

Biogas Upgrading Equipment Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Technology (Water Wash, Chemical Scrubbing, Pressure Swing Adsorption (PSA), Membrane Separation, Cryogenic Separation), By Application (Municipal, Industrial, Agricultural), By Region, By Competition, 2020-2030F

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Report description:

Market Overview

The Global Biogas Upgrading Equipment Market was valued at USD 8.6 billion in 2024 and is anticipated to reach USD 16.3 billion by 2030, growing at a CAGR of 11.1% during the forecast period. The market is experiencing significant momentum due to the increasing demand for renewable energy sources, particularly Renewable Natural Gas (RNG), as part of global efforts to reduce greenhouse gas emissions and lessen dependence on fossil fuels. Upgraded biogas, processed into biomethane, is gaining traction as a clean alternative for grid injection and vehicle fuel. This shift is being reinforced by environmental regulations and climate commitments aimed at accelerating energy transitions. Technological progress in upgrading methods-such as membrane separation, pressure swing adsorption (PSA), and cryogenic techniques-has improved operational performance and cost-efficiency, boosting adoption. Growth in circular economy projects and waste-to-energy applications in sectors like municipal waste, agriculture, and wastewater is also expanding the market. Digital technologies and smart plant monitoring systems are enhancing process optimization, while government incentives, especially in Europe and North America, continue to support project development. Rapid expansion in Asia-Pacific driven by sustainability initiatives and rising energy needs is further strengthening market growth.

Key Market Drivers

Rising Demand for Renewable Natural Gas (RNG) and Energy Transition Goals

The increasing global focus on climate change mitigation and clean energy adoption is a major driver of the biogas upgrading

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equipment market. Renewable Natural Gas (RNG), also known as biomethane, offers a viable substitute for fossil-based natural gas and aligns with international climate commitments like the Paris Agreement. Biogas, when upgraded to high-purity biomethane, can be used across multiple sectors including electricity generation, heating, and transportation. Its methane concentration exceeding 90% enables direct injection into natural gas networks, minimizing the need for new infrastructure. RNG's utility as a fuel for heavy-duty transport-where electrification is less feasible-is also stimulating investments from utilities, municipalities, and transport operators in biogas upgrading technologies.

Key Market Challenges

High Capital and Operational Costs

A major hurdle for the biogas upgrading equipment market is the high upfront capital investment and ongoing operational costs. Unlike simpler renewable energy systems, biogas upgrading involves complex installations with multiple components such as digesters, compressors, purification units, and control systems. This complexity increases capital requirements, limiting adoption among small- and medium-scale producers, particularly in developing regions. Access to financing remains a concern as many financial institutions consider such projects high-risk due to long payback periods and technical intricacies. Additionally, operating costs-particularly in energy-intensive processes like chemical scrubbing or cryogenic separation-can be considerable. Even relatively efficient technologies like PSA and membrane separation involve maintenance expenses, replacement parts, and methane losses. Variability in biogas composition adds further operational challenges, necessitating advanced control and monitoring systems that increase overall costs.

Key Market Trends

Integration of Digitalization and Smart Monitoring Systems

A key trend shaping the biogas upgrading equipment market is the increasing incorporation of digital technologies to enhance efficiency, reliability, and cost-effectiveness. As facilities scale up, operators are adopting advanced monitoring systems, IoT-enabled sensors, and AI-driven analytics to ensure consistent gas quality and optimal equipment performance. These digital tools monitor real-time metrics such as gas purity, flow rate, temperature, and contaminants. With predictive maintenance capabilities, operators can detect and address issues proactively, reducing downtime and extending equipment life. This move toward automation and data-driven operations is transforming biogas upgrading into a more scalable and economically viable solution, especially for larger projects aiming for long-term efficiency.

Key Market Players

- Greenlane Renewables Inc.
- Pentair Haffmans B.V.
- Air Liquide S.A.
- Xebec Adsorption Inc.
- DMT Environmental Technology B.V.
- Envitech Biogas AG
- Bright Biomethane B.V.
- Malmberg Water AB

Report Scope:

In this report, the Global Biogas Upgrading Equipment Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

- Biogas Upgrading Equipment Market, By Technology:
 - o Water Wash
 - o Chemical Scrubbing
 - o Pressure Swing Adsorption (PSA)
 - o Membrane Separation
 - o Cryogenic Separation
- Biogas Upgrading Equipment Market, By Application:
 - o Municipal
 - o Industrial

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- o Agricultural

- Biogas Upgrading Equipment Market, By Region:

- o North America

- United States

- Canada

- Mexico

- o Europe

- Germany

- France

- United Kingdom

- Italy

- Spain

- o Asia Pacific

- China

- India

- Japan

- South Korea

- Australia

- o South America

- Brazil

- Colombia

- Argentina

- o Middle East & Africa

- Saudi Arabia

- UAE

- South Africa

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Biogas Upgrading Equipment Market.

Available Customizations:

Global Biogas Upgrading Equipment 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).

Table of Contents:

1. Product Overview

- 1.1. Market Definition

- 1.2. Scope of the Market

- 1.2.1. Markets Covered

- 1.2.2. Years Considered for Study

- 1.2.3. Key Market Segmentations

2. Research Methodology

- 2.1. Objective of the Study

- 2.2. Baseline Methodology

- 2.3. Key Industry Partners

- 2.4. Major Association and Secondary Sources

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- 2.5. Forecasting Methodology
- 2.6. Data Triangulation & Validation
- 2.7. Assumptions and Limitations
- 3. Executive Summary
 - 3.1. Overview of the Market
 - 3.2. Overview of Key Market Segmentations
 - 3.3. Overview of Key Market Players
 - 3.4. Overview of Key Regions/Countries
 - 3.5. Overview of Market Drivers, Challenges, and Trends
- 4. Voice of Customer
- 5. Global Biogas Upgrading Equipment Market Outlook
 - 5.1. Market Size & Forecast
 - 5.1.1. By Value
 - 5.2. Market Share & Forecast
 - 5.2.1. By Technology (Water Wash, Chemical Scrubbing, Pressure Swing Adsorption (PSA), Membrane Separation, Cryogenic Separation)
 - 5.2.2. By Application (Municipal, Industrial, Agricultural)
 - 5.2.3. By Region (North America, Europe, South America, Middle East & Africa, Asia Pacific)
 - 5.3. By Company (2024)
 - 5.4. Market Map
- 6. North America Biogas Upgrading Equipment Market Outlook
 - 6.1. Market Size & Forecast
 - 6.1.1. By Value
 - 6.2. Market Share & Forecast
 - 6.2.1. By Technology
 - 6.2.2. By Application
 - 6.2.3. By Country
 - 6.3. North America: Country Analysis
 - 6.3.1. United States Biogas Upgrading Equipment Market Outlook
 - 6.3.1.1. Market Size & Forecast
 - 6.3.1.1.1. By Value
 - 6.3.1.2. Market Share & Forecast
 - 6.3.1.2.1. By Technology
 - 6.3.1.2.2. By Application
 - 6.3.2. Canada Biogas Upgrading Equipment Market Outlook
 - 6.3.2.1. Market Size & Forecast
 - 6.3.2.1.1. By Value
 - 6.3.2.2. Market Share & Forecast
 - 6.3.2.2.1. By Technology
 - 6.3.2.2.2. By Application
 - 6.3.3. Mexico Biogas Upgrading Equipment Market Outlook
 - 6.3.3.1. Market Size & Forecast
 - 6.3.3.1.1. By Value
 - 6.3.3.2. Market Share & Forecast
 - 6.3.3.2.1. By Technology
 - 6.3.3.2.2. By Application
- 7. Europe Biogas Upgrading Equipment Market Outlook

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- 7.1. Market Size & Forecast
 - 7.1.1. By Value
- 7.2. Market Share & Forecast
 - 7.2.1. By Technology
 - 7.2.2. By Application
 - 7.2.3. By Country
- 7.3. Europe: Country Analysis
 - 7.3.1. Germany Biogas Upgrading Equipment Market Outlook
 - 7.3.1.1. Market Size & Forecast
 - 7.3.1.1.1. By Value
 - 7.3.1.2. Market Share & Forecast
 - 7.3.1.2.1. By Technology
 - 7.3.1.2.2. By Application
 - 7.3.2. France Biogas Upgrading Equipment Market Outlook
 - 7.3.2.1. Market Size & Forecast
 - 7.3.2.1.1. By Value
 - 7.3.2.2. Market Share & Forecast
 - 7.3.2.2.1. By Technology
 - 7.3.2.2.2. By Application
 - 7.3.3. United Kingdom Biogas Upgrading Equipment Market Outlook
 - 7.3.3.1. Market Size & Forecast
 - 7.3.3.1.1. By Value
 - 7.3.3.2. Market Share & Forecast
 - 7.3.3.2.1. By Technology
 - 7.3.3.2.2. By Application
 - 7.3.4. Italy Biogas Upgrading Equipment Market Outlook
 - 7.3.4.1. Market Size & Forecast
 - 7.3.4.1.1. By Value
 - 7.3.4.2. Market Share & Forecast
 - 7.3.4.2.1. By Technology
 - 7.3.4.2.2. By Application
 - 7.3.5. Spain Biogas Upgrading Equipment Market Outlook
 - 7.3.5.1. Market Size & Forecast
 - 7.3.5.1.1. By Value
 - 7.3.5.2. Market Share & Forecast
 - 7.3.5.2.1. By Technology
 - 7.3.5.2.2. By Application
- 8. Asia Pacific Biogas Upgrading Equipment Market Outlook
 - 8.1. Market Size & Forecast
 - 8.1.1. By Value
 - 8.2. Market Share & Forecast
 - 8.2.1. By Technology
 - 8.2.2. By Application
 - 8.2.3. By Country
 - 8.3. Asia Pacific: Country Analysis
 - 8.3.1. China Biogas Upgrading Equipment Market Outlook
 - 8.3.1.1. Market Size & Forecast

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- 8.3.1.1.1. By Value
- 8.3.1.2. Market Share & Forecast
 - 8.3.1.2.1. By Technology
 - 8.3.1.2.2. By Application
- 8.3.2. India Biogas Upgrading Equipment Market Outlook
 - 8.3.2.1. Market Size & Forecast
 - 8.3.2.1.1. By Value
 - 8.3.2.2. Market Share & Forecast
 - 8.3.2.2.1. By Technology
 - 8.3.2.2.2. By Application
- 8.3.3. Japan Biogas Upgrading Equipment Market Outlook
 - 8.3.3.1. Market Size & Forecast
 - 8.3.3.1.1. By Value
 - 8.3.3.2. Market Share & Forecast
 - 8.3.3.2.1. By Technology
 - 8.3.3.2.2. By Application
- 8.3.4. South Korea Biogas Upgrading Equipment Market Outlook
 - 8.3.4.1. Market Size & Forecast
 - 8.3.4.1.1. By Value
 - 8.3.4.2. Market Share & Forecast
 - 8.3.4.2.1. By Technology
 - 8.3.4.2.2. By Application
- 8.3.5. Australia Biogas Upgrading Equipment Market Outlook
 - 8.3.5.1. Market Size & Forecast
 - 8.3.5.1.1. By Value
 - 8.3.5.2. Market Share & Forecast
 - 8.3.5.2.1. By Technology
 - 8.3.5.2.2. By Application
- 9. Middle East & Africa Biogas Upgrading Equipment Market Outlook
 - 9.1. Market Size & Forecast
 - 9.1.1. By Value
 - 9.2. Market Share & Forecast
 - 9.2.1. By Technology
 - 9.2.2. By Application
 - 9.2.3. By Country
 - 9.3. Middle East & Africa: Country Analysis
 - 9.3.1. Saudi Arabia Biogas Upgrading Equipment Market Outlook
 - 9.3.1.1. Market Size & Forecast
 - 9.3.1.1.1. By Value
 - 9.3.1.2. Market Share & Forecast
 - 9.3.1.2.1. By Technology
 - 9.3.1.2.2. By Application
 - 9.3.2. UAE Biogas Upgrading Equipment Market Outlook
 - 9.3.2.1. Market Size & Forecast
 - 9.3.2.1.1. By Value
 - 9.3.2.2. Market Share & Forecast
 - 9.3.2.2.1. By Technology

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- 9.3.2.2.2. By Application
- 9.3.3. South Africa Biogas Upgrading Equipment Market Outlook
 - 9.3.3.1. Market Size & Forecast
 - 9.3.3.1.1. By Value
 - 9.3.3.2. Market Share & Forecast
 - 9.3.3.2.1. By Technology
 - 9.3.3.2.2. By Application
- 10. South America Biogas Upgrading Equipment Market Outlook
 - 10.1. Market Size & Forecast
 - 10.1.1. By Value
 - 10.2. Market Share & Forecast
 - 10.2.1. By Technology
 - 10.2.2. By Application
 - 10.2.3. By Country
 - 10.3. South America: Country Analysis
 - 10.3.1. Brazil Biogas Upgrading Equipment Market Outlook
 - 10.3.1.1. Market Size & Forecast
 - 10.3.1.1.1. By Value
 - 10.3.1.2. Market Share & Forecast
 - 10.3.1.2.1. By Technology
 - 10.3.1.2.2. By Application
 - 10.3.2. Colombia Biogas Upgrading Equipment Market Outlook
 - 10.3.2.1. Market Size & Forecast
 - 10.3.2.1.1. By Value
 - 10.3.2.2. Market Share & Forecast
 - 10.3.2.2.1. By Technology
 - 10.3.2.2.2. By Application
 - 10.3.3. Argentina Biogas Upgrading Equipment Market Outlook
 - 10.3.3.1. Market Size & Forecast
 - 10.3.3.1.1. By Value
 - 10.3.3.2. Market Share & Forecast
 - 10.3.3.2.1. By Technology
 - 10.3.3.2.2. By Application
- 11. Market Dynamics
 - 11.1. Drivers
 - 11.2. Challenges
- 12. Market Trends and Developments
 - 12.1. Merger & Acquisition (If Any)
 - 12.2. Product Launches (If Any)
 - 12.3. Recent Developments
- 13. Company Profiles
 - 13.1. Greenlane Renewables Inc.
 - 13.1.1. Business Overview
 - 13.1.2. Key Revenue and Financials
 - 13.1.3. Recent Developments
 - 13.1.4. Key Personnel
 - 13.1.5. Key Product/Services Offered

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- 13.2. Pentair Haffmans B.V.
- 13.3. Air Liquide S.A.
- 13.4. Xebec Adsorption Inc.
- 13.5. DMT Environmental Technology B.V.
- 13.6. Envitech Biogas AG
- 13.7. Bright Biomethane B.V.
- 13.8. Malmberg Water AB
- 14. Strategic Recommendations
- 15. About Us & Disclaimer

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