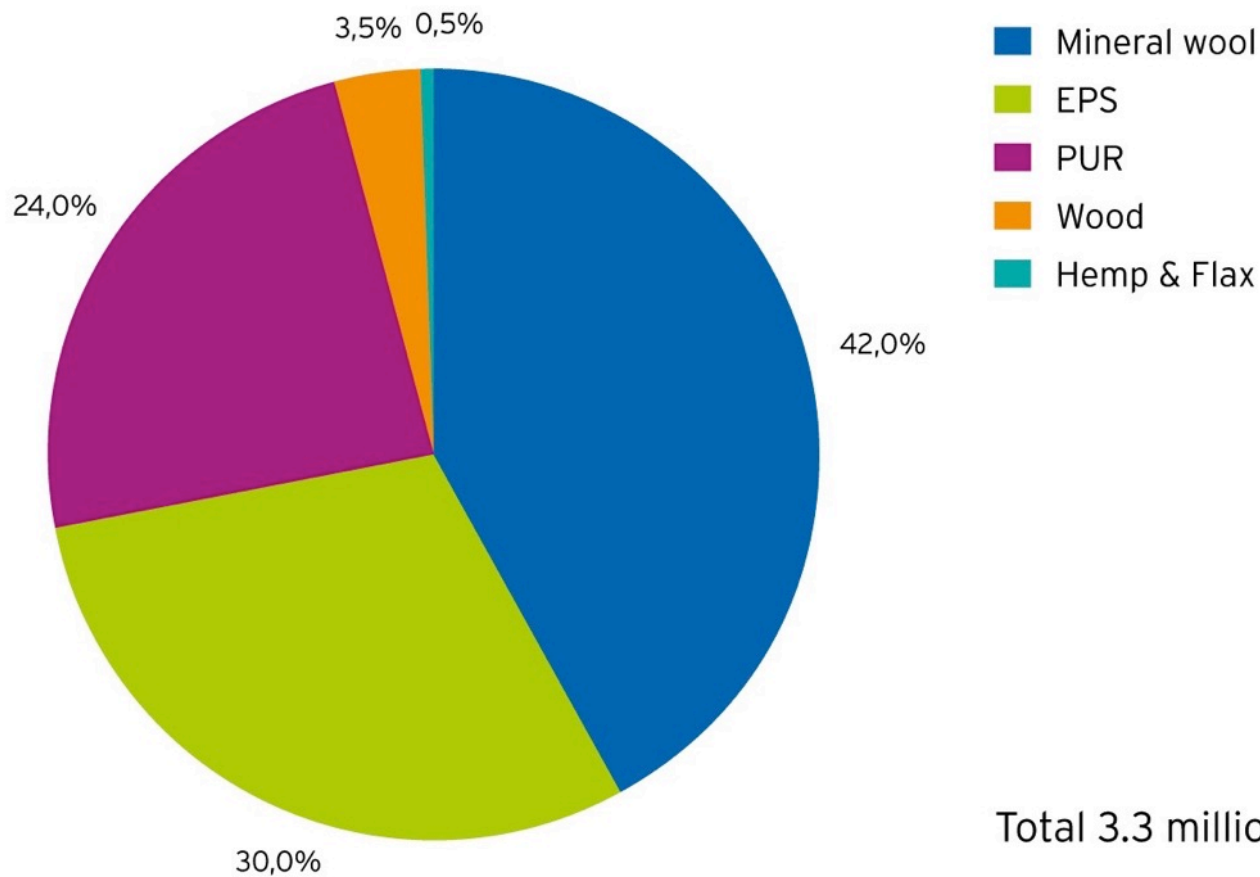
100 % equal the price of technical hemp short fibres in March 2003. Basis: Supply of 100 t per year.

Sources: nova-Institute GmbH on the basis of bi-monthly price reports from: Agrofibre SAS (F, since 2009), Badische Naturfaseraufbereitung BaFa GmbH (D), Hemp Technology Ltd. (UK), HempFlax B.V. (NL), Holstein Flachs GmbH (D), Linolitas (LT, until 2007-12), NAFGO GmbH (D, until 2008), Procotex SA Corporation (B, until 2005-10, since 2013-10), Sachsen-Leinen GmbH (D, since 2003-10), SANECO (F, since 2008), Institute of Natural Fibres and Medicinal Plant (P, since 2015).

Applications for European hemp fibre from 2010 harvest (in percentage)



European insulation market and shares of types of materials





Biocomposites in the European Automotive Industry



Definition Biocomposites: WPC and NFC

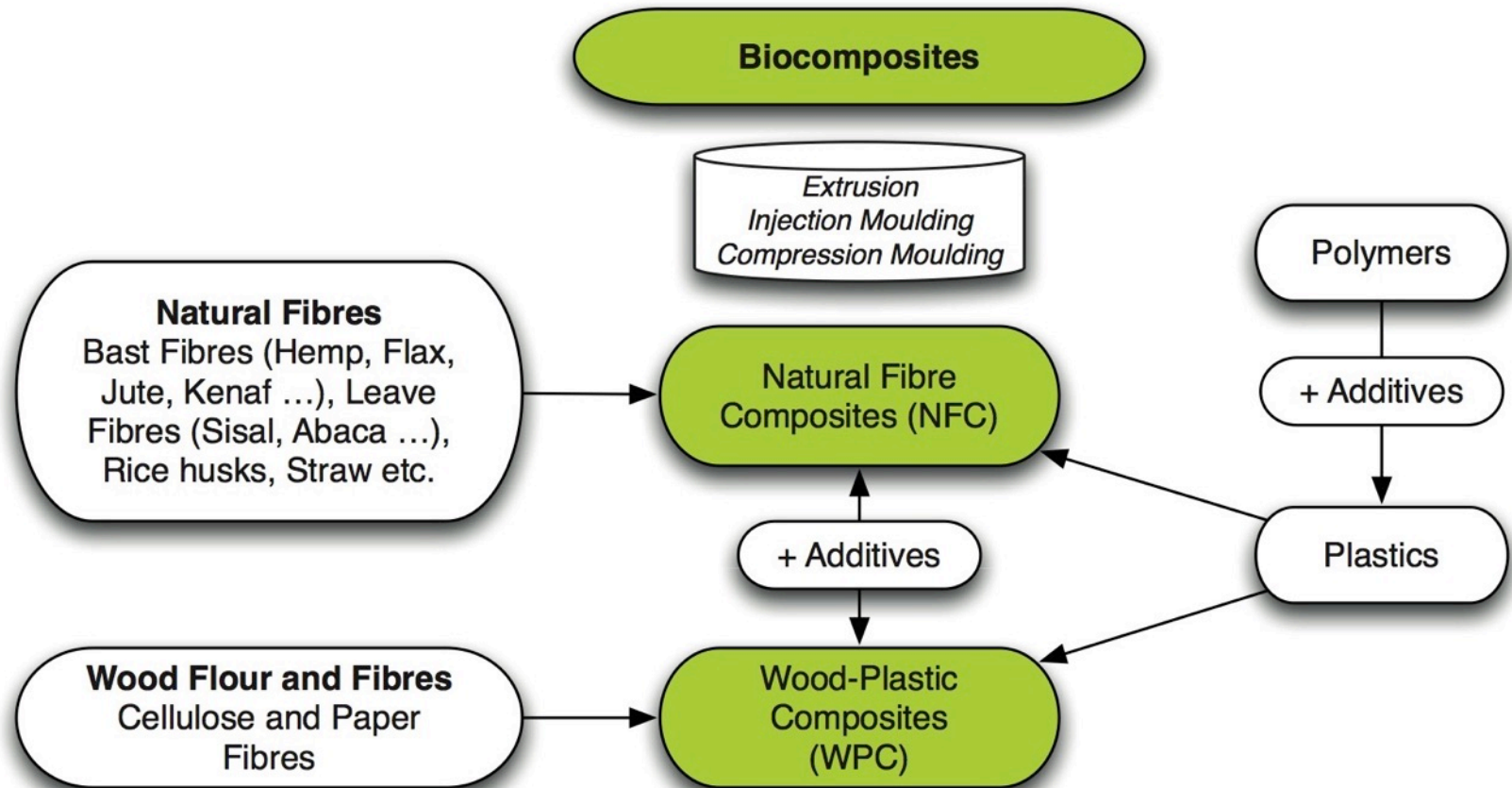


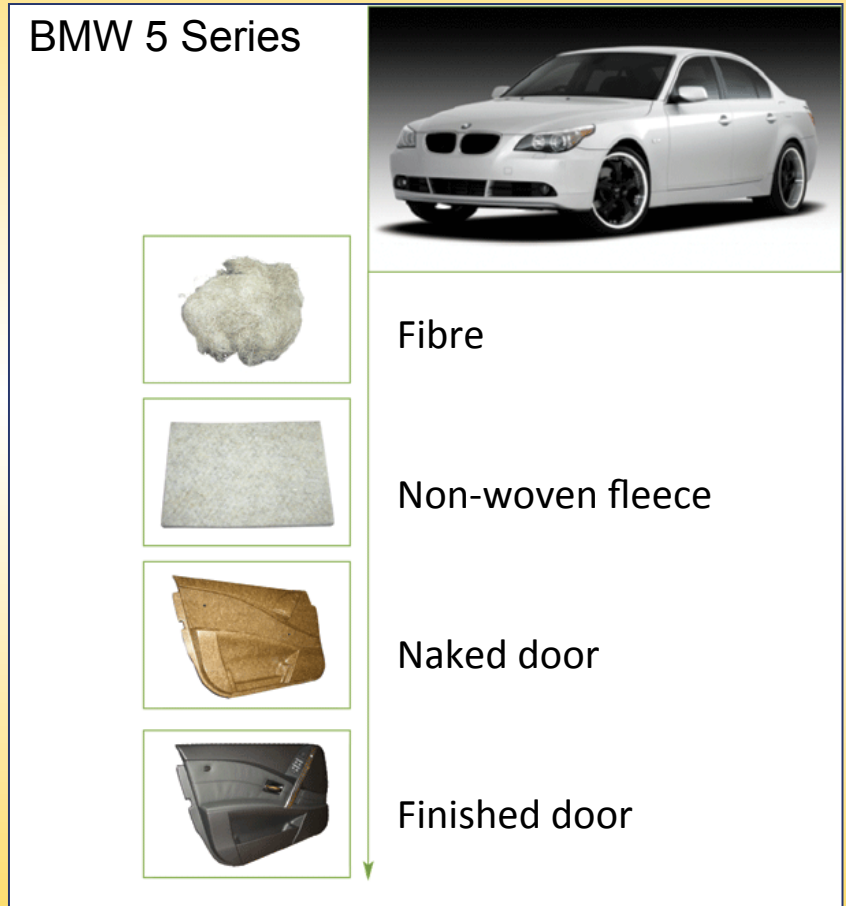
Figure 1.1: Description of biocomposites (nova 2014)



Wood and Natural Fibres Composites for Automobile Interior Parts



- **Total amount: 150,000 t/a (EU27)**
- **Fibre use: 80,000 t/a (EU27)**
Wood, Cotton, Flax, Kenaf, Hemp, Jute, Sisal, Coir
- **Established and stable market with a new potential**
 - Good mechanical properties
 - Light weight
 - Impressive GHG saving
 - Price competitive
 - Good accident behaviour
 - High bio-based share
- **New trends**
 - **Showing the natural fibres** under transparent films or lacquers
 - **Using bio-based polymers** from 50-60% to 100% bio-based



Source: BMW 2008, nova-Institut 2013



Biocomposites with Natural Fibres, Wood Fibres and Recycled Cotton in the European Automotive Production in 2012

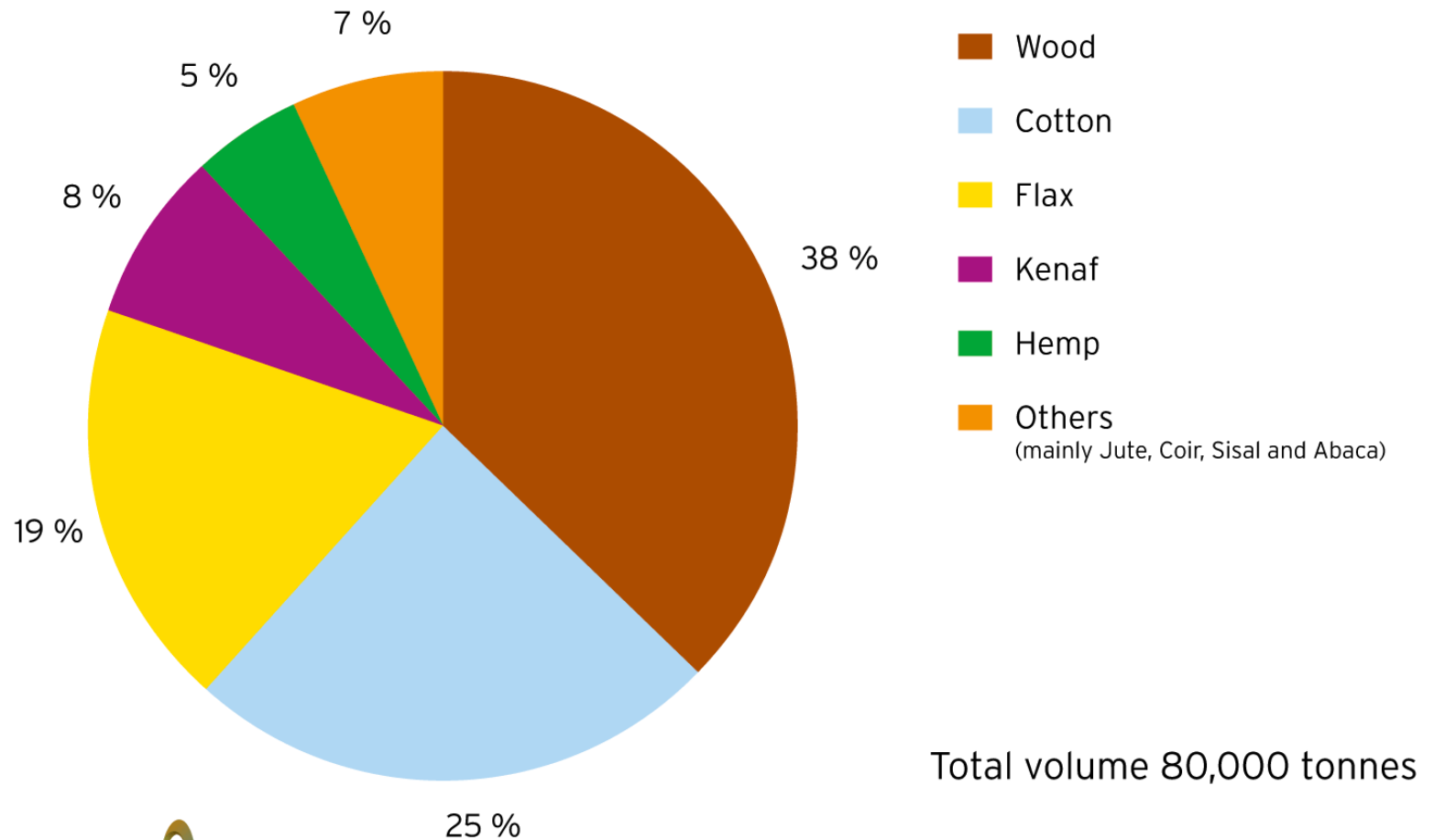
Biocomposites	Volume fibres in tonnes in 2012	Volume biocomposites in tonnes in 2012	Processing technologies	Matrice
Natural Fibre Composites	30,000	60,000	95 % compressing moulding, 5 % injection moulding & others	55 % thermoplastics, 45 % thermosets
Wood-Plastic Composites	30,000	60,000	45 % extrusion & thermoforming, 50 % compression moulding, 5 % injection moulding & others	Extrusion: 100 % thermoplastics, compression moulding: > 90 % thermoset
Recycled Cotton Reinforced Plastics	20,000	30,000	mainly compression moulding	> 90 % thermoset
Total	80,000	150,000		



Automotive Processing Technology	Share of Natural/Wood Fibres in Biocomposites Typical Ranges
Press Moulding: Natural Fibre & Thermoplastic	40–50 %
Compression Moulding: Natural Fibre & Thermoset	50–70 %
Press Moulding: Wood Fibre & Thermoset	70–90 %
Extrusion: Wood Fibre & Thermoplastic	30–40 %
Injection Moulding: Natural Fibre & Thermoplastic	30–40 %

Table 9.4: Typical ranges of natural fibre shares for different production techniques (nova 2014)

Use of Wood and Natural Fibres for Composites in the European Automotive Industry 2012



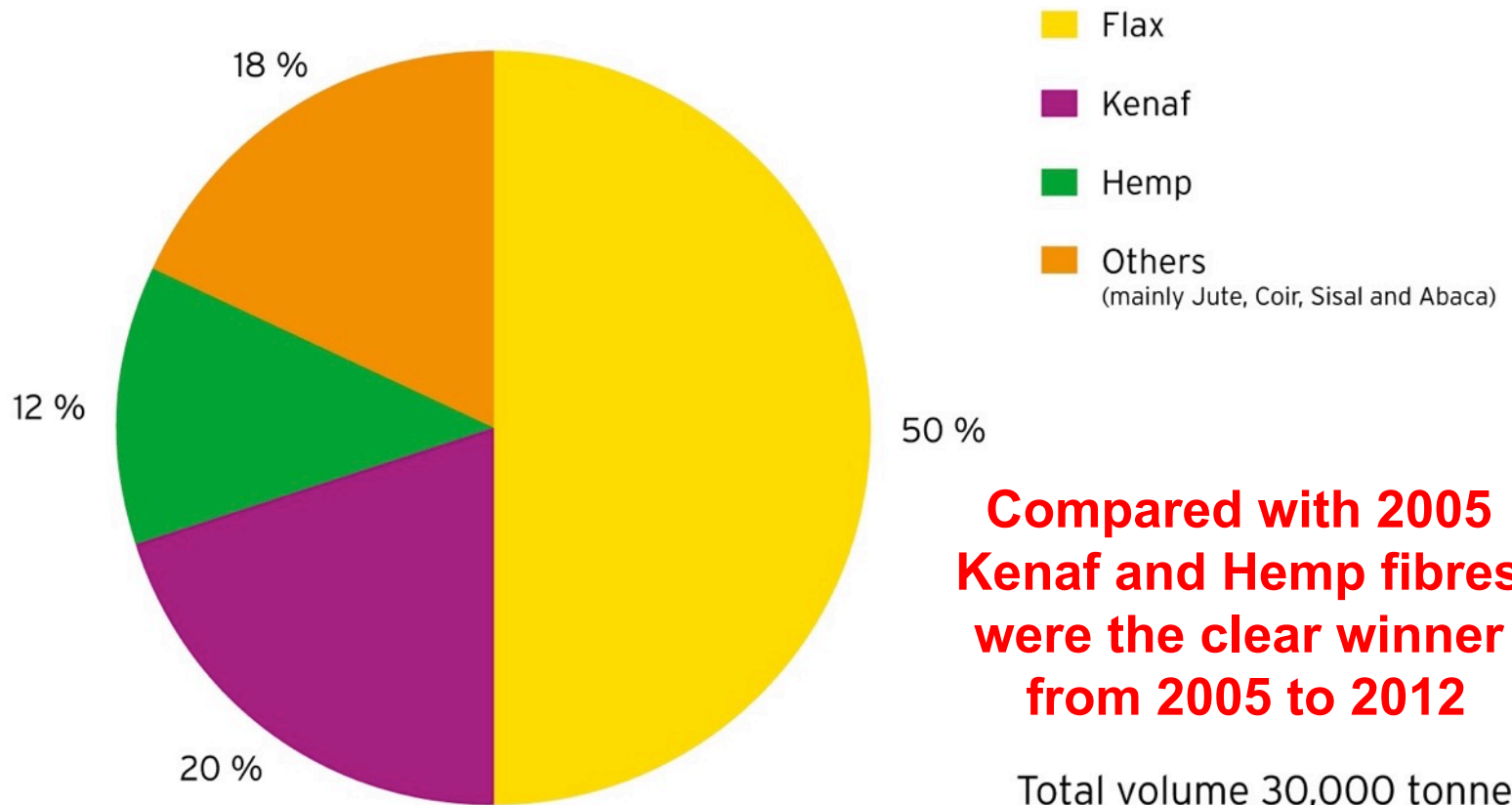
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Source: Carus & Eder et al. 2014

Use of Natural Fibres for Composites in the European Automotive Industry 2012

(without Cotton and Wood)





Success story compression moulded parts

Automotive interior parts	Area weight in g/m ²
Injection moulded pure plastic or glass fibre reinforced plastics	> 2,200
Compression moulded PP-NF	1,800
Compression moulded PP-NF with bonding agent MAPP	1,500
Compression moulded Thermosets+NF	1,400
Compression moulded Thermosets+NF In development	800 – 1,000

Superior light weight properties and very attractive low price level



Outlook



Right now, as our survey showed, this would merely result in **about 4 kg natural and wood fibres per vehicle in average in Europe;**

but vehicles with considerably larger amounts of **20 kg** natural and wood fibres have been successfully produced in series for years.

Any incentive for the use of natural and wood fibres in the European automotive industry could help to extend the existing amount of **30,000 t/y for each natural and wood fibres, up to five times, that means to 150,000 t/y each** – the technologies are ready to use.

A great potential for biocomposites!



Latest news I



December 2014: **Automotive Performance Materials (APM)**, a joint venture between **Faurecia** and **Interval**, is aiming to develop and produce bio-sourced raw materials to create lighter, cleaner vehicles.

APM aims to supply the automotive industry through Faurecia, one of the world's leading automotive equipment suppliers, and other players in plastics.

Interval, a major French agricultural cooperative, will harvest and defibrate hemp to supply it to **Automotive Performance Materials**, where it will be transformed and mixed with a thermoplastic resin to create an injectable material known as **NAFILEan**.

Automotive equipment suppliers can use the raw materials to make automotive parts. **NAFILEan enables weight savings of up to 20% based on equivalent performance, with a 25% improvement in lifecycle.**





Latest news II



HIB TRIM PART SOLUTIONS GmbH (Germany): Nature 50 – Natural fibre reinforced plastic (Hemp – PP) including a long fibre ratio > 50% for injection moulding

The **new Nature 50 granulate is a completely new development with unique properties**. Long hemp fibres (> 50%) are mixed with PP and additives in an innovative **cold-press technology (no extruder)**. The granulate can then be extruded and injection moulded in serial moulding tools. **The long hemp fibres give a unique design and a good Charpy impact property to the material – making it suitable for automotive parts**. The weight reduction is between 18 and 20% in substitution of serial plastic PC ABS GF20. Also impact strength, shrinkage and heat expansion show attractive properties.

As a pure injection moulding part, Nature 50 shows an **extraordinary appearance due to the long fibres**, which can be varied through colouring. Therefore the material offers a wide range of design options in- and outside of the automotive sector.





Thank you for your attention!

CEO



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