

Overview of Bio-based Materials for Healing the Planet

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The escalating climate crisis and dwindling resources necessitate a fundamental transformation in our production and consumption habits. Bio-based materials, derived from renewable biological resources, offer a promising solution to these environmental challenges.

What are bio-based materials?

Bio-based materials are products made from renewable biological sources such as plants, animals, microorganisms, and enzymes. These materials offer a sustainable alternative to traditional materials often derived from fossil fuels.

- Bioplastics
- Cellulose
- Lignin-based Materials



Key characteristics

Renewability

These are renewable in nature. Plants are primary source, can be regrown, ensuring a continuous supply, but fossil fuels are finite resources.

Biodegradability

Many are biodegradable, as they decompose into harmless substances reducing landfill waste and environmental pollution.

Lower Carbon Footprint

Production of bio-based materials requires less energy and emits fewer greenhouse gases, thus, mitigating climate change.

Versatility

These have a many applications across industries, to develop products like packaging, textiles, construction materials and biofuels.



Stages contributing to the carbon footprint of bio-based materials

CULTIVATION

Cultivation of plant material consumes energy, fertilizers, and involves transportation.

PROCESSING

Processing these materials requires energy-intensive methods like pulping, refining, and chemical treatments.

TRANSPORTATION

Transportation of raw materials and finished products contributes to emissions.

RECYCLING

Disposal or recycling methods at the end-of-life impact the overall carbon footprint of bio-based materials

Relevant standards for Bio-based materials

CSN EN 16785-1 – Bio-based products – Bio-based content – Part 1: Determination of the bio-based content using the radiocarbon analysis and elemental analysis

ASTM D6866 – 18 – Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis



USE CASES

BIODEGRADABLE FOOD PACKAGING	Researchers and industry funded project has developed game-changing food packaging material that is rapidly biodegradable. The material is a means to replace the plastic packing used for ready meals and reduce pollution.
BIO-BASED AIRCRAFT MATERIALS	Researchers are developing eco-friendly bio-based materials for aircraft. Collaboration with researchers in China and the aviation industry will see these materials replace traditional high-carbon footprint, non-recyclable materials in planes.
CONSUMER PRODUCTS	Companies are adopting bio-based materials due to their sustainability benefits. E.g., high-performance enzymes from biological sources used in laundry detergents, providing an eco-friendly alternative to traditional chemical-based products.

Market Size:

The global bio-based materials market is valued at approx. USD 41.20 billion in 2023 and is projected to reach USD 396.01 billion by 2033.

Growth Rate:

The market is expected to grow at a compound annual growth rate (CAGR) of 25.40% from 2023 to 2033.

Key Drivers:

The increasing demand for sustainable materials and rising concerns about greenhouse gas emissions.

Services, we can help with

Carbon Footprint Assessment |
Material Selection | Strategies to reduce emissions | Product optimization |
Material testing and characterizations |
Supply chain for carbon-intensive areas |
Product Sustaining activities |
Innovative bio-based products |
Life Cycle Assessment (LCA)



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