

Biocomposites: 350,000 t production of wood and natural fibre composites in the European Union in 2012 – new market and trend report published

The most important application sectors are construction (decking, siding and fencing) and automotive interior parts. Between 10 – 15% of the total European composite market is covered by Wood-Plastic Composites (WPC) and Natural Fibre Composites (NFC). Main authors of the study are Michael Carus and Asta Eder, biocomposite experts of nova-Institute, Germany. The study points out the growth potential of WPC and NFC granulates for injection moulding for all kinds of technical applications and consumer goods as well as in the automotive industry. What's more, bio-based polymers in combination with wood and natural fibres take on greater significance – applied in everything from toys to automotive interior.

The market report gives the first comprehensive and detailed picture of the use and amount of wood and natural fibre reinforced composites in the European bio-based economy. The analysis covers natural fibre as well as Wood-Plastic Composites in extrusion, injection and compression moulding in different branches and applications. To achieve a reliable base of data, the study draws from a survey conducted in 2013 among the WPC and NFC industry, producers and customers. The rate of return was exceptionally high, especially for the WPC part of the study, more than 50% of the extruded volume produced took part in the survey – that means the study covers about 65 European WPC extruding companies in 21 countries. Personal interviews, conducted in 2014 and 2015, show recent trends in the WPC and NFC granulate market.

Wood-Plastic Composites – Decking still dominant, but technical applications and consumer goods rising

The total volume of WPC production in Europe was 260,000 tonnes in 2012 (plus 90,000 tonnes Natural Fibre Composites for the automotive industry, see below). The level of market penetration of bio-based composites varies between different regions and application fields. Germany leads in terms of number of actors as well as in production figures. The typical production process in Europe is extrusion of a decking profile based on a PVC or PE matrix. The increasing market penetration of WPC in decking has meant that WPC volumes have risen strongly and that today, Europe has reached a mature WPC market stage. This study predicts growth especially in the German-speaking area on the back of a recovery in construction, especially in renovation, and a further increase of WPC share in the highly competitive decking market. Also, variations of WPC decking models, such as capped embossed full profiles or garden fencing are on the rise across Europe.

The development in shares of applications points to a direction where WPC is increasingly used for applications beyond the traditional ones such as decking or automotive parts. For example, WPC is increasingly used to produce furniture, technical parts, consumer goods and household electronics, using injection moulding and also other processes than extrusion. Also new production methods are being developed for extrusion of broad WPC boards.

Figure 1 shows the different application fields of WPC produced in Europe. The decking market is leading with 67% (mainly extrusion), followed by automotive interior parts with 23% (mainly compression moulding and sheet extrusion as well as thermoforming). Although still smaller, siding and fencing as well as technical applications (mainly extrusion) and consumer goods and furniture (mainly injection moulding) are showing the highest increase in percentage. With increasing plastic prices, WPC granulates for injection moulding are getting more and more attractive, and are increasingly found in the product range of the European granulate suppliers.

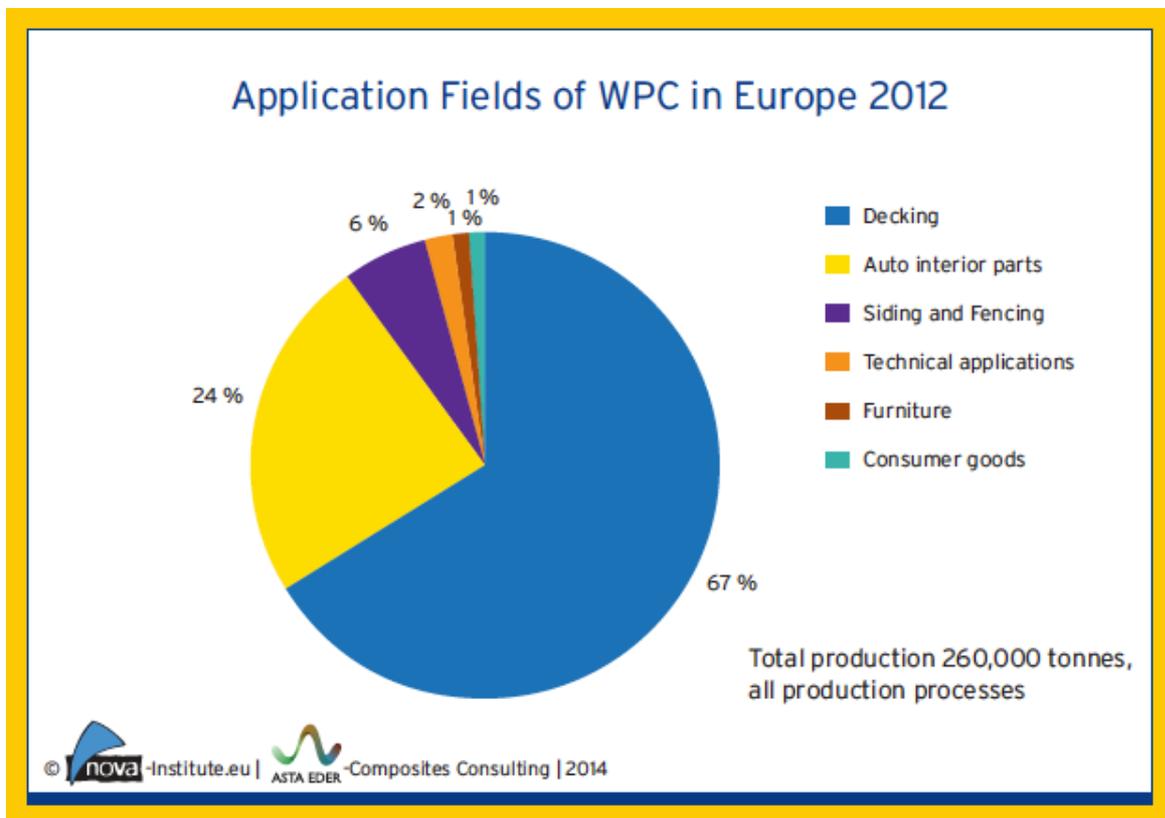


Figure 1: Application fields of WPC in Europe in 2012 (Total production 260.000 tonnes, all production processes)

The report also gives an overview of the latest market development in North America and Asia and an overview and forecast of the global WPC market situation, which has grown up to 2.5 million tonnes of production in 2012. China has the strongest growth rates with a production volume of 900,000 tonnes in 2012 and is trying to catch up with the largest WPC production volume in the world, which takes place in North America and has grown to 1.1 million tonnes of WPC production in 2012. The share of WPC decking in the total decking market is increasing again, after a period of housing crises and WPC quality problems that have led to a shakeout of the top WPC producers. The trend in WPC decking is towards producing more filled decking boards (overall market

share in Europe is already about 47%) and especially imports from the USA are more and more offered.

Interviews conducted during the FAKUMA 2014 trade fair found a growing portfolio of fibre-filled granulates offered both by producers and retailers; by now there are about 60 producers and retailers active on the market. The following table shows growth opportunities for WPC and NFC granulates in injection moulding for all kinds of technical applications and consumer goods. Accounting for improved technical properties, dropping prices and higher delivery volumes, the authors predict an increase from 10,000 t in 2012 to 100.000 t in 2020. Additional incentives could probably more than double the size of the market. Compared with WPC, NFC granulates are predicted to only gain in niche markets with specific needs.

The table also shows the volume of traded granulates for extrusion and injection moulding. Direct extrusion is the domineering process in extruding, which does not require granulates as an intermediate material. Therefore, the share of granulates for extrusion is low. In contrast, granulates are used in most injection moulding applications and are traded between actors of the process chain.

Table 1: Production of biocomposites (WPC and NFC) in the European Union 2012 and forecast for 2020

Biocomposites	Production in 2012	Forecast production in 2020 (without incentives for bio-based products)	Forecast production in 2020 (with strong incentives for bio-based products)
WPC			
Construction, extrusion	190,000 t	400,000 t	450,000 t
Automotive, compression moulding & extrusion/ thermoforming	60,000 t	80,000 t	300,000 t
Technical applications, furniture and consumer goods, mainly injection moulding	10,000 t	100,000 t	> 200,000 t
<i>Traded granulates for extrusion and injection moulding</i>	<i>40,000 t</i>	<i>200,000 t</i>	<i>> 300,000 t</i>
NFC			
Automotive, compression moulding	90,000 t	120,000 t	350,000 t
Granulates, injection moulding	2,000 t	10,000 t	> 20,000 t

Natural fibre composites: Growth potential in automotive due to lightweight components and new processing techniques

The most dominant use of natural fibre composites by far can be found in interior parts of the automotive industry – other sectors such as consumer goods are still in a very early stage. In automotive, natural fibres composites have a clear focus on interior trims for doors for high-value doors and dashboard. Wood-Plastic Composites are mainly used in rear shelves and trims for trunks and spare wheels as well as in interior trims for doors.

Figure 2 shows the total volume of 80,000 tonnes different wood and natural fibres used in 150,000 tonnes of composites in passenger cars and lorries, produced in Europe in 2012 (90,000 tonnes Natural Fibre Composites and 60,000 tonnes WPC). Recycled Cotton Fibre Composites are mainly used for the driver cabins of lorries.

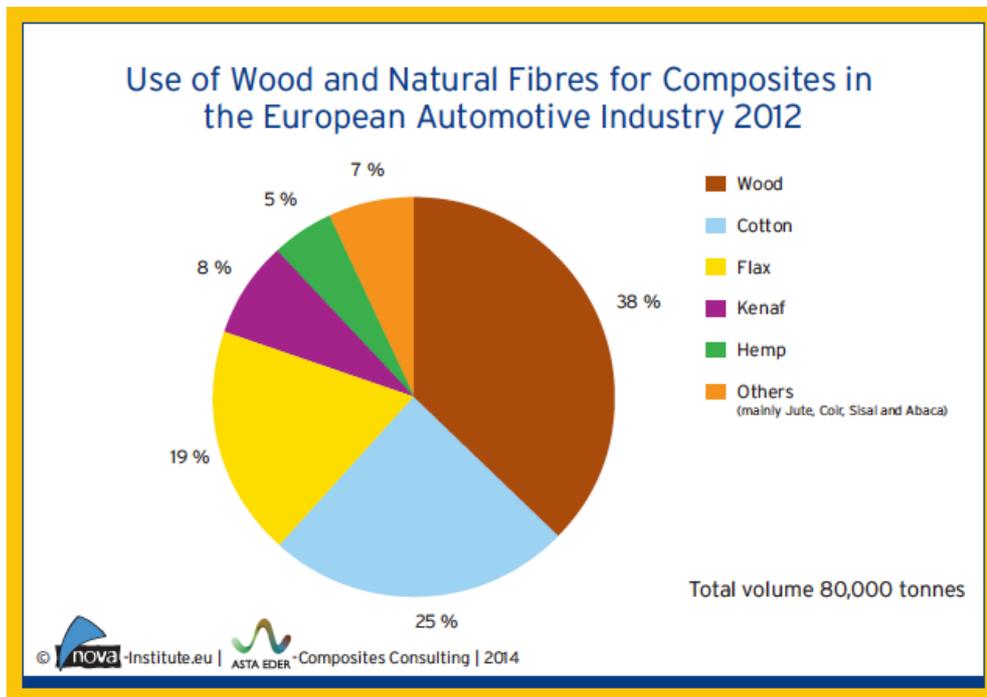


Figure 2: Use of Natural Fibres for Composites in the European Automotive Industry 2012, including cotton and wood (total volume 80,000 tonnes), others are mainly Jute, Coir, Sisal and Abaca

The highest market shares are made up for by wood (European origin), recycled cotton (from world market) and flax fibres (European origin). Compared to the last survey for the year 2005, the shares of kenaf (from Asia) and hemp fibres (European origin) show the biggest increase in percentage.

Process-wise, compression moulding of Wood and Natural Fibre Composites is an established and proven technique for the production of extensive, lightweight and high-class interior parts in mid-range and luxury cars. Advantages (lightweight construction, crash behaviour, deformation resistance, lamination ability, depending on the overall concept, also price) and disadvantages (limited shape and design forming, scraps, cost disadvantages in case of high part integration in construction parts) are well known. Process optimisations are in progress in order to reduce certain problems such as scraps and to recycle wastage.

In recent years new improved compression moulded parts have shown impressive properties in weight reduction (see table 2). This is one reason for the increasing interest in new car models. Today with the newest technology, an area weight of down to 1,500 g/m² can be reached with thermoplastics; thermosets are even aiming towards 800 g/m². These are outstanding properties compared to pure plastics or glass fibre composites.

Table 2: Natural fibre compression moulded parts – superior lightweight properties

NF compression moulded parts – superior lightweight properties	
Automotive interior parts	Area weight in g/m ²
WPC – extruded and moulded	2,500
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 – 1,500
Compression moulded Thermosets-NF In development, production expected after 2018	800 – 1,000

In the EU, 15.7 million passenger cars were produced in 2011; in addition, 2 millions of other motor vehicles (incl. trucks, transporter, motor bikes, etc.) were manufactured. Considering that 30,000 tonnes of natural fibres and another 30,000 tonnes of wood fibres were used in 15.7 million passenger cars, every passenger car in Europa averagely contains 1.9 kg of natural fibres, respectively 1.9 kg wood fibres, so in total that makes almost 4 kg of these fibres per car.

From a technical point of view, much higher volumes are possible. Vehicles with considerably larger amounts of 20 kg natural and wood fibres have been successfully produced in series for years. The market development depends also on the political framework: 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/year for natural and wood fibres each. The vision could be an increase of up to five times, that means to 150,000 t/year for each fibre type – the technologies are ready to use. A great potential for biocomposites!

Bio-based plastics are also used for high-value applications in the automotive industry. Bio-based polyamides from castor oil are used in high-performance components, polylactic acid (PLA) is used in natural fibre-reinforced interior door panelling, soy-based foams in seat cushions and armrests and bio-based epoxy resins in composites. A special area at the Composites Europe 2015 in Stuttgart (www.composites-europe.com) as well as the new accompanying conference bio!CAR (www.bio-car.info) will demonstrate what the bio-based car of the future could look like.

Content of the report

The full report contains about 90 pages and covers almost all aspects of technical markets for natural fibres and WPC:

- WPC and NFRC: Definition, standards and norms, certifications
- Processing technologies
- Mechanical properties
- Comprehensive analysis of WPC market and application fields as well as distribution channels in Europe 2012 and overview for other regions
- World market for natural fibres
- Natural fibres in the European automotive industry 2012
- Overview of life cycle assessments for WPC and Natural Fibre Composites

The report "Wood-Plastic Composites (WPC) and Natural-Fibre Composites (NFC): European and Global Markets 2012 and Future Trends in Automotive and Construction" can be ordered for 1,000 € (plus VAT). Please order here: www.bio-based.eu/markets

If you have already purchased the study before this update, you will soon receive a personal discount code for the purchase of the latest version.

Customers will receive a 30% discount code for the Sixth WPC Conference Cologne, 16-17 December 2015 in Cologne, Germany (www.wpc-conference.com)

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Please download the figures included in the press release. Use of the material is free of charge for press purposes. https://bio-based.eu/market_study_wpc_nfc/press/15-06_Graphics_PR_WPC-NFC-Study_nova.zip

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