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Renewable Energy in Agriculture: Biofuels, Solar Farms, and Sustainable Practices Market - A Global and Regional Analysis: Focus on Application, Product, and Regional Analysis - Analysis and Forecast, 2025-2035

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Abstracts

The Renewable Energy in Agriculture Market focuses on collaborations between renewable energy companies and agribusinesses to harness land or biomass for sustainable energy production. These partnerships allow farmers and agribusinesses to generate additional revenue through biofuel installations, wind energy systems, and solar farms. Companies leasing land or partnering with farms enable the installation of solar PV systems or wind turbines, contributing to the transition toward cleaner energy sources. This market is expanding as it offers dual benefits economic growth for agribusinesses and a sustainable energy solution.

In the Asia-Pacific region, recent developments highlight its leadership in this sector. For example, in 2024, China's clean energy investments reached approximately $940 billion, with solar power as a major driver, installing a record 277 GW of utility-scale solar capacity. Additionally, the Chinese Ministry of Finance allocated $758.95 million in renewable energy electricity price subsidies, including funding for agri-solar projects where solar panels are installed above farmland for dual-use energy generation and crop cultivation. These investments solidify the region's role in driving the renewable energy in agriculture market.

Market Overview

The Global Renewable Energy in Agriculture Market, valued at $8,091.4 million in 2024, is poised for significant growth, expanding at a CAGR of 11.37% between 2025 and

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2035, and reaching $26,400.4 million by 2035. This growth is driven by the increasing demand for sustainable farming practices and cleaner energy sources. Among applications, the Single Ownership or Family Farms segment is leading, as these farms increasingly seek energy solutions that align with their operational goals, offering both cost savings and sustainability. Additionally, the Crop Farming segment is witnessing strong growth, driven by the need to reduce operational costs and enhance productivity through renewable energy integration.

In the product segmentation, Biofuels, particularly Ethanol and Biodiesel, are gaining significant traction due to their ability to repurpose agricultural waste and biomass for energy production, providing a circular economy benefit. From a regional perspective, the Asia-Pacific region dominates the market, with China leading the way through massive investments in renewable energy, including solar and biofuel projects, driving the region’s growth.

Industrial Impact

The renewable energy in agriculture market has significantly impacted the agriculture sector, offering farmers and agribusinesses new revenue streams through collaborations with renewable energy companies. By leasing land or utilizing biomass for biofuel production, wind energy systems, or solar PV installations, farms can generate additional income while supporting sustainable energy solutions. This shift has also created opportunities for Precision Agri tech companies to develop technologies that assist farms, especially single-ownership and cooperative farms, in participating in large-scale renewable energy projects. One such opportunity arises from Precision Agri tech companies developing digital platforms that streamline logistics, aggregate biomass supply, and ensure transparent tracking. These technologies simplify the process for smallholder farmers, enabling them to participate more easily in large-scale renewable energy projects. By doing so, these platforms help bridge the gap between small farms and renewable energy ventures, facilitating broader inclusion in the market. As a result, the market fosters economic growth for farmers while promoting cleaner energy, positioning them as key contributors to the global shift toward sustainability.

Market Segmentation:

Segmentation 1: By Type of Farming Entity

Co-operative Farms

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Single Ownership or Family Farms

Corporation/Private Ownership

Government Ownership

Single Ownership or Family Farms to Lead the Market (by Application)

Single ownership or family farms are poised to lead the Renewable Energy in Agriculture market, particularly in applications such as solar farms, biofuel production, and wind energy installations. These individually owned farms, often passed down through generations, are increasingly participating in the renewable energy sector by leasing portions of their land to renewable energy companies. This collaboration enables farm owners to generate additional revenue streams, including lease payments or profit-sharing from energy sales, providing financial stability, especially in times of agricultural market fluctuations. For example, Marion Mitchell's family farm in North Carolina has partnered with EnerWealth Solutions, LLC to host solar panels on their land, receiving annual payments between $500 and $750 per acre over a 35-year period. As the Renewable Energy in Agriculture industry continues to grow, single ownership and family farms are expected to take on a more prominent role, diversifying their energy systems and strengthening their economic resilience alongside traditional farming operations.

Segmentation 2: By Type of Farm

Crop Farming

Livestock

Pasture and Forestry

Others

Segmentation 3: By Energy Type

Biofuels (Ethanol & Biodiesel)

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Biogas (Farm-Based Anaerobic Digestion)

Agrivoltaics (Solar PV on Farmland)

Wind Energy Systems on Farmland

Other Renewable Practices (Geothermal, Small Hydro, etc.)

Segmentation 4: By Region

North America

Europe

Asia-Pacific

Rest-of-the-World

Recent Developments in the Renewable Energy in Agriculture: Biofuels, Solar Farms and Sustainable Practices Market

In 2024, Aemetis, a renewable energy company, partnered with 49 dairy farms in California's Central Valley to establish a multi-dairy anaerobic digestion network. This collaboration aims to process cow manure from over 14,000 dairy cows across 16 dairies, utilizing 12 digesters. By 2025, the project is expected to produce 550,000 MMBtu/year of renewable natural gas (RNG). A 36-mile Aemetis-owned biogas pipeline will connect the farms to a central RNG facility, supporting California's renewable energy initiatives.

In 2024, VERBIO India and GAIL, a leading Indian energy company, signed a Memorandum of Understanding (MoU) to jointly develop compressed biogas (CBG) plants across India. This partnership will leverage agricultural residues such as paddy straw and sugarcane press mud to create sustainable energy solutions. The initiative is designed to boost farmers' incomes and replicate the successful agri-waste models of Punjab, driving the adoption of green energy practices in additional regions across the country.

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In 2024, Vanguard Renewables joined forces with Oakmulgee Dairy Farm, a 130-year-old family-operated farm in Virginia, to build an anaerobic digester facility. The digester will process dairy manure and 105,000 tons of food waste annually, producing 259,000 MMBtu/year of renewable natural gas (RNG). The farm will benefit from 20+ years of land lease payments, and the RNG produced will supply AstraZeneca's Maryland facilities, supporting both sustainable farming and clean energy goals.

In 2022, BTS Biogas partnered with A2A, an Italian energy and waste management company, to form a joint venture focused on developing biogas and biomethane plants across Italy. This collaboration aims to convert existing waste management infrastructure into facilities for producing renewable energy from organic waste, contributing to Italy's circular economy and decarbonization efforts.

In 2017, Nexamp, a clean energy company, collaborated with Evergreen Farm, a 265-year-old family-owned farm in Dudley, Massachusetts, to complete a 2.4 MW community solar project. This initiative co-locates solar energy generation with the farm's agricultural operations, providing stable lease revenue for the farm while supporting sustainable farming practices and expanding clean energy access.

How can this report add value to an organization?

Product/Innovation Strategy: This report provides an in-depth analysis of the Renewable Energy in Agriculture Market, focusing on biofuels, solar energy solutions, and sustainable farming practices. By segmenting the market across applications such as crop farming, livestock, and pasture management, it offers organizations a clear understanding of specific energy needs for different agricultural operations. The report further explores emerging technologies, such as decentralized energy hubs and smart farm integration, offering product teams insight into innovation opportunities. By identifying key trends in energy efficiency, sustainability, and regulatory compliance, companies can develop tailored solutions that address the evolving needs of the agriculture sector. Additionally, this segmentation aids in identifying potential areas for product differentiation, ensuring scalability, integration with existing agricultural processes, and long-term cost-effectiveness.

Growth/Marketing Strategy: As the Renewable Energy in Agriculture Market grows,

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driven by increasing demand for sustainable energy solutions, this report helps organizations track growth patterns and market dynamics. Key drivers, such as government incentives, policy support, and rising environmental awareness, are examined to guide marketing teams in aligning their strategies with regional and sector-specific demand. The report highlights high-growth segments, such as solar farms on family-owned farms and biofuels for livestock operations, enabling organizations to tailor their value propositions accordingly. With insights into market expansion, technological advancements, and competitor activity, businesses can refine their go-to-market approach, improve customer engagement, and position themselves competitively in the rapidly evolving renewable energy landscape.

Competitive Strategy: The report offers a comprehensive competitive analysis of the Renewable Energy in Agriculture market, profiling leading players in biofuels, solar energy, and sustainable practices. Competitive benchmarking enables organizations to evaluate their position against market leaders and assess their innovation pipelines, product offerings, and expansion strategies. Insights into strategic partnerships, joint ventures, and investment trends help businesses understand market entry points and potential threats from emerging competitors. By understanding the strengths and weaknesses of key players, companies can refine their competitive strategies, enhance product differentiation, and align their offerings with evolving customer needs.

Research Methodology

Data Sources

Primary Data Sources

The primary sources involve industry experts from the Renewable Energy in Agriculture market and various stakeholders in the ecosystem. Respondents, including CEOs, vice presidents, marketing directors, and technology and innovation directors, have been interviewed to gather and verify both qualitative and quantitative aspects of this research study.

The key data points taken from primary sources include:

validation and triangulation of all the numbers and graphs

validation of report segmentations and key qualitative findings

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- understanding the competitive landscape
- validation of the numbers of various markets for the market type
- percentage split of individual markets for geographical analysis

Secondary Data Sources

This research study involves the usage of extensive secondary research, directories, company websites, and annual reports. It also makes use of databases, such as Hoovers, Bloomberg, Businessweek, and Factiva, to collect useful and effective information for an extensive, technical, market-oriented, and commercial study of the global market. In addition to core data sources, the study referenced insights from reputable organizations and websites, such as the Food and Agriculture Organization (FAO), United States Department of Agriculture (USDA), National Institute of Food and Agriculture (NIFA), Canadian Agri-Food Automation and Intelligence Network (CAAIN), Smart Agriculture Council Mexico, Ministry of Agriculture, Food and Rural Affairs (MAFRA), Ministry of Agriculture and Rural Affairs (MARA), International Cooperative Agricultural Organization (ICAO) and others, to understand trends in the Renewable Energy in Agriculture market.

Secondary research has been done to obtain crucial information about the industry’s value chain, revenue models, the market’s monetary chain, the total pool of key players, and the current and potential use cases and applications.

The key data points taken from secondary research include:

- segmentations and percentage shares
- data for market value
- key industry trends of the top players in the market
- qualitative insights into various aspects of the market, key trends, and emerging areas of innovation
- quantitative data for mathematical and statistical calculations

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Data Triangulation

This research study utilizes extensive secondary sources, including certified publications, articles by recognized authors, white papers, company annual reports, directories, and major databases, to collect useful and effective information for a comprehensive, technical, market-oriented, and commercial study of the Renewable Energy in Agriculture Market.

The process of market engineering involves the calculation of the market statistics, market size estimation, market forecast, market crackdown, and data triangulation (the methodology for such quantitative data processes has been explained in further sections). A primary research study has been undertaken to gather information and validate market numbers for segmentation types and industry trends among key players in the market.

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