Natural Fiber Composites

Market Scenario and Competitive Landscape

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Disclaimer

Introduction and Methodology

“Market Scenario” is a customized and organized analysis to gather information about target markets and competitive landscape in a particular sector.

“Market Scenario” provides relevant information to identify and analyze market needs, market size and competition in the fields of interest of the customer. A technology or a product developed by the customer can be characterized according to the sectors and potentiality of application, target market, competitive advantages and potential partners of the technology. The analysis is performed with the application of technology and business intelligence tools. The research in the information providers is usually based on the use of keywords or by thematic area, according to the specific topic of interest.

The results of the assessment are data about the target or global market potential, market value and applicability of the technologies or products developed by the customer, the trends of the market of interest, the segmentation of the market (e.g., by application, geography or indication), the supply chain and the competitive advantages of products or technologies, the key players active in the market of interest and the possible direct or indirect competitors of the customer.

Context

This report provides an overview of the **natural fiber composites market**, with reference to the trend and dynamics in the period 2023 – 2028, to the market segmentations by type, by manufacturing process, by end-use industry, by region and to the competitive landscape in the field, especially at the European level.

1 Natural Fiber Composites

Natural fiber composites are fabricated from natural fibers reinforced with polymer matrix, such as polypropylene, polyethylene, epoxy and polyester. These natural fiber composites are non-wood composite fibers comprising flax, jute, hemp, kenaf, sisal, coir, etc. Natural fibers are low-cost fibers with low density and high specific properties. Unlike synthetic fibers such as glass and carbon, natural fibers offer certain benefits to the composites, such as low density, low cost, renewability, biodegradability, and a high degree of flexibility during processing.

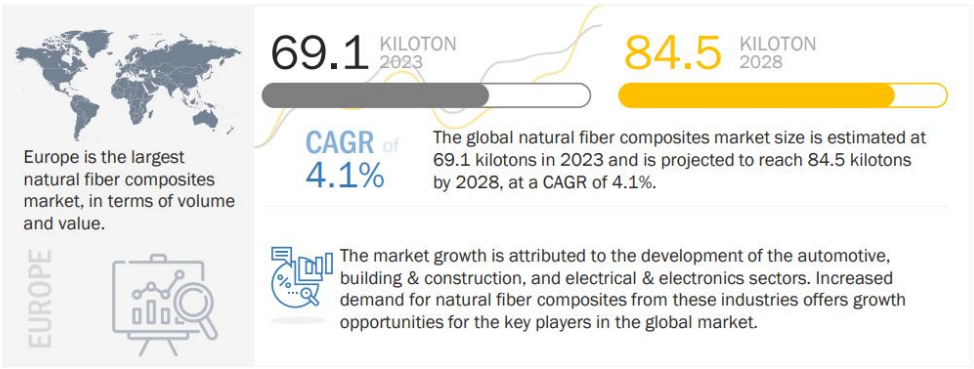
Owing to their low density and outstanding mechanical properties, natural fiber composites have piqued the interest of many researchers to replace synthetic fibers for fabricating fiber-reinforced polymer composites for various end-use industries, such as building & construction, automotive, electrical & electronics, and consumer goods. In automotive applications, natural fiber composites are mainly used in door panels, seat backs, and load floors. In construction, such composites are used for door panels, window frames, decking, railings, fencing, and indoor furniture.

1.1 Global Market and Market Dynamics

The **global natural fiber composites market** size was USD 313.5 million in 2022 and is expected to reach USD 424.1 thousand by 2028, at a Compound Annual Growth Rate (CAGR) of 5.3% between 2023 and 2028. This growth is driven by the increasing demand for natural fiber from automotive, building & construction, and other end-use industries.

The **market in kilotons in the period 2023 – 2028** is reported in the following Figure.

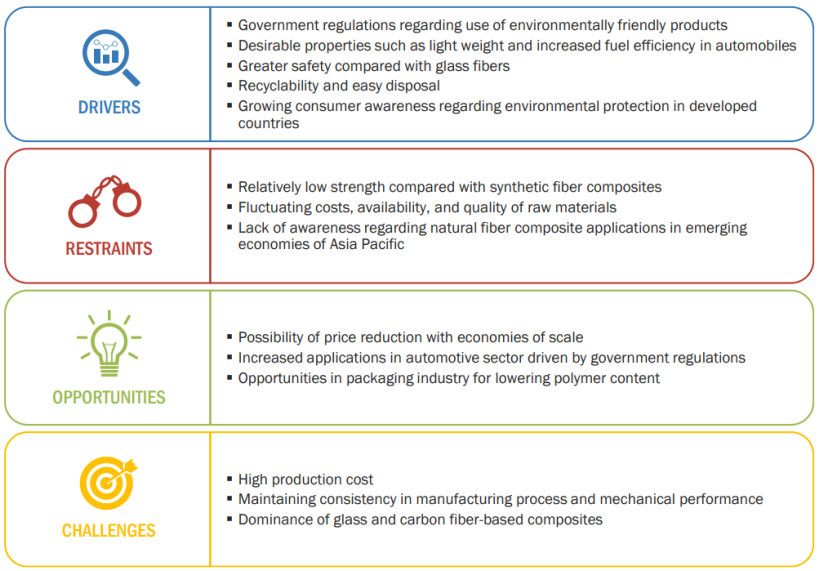
Figure 1. Global Natural Fiber Composites in Kilotons, in the Period 2023 - 2028



The market for natural fiber composites is highly competitive, with a focus on innovative methods to develop novel natural fiber composites with enhanced mechanical performance and strength. Leading innovators are expected to dominate this industry, while the threat of new entrants in the market is considered low due to the large capital investment, production capabilities, and technical knowledge required. High tensile strength, better crack resistance, less energy consumption, improved fuel efficiency, and light weight have made natural fiber composites more lucrative than their synthetic counterparts. The **unique properties** are aiding natural fiber composites to gain market share, especially in the automotive industry. However, the application of natural fibers is restricted due to a **lack of reproducibility** along with inconsistency in the manufacturing processes. The natural fiber composites industry has a small number of suppliers. In addition, some of them are into forward integration.

The increasing demand for natural fiber composites in end-use industries, such as automotive and construction, is expected to **drive** the natural fiber composites market (Figure 2). Automotive manufacturers are trying to reduce the weight of vehicles by using natural fiber composites, increasing their demand. Nevertheless, relatively low strength compared to synthetic fiber-based composites is the biggest restraint to the growth of the natural fiber composites market. Furthermore, fierce competition, economic volatility, price fluctuations, and raw material availability are some of the **challenges** associated with the market.

Figure 2. Natural Fiber Composites Market: Drivers, Restraints, Opportunities and Challenges



1.2 Market Segmentation by Type

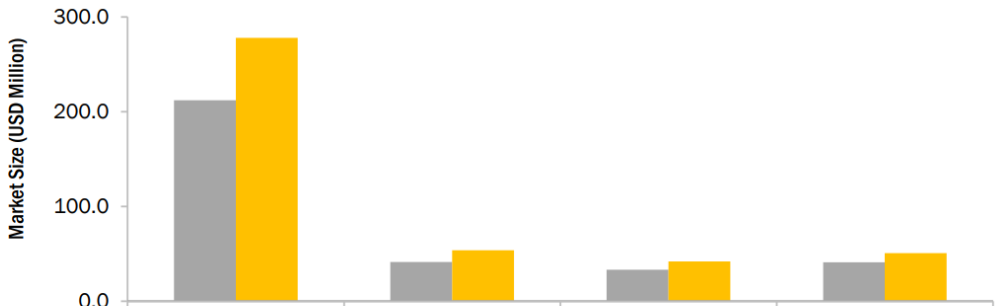
The natural fiber composites market is categorized into types based on the fibers used in its production: **flax, kenaf, hemp and others** (jute, coir, ramie, recycled cotton, abaca and sisal) (Figure 3). These composites are produced by blending non-wood fibers with resin, such as PP, PE, polyester, and epoxy. The availability, renewability, low density, and low price combined with reasonable mechanical properties of non-wood fiber composites have made them an attractive alternative to glass, carbon, and other man-made fibers composites.

Bast fibers, such as flax, hemp, and kenaf, are the most widely used non-wood fibers for industrial applications. These fibers are preferable as they are relatively long fibers and have high cellulose content, thereby delivering high tensile strength. Apart from this, these composites increase fuel efficiency in automobiles as they are lighter in weight than synthetic fiber composites.

The **flax** fiber composites market segment dominated the natural fiber composites market by type in 2023 and is projected to reach USD 278.0 million by 2028, at a CAGR of 5.6% between 2023 and 2028. Flax composites are light in weight, making them suitable for a wide range of applications in automotive, building & construction and other end-use industries. Flax fibers offer inherent mechanical properties, which provide high stiffness and strength to the composites. Moreover, these fibers also have a high tensile strength, enabling the production of load-bearing and structurally sound parts.

The global **kenaf** fiber composite market size is projected to reach USD 53.6 million by 2028 at a CAGR of 5.3% during the forecast period. The kenaf fiber composites can be manufactured sustainably, offer better resistance against moisture and microbial activities than wood fibers, and have the ability to provide cost-effective solutions.

Figure 3. Natural Fiber Composites Market, by Type, in the Period 2023 - 2028



	Flax	Kenaf	Hemp	Others
2023	211.8	41.4	33.3	41.0
2028	278.0	53.6	41.9	50.7
CAGR (2023–2028)	5.6%	5.3%	4.7%	4.3%

Other non-wood fibers include **jute**, coir, ramie, abaca and sisal. Jute fibers are lignocellulosic fibers that offer good fiber strength, dimensional stability, and impact resistance. The fibers with PLA, epoxy, polypropylene, and other resins are used in end-use industries, such as consumer goods, marine, transportation, etc. Some of the major countries involved in the production of jute fibers are India, China, and Bangladesh.

North America is estimated to have the second-largest share in the global other fiber-based natural fiber composites market by 2028 due to high demand from the transportation and building & construction industries. The need for using lightweight and easily available materials in part manufacturing for reduced CO_2 emissions is expected to drive the demand for other fibers in the automotive industry between 2023 and 2028.

1.3 Market Segmentation by Manufacturing Process

Natural fiber composites are processed through a few manufacturing processes, such as **compression, injection moldings** and **others** (extrusion, resin transfer molding and vacuum infusion) (Figure 5). These methods can be implemented to process the composites owing to limitations such as low mechanical performance and moisture content. Factors influencing the processing methods include moisture content, fiber type, and content and properties of additives. The moisture content in natural fiber composites and changing environmental conditions can adversely affect their mechanical performance in the long run. Natural fibers made of cellulose can take up high volumes of water and negatively influence the processing, thus reducing the mechanical strength and increasing the swelling of fibers. Similarly, the type of natural fiber or organic fillers can also influence the processing and cause corrosion and abrasion of screws, barrels, and molds. The additive also influences the processing of natural fiber composites and has the ability to improve material characteristics, including throughput, physical, chemical, and mechanical properties.

The choice of the composite manufacturing process largely depends on the shape and the dimensions of the structural components to be manufactured. The global manufacturing natural fiber composites market is mainly categorized into three segments based on the manufacturing process: **compression molding**, **injection molding**, and **resin transfer molding** (Figure 4). These processes produce lightweight composites with a high strength-to-weight ratio, good surface quality, high dimensional tolerance and composite structural parts.

Figure 4. Comparative Study of Major Natural Fiber Composite Manufacturing Processes

MANUFACTURING PROCESSES	ADVANTAGES	DISADVANTAGES	APPLICATIONS
Compression Molding	Simple, relatively fast cycle times, high repeatability, and high-volume production	Large initial capital investments in molds and presses and minor defects as a result of residual stresses, delamination, warpage, and flow orientation of fibers	Automotive (non-structural automobile applications, such as interiors, closures, and miscellaneous parts)
Injection Molding	Versatile, low cost, and offers high-volume production means for thermoplastic resin parts reinforced with fiber	Long cycle time	Automotive and Building & Construction
Resin Transfer Molding	Used in the fabrication of complex, large-scale integrated automobile structural parts	Expensive and generally limited to smaller components; can lead to producing expensive scrap parts	Automotive (body frame, chassis/suspension, roof, and hood applications) and Building & Construction

Compression molding is the most widely used manufacturing process for natural fiber composites, followed by injection molding. These processes are widely used in the building & construction and automotive industries. Other manufacturing processes include extrusion, resin transfer molding, and vacuum infusion. Extrusion is used in the construction as well as automotive industries.

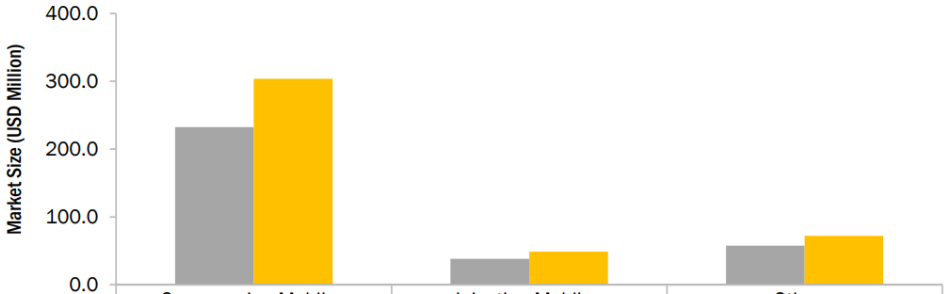
In 2023, the **compression** molding segment accounted for the largest share of the natural fiber composites market, in terms of value, which is projected to reach USD 303.5 million by 2028, registering a CAGR of 5.5% during the forecast period. Compression molding is the most extensively used manufacturing process for natural fiber composites because of the high demand for the composites manufactured by this process in the automotive and building & construction

industries. The automotive & construction industry is the key end user of compression-molded natural fiber composites due to their benefits, such as cost-effectiveness, high reproducibility, and low cycle time, compared with synthetic fiber composites.

The **injection** molding segment is projected to register a CAGR of 5.0% between 2023 and 2028. Increasing penetration of the injection molding process in electrical & electronics and consumer goods industries is estimated to drive the injection molding market in the near future.

The market size for **other** manufacturing processes is projected to reach USD 72.0 million by 2028, registering a CAGR of 4.6%. Resin transfer molding is estimated to contribute majorly to the growth of this segment due to its low cycle time, high productivity, cost-effectiveness, and ability to develop complex structures.

Figure 5. Natural Fiber Composites Market, by Manufacturing Process, in the Period 2023 - 2028



	Compression Molding	Injection Molding	Others
2023	232.1	38.0	57.5
2028	303.5	48.6	72.0
CAGR (2023–2028)	5.5%	5.0%	4.6%

Note: Others include extrusion, resin transfer molding, and vacuum infusion.

1.4 Market Segmentation by End-Use Industry

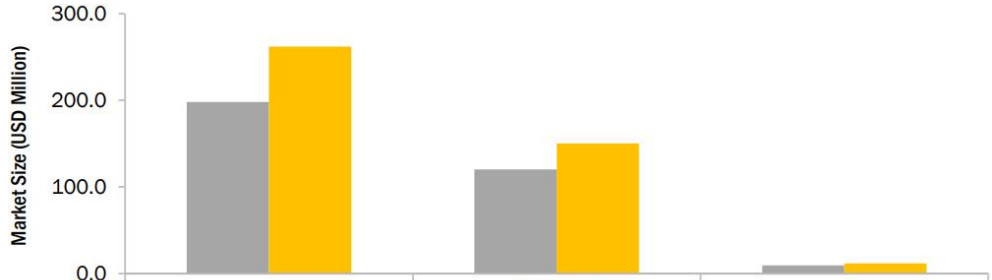
Natural fiber composites are used in various industrial applications, such as in **automotive parts, building structures, and others** (electrical & electronics, sporting goods and consumer goods) (Figure 6). The demand for natural fiber composites in these industries is growing due to their benefits over synthetic fiber composites, such as low density, competitive specific mechanical properties, sustainability, and recyclability.

The **automotive** segment serves as the biggest application area for natural fiber composites, followed by the building & construction industry. This segment accounted for the largest share of the natural fiber composites market in 2023 and is projected to witness a CAGR of 5.8% during the forecast period. Increasing environmental awareness, modified government policies in favor of environmentally friendly and recyclable products, and preferences of automobile manufacturers are the key factors contributing to the growth of the natural fiber composites market.

The **building & construction** segment accounted for 37.0% of the natural fiber composites market in 2022 and is projected to register the highest CAGR of 4.6% between 2023 and 2028. In the building & construction sector, major applications of natural fiber composites are door panels, window frames, railings, decking, furniture, structural beams, and others. Key players in the automotive industry, such as Mercedes-Benz (Germany), BMW (Germany), Audi (Germany), Ford (US), and Toyota (Japan), use natural fiber composites in various parts, such as door panels, headliner panels, trims, seat backs, noise insulation panels, and other components.

Natural fiber composites are expected to grow at a CAGR of 4.4% between 2023 and 2028 in **other end-use industries**, which include electrical & electronics, sporting goods and others. The applications of natural fiber composites in electrical & electronics include mobile and laptop cases, musical instrument covers, voltage stabilizer covers, and loudspeakers. Other applications of natural fiber composites are sporting goods, such as tennis racket frames, bicycle frames, snowboards, skis, hockey sticks, and skiing & trekking poles, and other industrial and consumer goods, including helmets, paperweights, mirror casing, toys, and so on.

Figure 6. Natural Fiber Composites Market, by End-Use Industry, in the Period 2023 - 2028



	Automotive	Building & Construction	Others
2023	197.8	120.3	9.5
2028	262.1	150.3	11.8
CAGR (2023–2028)	5.8%	4.6%	4.4%

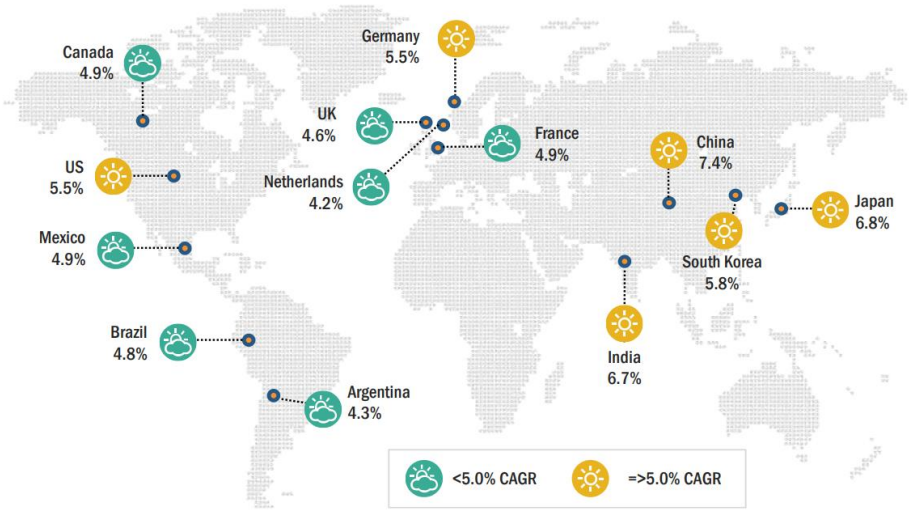
1.5 Market Segmentation by Region

The natural fiber composites market by region, can be segmented into: **North America, Europe, Asia Pacific and Rest of the World** (RoW) (Figure 7). The natural fiber composites market in **North America** is estimated to register significant growth owing to the increase in demand from the building & construction and automotive industries. The presence of many natural fiber composites end-part manufacturers in the US also plays a crucial role in boosting the market in North America. In addition, several leading vehicle manufacturers in this region are increasingly using these composites for making interior and exterior parts of automobiles.

Asia Pacific has the potential to emerge as the largest producer of natural fiber composites, as the region has abundant raw materials. Jute is primarily grown in South Asian countries, such as India, Bangladesh, China, Myanmar, and Vietnam. India, Russia, China, and Thailand are the primary producers of jute-like fibers, including kenaf.

In terms of value, **Europe** accounted for 55.3% of the natural fiber composites market in 2022. The demand for high-strength, impact-resistant, naturally sourced materials, mainly in the automotive and building & construction industries, is driving the natural fiber composites market in the region.

Figure 7. Natural Fiber Composites Market, by Region, CAGRs in the Period 2023 - 2028



Note: The figure given above highlights the growth rate of key countries for the natural fiber composites market, in terms of value

1.5.1 Focus on: Europe

The market size of Europe in the natural fiber composites market is projected to register a CAGR of 5.1% between 2023 and 2028 and reach a size of USD 231.6 million by 2028 (Figure 8). In **Europe**, natural fiber composites are mainly used for upholstery applications in automobiles; flax and jute are the major natural fibers used in making composites for interiors and exteriors, such as seat backs, door panels, armrests, sunshades, package trays, headliners, pillar covers, and trunk trims. The availability of flax and jute plays a crucial role in boosting the European natural fiber composites market.

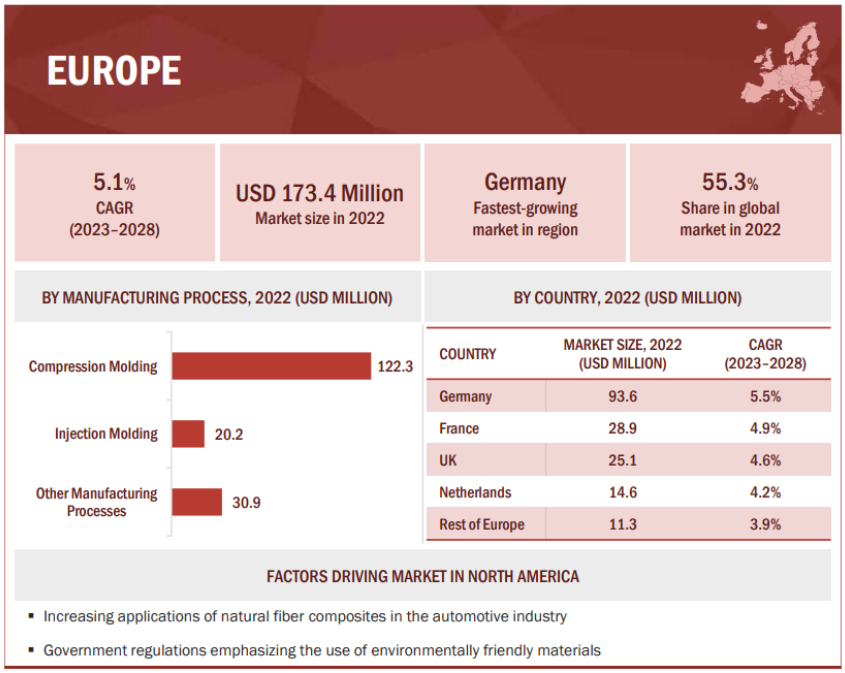
The market for the use of natural fiber composites in this region is driven by stringent government **regulations**. For instance, the European Commission has adopted the European Union's end-of-life of vehicles (ELV) directive, which aims to make vehicles up to 95% recyclable. Apart from this, European automotive manufacturers prefer these composites over glass fiber composites due to their light weight. The key **automotive** market leaders in Europe are located in Germany, France, the UK, and Russia, with Germany holding the largest market share.

The use of these composites in the automotive industry of Europe is increasing mainly because of their low weight and high strength and government regulations set for reducing carbon emissions. Manufacturing lightweight parts to increase fuel efficiency and meet CO_2 emission standards plays an important role in fueling the need for natural fiber composites in the region.

Flax fiber dominated the natural fiber composites market with a share of 64.7% in 2022, in terms of value. The demand for flax fiber in the natural fiber composites market in Europe has been increasing, driven by various industries. The automotive sector has been a prominent driver of this demand, with manufacturers seeking lightweight and sustainable alternatives to traditional materials. Flax-based composites are used in automotive interior components, such as door panels, seat backs, and instrument panels, to reduce weight and enhance sustainability.

Germany dominates the natural fiber composites market in Europe owing to the extensive use of these fibers in the automotive industry, which is backed by the presence of established automotive companies. Major revenue is generated from upholstery parts of automotive. However, the companies are now also focusing on developing structural parts.

Figure 8. Europe: Natural Fiber Composites Market Snapshot



Note: Rest of Europe includes Russia, Spain, and Italy.

1.6 Competitive Landscape

The **major players** active in the natural fiber composites market can be considered: Procotex SA Corporation NV (Belgium), Polyvlies Franz Beyer GMBH & Co. KG (Germany), Tecnaro GmbH (Germany), FlexForm Technologies (US), Meshlin Composites Zrt (Hungary), GreenCore Composites Inc. (Canada), GreenGran B.V. (Netherlands) and JELU-WERK Josef Ehrler GmbH Co & Co. KG (Germany).

Polyvlies Franz Beyer, **Procotex**, **FlexForm Technologies**, **Tecnaro**, and **JELU-WERK** are the major players in the natural fiber composites market. These companies account for a significant share of the market, backed by their technological capabilities, geographical presence, wide product portfolio, and adoption of growth strategies.

The main European players active in the market are further described in the following Table.

Table 1. European Players in the Natural Fiber Composites Market

Company	Location	Description	Website
Biowert Industrie	Germany	Raw material manufacturer and provider in Germany. Along with raw materials, the company also offers sustainable technologies and processes to manufacture a wide range of products	Biowert Industrie GmbH – BIOWERT - bio based industry
GreenGran	The Netherlands	Producer of biocomposite granules that are used in injection molding applications. The granule portfolio of the company includes the following grades: bio-based and sustainable, bio-based and biodegradable, bio-based and flame retardant, and bio-based and waterworks	Welcome to GreenGran - Home for biobased and biodegradable materials

Company	Location	Description	Website
Jelu-Werk	Germany	Manufactures products made from natural fibers such as cellulose, food fibers, raw fiber concentrates, and wood-plastic composites	Cellulose, powdered cellulose, lignocellulose, dietary fibre, WPC
J. RETTENMAIER & SÖHNE	Germany	Company involved in the production of a variety of functional fiber products made from renewable, natural materials. The company offers a wide variety of cellulose products, natural fibers, etc., with applications in multiple end-use industries, including automotive and construction	Every fiber for a better tomorrow.
Polyvlies	Germany	The company produces non-woven fibers and composites applicable in various industries	Polyvlies
Procotex SA Corporation	Belgium	Procotex is a key player in the natural fiber composites market. The company specializes in non-wood fiber composites and has a broad range of products	Home - Procotex
Tecnaro	Germany	Spinoff of Fraunhofer-Institut für Chemische Technologie (ICT). It is involved in the development, production and marketing of bio-composites with renewable raw materials	TECNARO – The Biopolymer Company

2 Sources

MarketsandMarkets Knowledge Store - Multisectoral database that collects market research reports in various technological fields and designed to process some information interactively. More than 1,200 market reports are published each year (https://www.mnmks.com/). The information presented are contained in the report "*Natural Fiber Composites Market – Forecast to 2028*", published in June 2023.