

Bioenergy with Carbon Capture (BECCS) Market Forecasts to 2034 – Global Analysis By Feedstock (Agricultural Residues, Forestry Residues, Energy Crops, Municipal Solid Waste (MSW) and Industrial Organic Waste), Carbon Capture Method, Technology, Application, End User and By Geography

<https://marketpublishers.com/r/BDFF0388CAE3EN.html>

Date: July 2026

Pages: 200

Price: US\$ 4,150.00 (Single User License)

ID: BDFF0388CAE3EN

Abstracts

According to Statistics MRC, the Global Bioenergy with Carbon Capture (BECCS) Market is accounted for \$361.0 million in 2026 and is expected to reach \$1552.3 million by 2034 growing at a CAGR of 20.0% during the forecast period. Bioenergy with Carbon Capture and Storage (BECCS) is a climate-negative approach that integrates biomass energy generation with the capture and permanent storage of carbon emissions. Biomass sources such as crop residues, energy plantations, and organic waste are processed to produce electricity, heat, or fuels while CO₂ released during conversion is captured before release into the atmosphere. This captured carbon is then transported and stored underground in suitable geological sites. BECCS supports decarbonization by simultaneously producing renewable energy and removing carbon dioxide from the air, making it a key technology for achieving net-zero emission goals and long-term climate stabilization globally.

According to the International Energy Agency (IEA), only around 2 million tonnes (Mt) of biogenic CO₂ are currently captured per year, mainly from bioethanol applications. Based on projects in early and advanced stages, capture could reach 60 Mt CO₂ annually by 2030, but this falls short of the 185 Mt CO₂ per year required in the Net Zero Emissions by 2050 (NZE) Scenario.

Market Dynamics:

Driver:**Rising demand for renewable and clean energy sources**

The shift toward cleaner and renewable energy systems is significantly supporting the expansion of BECCS technologies. With increasing efforts to reduce dependence on fossil fuels, biomass energy is emerging as a reliable alternative. BECCS enhances this advantage by enabling energy production while simultaneously capturing emissions, resulting in carbon-negative output. This makes it an appealing option for utilities and industrial operators aiming to decarbonize operations. Additionally, concerns about energy security and sustainability are pushing governments and businesses to invest in diversified clean energy solutions. As a result, demand for BECCS is rising in global renewable energy transition strategies.

Restraint:**High capital and operational costs**

One of the major barriers to BECCS market growth is the extremely high cost associated with project development and operation. Establishing BECCS systems involves expensive infrastructure, including carbon capture technology, biomass handling facilities, and CO₂ transportation and storage networks. Moreover, continuous operational requirements such as energy use, system maintenance, and safety monitoring add to overall expenses. Without strong financial incentives or policy support, these projects struggle to achieve economic viability. This financial challenge discourages private investment and slows deployment, especially in cost-sensitive regions. Therefore, high capital intensity remains a critical limitation for the widespread adoption of BECCS technologies.

Opportunity:**Expansion of net-zero and carbon neutrality programs**

The increasing adoption of net-zero and carbon neutrality commitments is creating strong growth opportunities for the BECCS market. Many governments and companies are setting ambitious climate targets that require technologies capable of removing carbon from the atmosphere. BECCS plays a key role in balancing unavoidable emissions, making it an essential part of long-term decarbonization strategies. Its

inclusion in national and global climate frameworks is driving investment interest and policy support. As sustainability goals become more stringent, BECCS deployment is expected to expand significantly, supported by collaboration between industries and governments to achieve global emission reduction objectives.

Threat:

Competition from alternative carbon removal technologies

A major threat to the BECCS market is the rising competition from other carbon removal solutions like direct air capture, afforestation, and soil carbon storage methods. These alternatives are increasingly being explored because they may offer simpler deployment or lower land and resource requirements in certain regions. As innovation continues, policymakers and investors are spreading support across multiple negative emission technologies instead of relying heavily on BECCS. This diversification of funding and attention can reduce the dominance of BECCS in the carbon removal sector, potentially limiting its growth and slowing large-scale adoption in the global market.

Covid-19 Impact:

The COVID-19 crisis affected the BECCS market both negatively and positively. In the early stages, lockdowns and global disruptions delayed ongoing projects, interrupted supply chains, and reduced workforce availability, which slowed infrastructure expansion. Investment decisions were also postponed as governments focused on managing health emergencies and economic stabilization. However, the crisis increased awareness of the need for sustainable and resilient energy systems. As recovery plans were introduced, many countries included clean energy investments in stimulus programs. This shift supported long-term growth prospects for BECCS, strengthening its role in future climate and energy transition strategies worldwide.

The agricultural residues segment is expected to be the largest during the forecast period

The agricultural residues segment is expected to account for the largest market share during the forecast period owing to their abundant supply and economic advantages. These materials consist of by-products from crop production such as husks, straw, and other plant remains. They are widely preferred because they do not compete with food crops or require dedicated cultivation land. Their use helps in managing agricultural waste while supporting renewable energy generation combined with carbon capture.

Consistent farming activities across various regions ensure a steady biomass supply. As a result, agricultural residues remain the most widely utilized and dominant segment in BECCS applications globally.

The industrial processes segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the industrial processes segment is predicted to witness the highest growth rate due to rising efforts to decarbonize emission-intensive industries. Sectors such as steel, cement, chemicals, and heavy manufacturing face challenges in fully eliminating emissions through conventional clean energy solutions. BECCS provides an effective approach to manage these unavoidable emissions by combining bioenergy production with carbon capture systems. Increasing environmental regulations, net-zero commitments, and demand for sustainable industrial output are driving rapid adoption. As industries seek scalable carbon reduction solutions, BECCS integration in industrial applications is projected to grow at the fastest rate globally.

Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share owing to favourable regulatory frameworks, technological advancement, and strong financial backing for carbon capture initiatives. The United States is at the forefront with several large-scale projects driven by supportive government incentives and climate-focused policies. The region also has well-developed infrastructure for carbon transport and storage, along with significant geological potential. Active involvement of energy corporations and increasing net-zero commitments are further supporting market expansion. These combined factors position North America as the leading region in BECCS adoption and development across global markets.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR, driven by industrial expansion, rising energy consumption, and increasing focus on emission reduction. Major economies including China, India, Japan, and South Korea are actively investing in sustainable energy and carbon capture technologies. The region has strong availability of biomass resources and is rapidly developing bioenergy infrastructure. Government policies supporting decarbonization and net-zero targets are further boosting adoption. With growing environmental awareness and large-scale energy transition efforts, Asia Pacific is emerging as the most rapidly expanding

market for BECCS globally.

Key players in the market

Some of the key players in Bioenergy with Carbon Capture (BECCS) Market include Drax Group, Chevron Corporation, Equinor ASA, Aker Solutions, Shell plc, BP p.l.c., TotalEnergies SE, Eni S.p.A., Mitsubishi Heavy Industries, Ltd., Puro.earth, Vattenfall AB, Ørsted A/S, Stockholm Exergi, RWE AG, C-Capture Ltd., Carbfix, Hitachi Zosen Inova AG and Técnicas Reunidas S.A.

Key Developments:

In April 2026, TotalEnergies and Masdar have signed a binding agreement to establish a \$2.2 billion joint venture aimed at expanding renewable energy capacity in nine countries across Asia. The joint venture will have a portfolio capacity of 3 GW of operational assets and 6 GW of assets in advanced development, which are expected to be operational by the end of the decade.

In January 2025, BP plc has solidified its 70-year collaboration with United States-based KBR, Inc. KBR through a new global agreement that spans BP's onshore, offshore, greenfield and brownfield conventional energy projects as well as its new energy initiatives. This partnership highlights the company's commitment to leveraging KBR's proven expertise to deliver cutting-edge energy solutions.

In March 2024, Chevron New Energies ("Chevron"), a division of Chevron U.S.A. Inc and JX Nippon Oil & Gas Exploration Corporation have signed a Memorandum Of Understanding that provides a framework to evaluate the export of Carbon Dioxide (CO₂) from Japan to Carbon Capture and Storage (CCS) projects located in Australia and other countries in the Asia Pacific region. The collaboration will also explore the opportunity to develop suitable transboundary policies and the potential development of CO₂ storage sites in other countries in the Asia Pacific region.

Feedstocks Covered:

Agricultural Residues

Forestry Residues

Energy Crops

Municipal Solid Waste (MSW)

Industrial Organic Waste

Carbon Capture Methods Covered:

Pre-Combustion Capture

Post-Combustion Capture

Oxy-Fuel Combustion Capture

Technologies Covered:

Combustion with Carbon Capture

Gasification with Carbon Capture

Anaerobic Digestion with Carbon Capture

Pyrolysis with Carbon Capture

Applications Covered:

Power Generation

Heat Generation

Industrial Processes

End Users Covered:

Utilities

Independent Power Producers (IPPs)

Industrial Sector

Commercial Sector

Regions Covered:

North America

United States

Canada

Mexico

Europe

United Kingdom

Germany

France

Italy

Spain

Netherlands

Belgium

Sweden

Switzerland

Poland

Rest of Europe

Asia Pacific

China

Japan

India

South Korea

Australia

Indonesia

Thailand

Malaysia

Singapore

Vietnam

Rest of Asia Pacific

South America

Brazil

Argentina

Colombia

Chile

Peru

Rest of South America

Rest of the World (RoW)

Middle East

Saudi Arabia

United Arab Emirates

Qatar

Israel

Rest of Middle East

Africa

South Africa

Egypt

Morocco

Rest of Africa

What our report offers:

Market share assessments for the regional and country-level segments

Strategic recommendations for the new entrants

Covers Market data for the years 2023, 2024, 2025, 2026, 2027, 2028, 2030, 2032 and 2034

Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)

Strategic recommendations in key business segments based on the market

estimations

Competitive landscaping mapping the key common trends

Company profiling with detailed strategies, financials, and recent developments

Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

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