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Lignocellulosic Feedstock-based Biofuel Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Biofuel Type (Bioethanol, Biodiesel, Biobutanol, Bio-oil, Syngas), By Technology (Biochemical Conversion, Thermochemical Conversion, Hybrid Technologies), By End-Use (Transportation, Power Generation, Industrial Heating), By Region & Competition, 2020-2030F

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Abstracts

Market Overview

The Global Lignocellulosic Feedstock-based Biofuel Market was valued at USD 35.58 billion in 2024 and is anticipated to grow significantly, reaching USD 229.98 billion by 2030 with a CAGR of 36.28% during the forecast period. This market involves the production of advanced biofuels from non-food biomass such as agricultural residues, forestry waste, energy crops, and municipal solid waste, offering a sustainable alternative to traditional fossil fuels. These feedstocks are rich in complex organic compounds like lignin, cellulose, and hemicellulose, which can be processed into bioethanol, biobutanol, syngas, and other fuels through biochemical or thermochemical methods. Lignocellulosic biofuels are increasingly favored due to their minimal impact on food supply chains, ability to reduce carbon emissions, and contribution to rural economic development. Technological advancements and government support in the form of mandates and subsidies across regions such as North America, Europe, and Asia are driving market growth, supported by policies like the Renewable Fuel Standard (US), RED III Directive (EU), and India’s National Bio-Energy Mission.

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Key Market Drivers

Growing Emphasis on Reducing Greenhouse Gas Emissions

The market is witnessing strong growth due to rising global initiatives aimed at reducing greenhouse gas emissions and advancing sustainability goals. Lignocellulosic biofuels, made from non-food biomass such as forest and agricultural residues, present a low-carbon alternative to fossil fuels, particularly beneficial for high-emission sectors like transportation. Unlike first-generation biofuels, these fuels avoid competition with food resources, making them a more environmentally responsible choice for use in aviation, shipping, and freight. These biofuels can achieve emission reductions of 60–90% compared to fossil fuels, aligning with international commitments like the Paris Agreement. Regulatory frameworks such as the EU's Renewable Energy Directive (RED III), which increases renewable energy targets in transportation, further encourage adoption. Additionally, their production from waste materials like wood chips and wheat straw helps reduce land-use change and preserves natural ecosystems.

Key Market Challenges

Elevated Production Costs Undermine Commercial Viability

A major challenge limiting the commercial expansion of lignocellulosic biofuels is their high production cost. Although feedstocks like crop and forestry residues are relatively low-cost and abundant, the conversion processes involve complex and resource-intensive stages. Advanced biochemical and thermochemical techniques such as pretreatment, hydrolysis, and fermentation demand specialized equipment, skilled labor, and high energy inputs, driving up operational costs. The ongoing high prices of enzymes and catalysts, along with scalability challenges from lab-scale to full-scale production, contribute further to cost inefficiencies. Moreover, building commercial-scale biorefineries requires significant capital investment, posing financial hurdles in regions lacking robust policy support or subsidies.

Key Market Trends

Advancements in Conversion Technologies Enhancing Efficiency

One of the key trends transforming the market is the continuous improvement in conversion technologies, both biochemical and thermochemical. The inherent

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complexity of lignocellulosic biomass has historically hindered efficient fuel conversion. However, recent innovations in pretreatment, enzymatic breakdown, and fermentation methods are enhancing process yields and lowering costs. Developments such as engineered enzymes, improved catalysts, and integrated bioprocessing are enabling faster and more energy-efficient operations. Synthetic biology is also being applied to develop microbial strains capable of higher tolerance and broader fuel production. Additionally, thermochemical approaches like pyrolysis and gasification are seeing advances in reactor designs, improving energy efficiency, scalability, and emissions performance.

Key Market Players

POET-DSM Advanced Biofuels LLC

DuPont de Nemours, Inc.

Beta Renewables S.p.A.

Clariant AG

Abengoa Bioenergy S.A.

GranBio Investimentos S.A.

Ra?zen S.A.

Enerkem Inc.

INEOS Bio

Borregaard AS

Report Scope:

In this report, the Global Lignocellulosic Feedstock-based Biofuel Market has been segmented into the following categories, in addition to the industry trends which have

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also been detailed below:

Lignocellulosic Feedstock-based Biofuel Market, By Biofuel Type:

Bioethanol

Biodiesel

Biobutanol

Bio-oil

Syngas

Lignocellulosic Feedstock-based Biofuel Market, By Technology:

Biochemical Conversion

Thermochemical Conversion

Hybrid Technologies

Lignocellulosic Feedstock-based Biofuel Market, By End-Use:

Transportation

Power Generation

Industrial Heating

Lignocellulosic Feedstock-based Biofuel Market, By Region:

North America

United States

Canada

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- Mexico

Europe

- Germany
- France
- United Kingdom
- Italy
- Spain

South America

- Brazil
- Argentina
- Colombia

Asia-Pacific

- China
- India
- Japan
- South Korea
- Australia

Middle East & Africa

- Saudi Arabia

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UAE

South Africa

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Lignocellulosic Feedstock-based Biofuel Market.

Available Customizations:

Global Lignocellulosic Feedstock-based Biofuel Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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