

**Vertical Farming Market Assessment, By Mechanism [Aquaponics, Aeroponics, Hydroponics], By Structure [Building-based, Shipping Container-based, Others], By Crop Type [Cereals and Grains, Pulses and Oilseeds, Fruits and Vegetables, Others], By Region, Opportunities and Forecast, 2018-2032F**

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**Report description:**

Global vertical farming market is projected to witness a CAGR of 21.46% during the forecast period 2025-2032, growing from USD 7.02 billion in 2024 to USD 33.25 billion in 2032. The market is assigning importance to the rapid growth rate it brings into sustainable practices of agriculture coupled with increasing urbanization and the solutions needed to ensure global food security. Vertical farming is a process of growing crops in vertically stacked layers and incorporating systems such as hydroponics, optimizing resource use, and enhancing productivity using LED lighting and other devices. Due to this, vertical farming makes less dependency on arable land and is able to lessen the amount of water consumption while allowing for year-round cultivation irrespective of external climatic conditions. The increasing global population, reducing arable lands, and wide-ranging climate change effects have all justified vertical farming as a good solution for producing fresh, pesticide-free produce in a controlled environment.

Further, vertical farms being in proximity to urban centers cut down transport costs, increases the shelf life, and makes it affordable to the health-conscious consumers wanting to buy fresh and local produce. Public schemes and private investments in agri-tech innovations supplement the growing market further. However, high initial set costs, energy utilization, and highly skilled labor requirement constraints may impede speedy take-up. Nonetheless, improvements in technology and scaling opportunities shall continue to drive the vertical farming market. Vertical farming, as urban populations continue increasing and consumers become more aware of sustainability, presents a very important change in how food is produced, offering scalable solutions to future demand while conserving precious natural resources.

In March 2024, INSONGREEN, which designs solutions for the agro-technology market globally, extended its hydroponics and green house vertical farming business in Africa and the Middle East. This extension was developed to solve problems such as lack

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of water, limited arability, and very high food demands in such regions with the overall aim of improving and evolving local farming activities toward being more eco-friendly.

#### Growing Awareness for Food Security Catalyzes Market Expansion

Food security has become a major issue in the world today, with an increasing population, limited land available for farming, and climate change degrading the quality of land. Vertical farming offers a sustainable way to produce fresh food entirely under controlled conditions, independent of external climatic conditions. A regular supply of crops addresses the erratic problems of traditional agriculture, such as extreme weather conditions, pests, and soil degradation. Making the most of vertical spaces, while using advanced technologies, such as hydroponics and aeroponics, vertical farming maximizes crop yield per square foot, making it suitable for densely populated areas where farmland is limited.

All-year-round cultivation ensures food production without worrying about the seasons, this creates certainty in food-deficient areas or areas where reliance on imported foods is high. It further enhances the crop production portfolios available in places to meet the prevailing dietary requirements and preferences.

In August 2024, iFarm began the construction of vertical farm in Switzerland, using its iFarm StackGrow technology. This vertical farm will have a cultivation area of 1,031 m<sup>2</sup>, and green crops will be produced in tons of ultra-fresh greens per month. The yield will be distributed to major retail chains across the country.

#### Increased Resource Efficiency Influences Market Growth

Vertical farming considerably improves efficiency in resource use and thus offers a sustainable alternative to traditional agriculture. It can use as much as 95% less water by utilizing closed-loop systems in which the water is recycled and reused. This resource use reduction is critical because freshwater resources are becoming scarcer globally. Vertical farms also tend to have a significantly smaller land footprint as they grow crops in vertical space instead of occupying more land area and solve the problems of ever-increasing urbanization and deforestation.

Additionally, no chemical runoff is produced to contaminate surrounding ecosystems. Nutrient applications have been managed and tailored specifically for each crop, thus minimizing waste further. Use of LED mimics sunlight while minimizing consumption for optimizing energy usage. In addition, strong efficiency using vertical farming to localize production reduces transportation costs and emissions involved in transporting food, contributing to reducing the carbon footprint.

Capitalizing on the trend, in February 2024, Masdar City introduced its first indoor vertical farm in collaboration with Alesca Technologies, an agricultural innovation company specializing in complete localized farming solutions. Located in repurposed shipping containers and placed near Masdar City's Eco-Plaza, the farm comprises two fully fitted commercial-sized farming containers capable of producing over 650 kg of leafy greens every month of the year to provide farm-to-fork experience.

#### Hydroponics Hold the Majority Market Share

Hydroponics provides the largest percentage of vertical farming as it is resource saving and highly efficient in urban settings. This soilless culture of growing plants in extremely nutrient-rich water solutions allows for the control of nutrient supply as well as the pH to the optimum level for plant growth. This technique eliminates pest and weed-related soil-related issues, enhancing the crop's quality and yield-yielding with reduced dependence on pesticides and herbicides.

This method, flexible and adaptive, allows for its use in highly compact urban spaces, thus making it most suitable for vertical farming in cities. It ensures all-round crop production throughout the year, with no interruption due to seasonal changes or climatic conditions resulting in constant availability of fresh produce. Advances in technology, such as automated nutrient delivery and monitoring systems, add to the efficiency and scale of hydroponics.

In July 2024, Globalmex International Inc. produced roma tomatoes under Magic Sun brand in central Mexico using a hydroponic greenhouse. By using developed hydroponic systems in conjunction with high-altitude sites in central Mexico, it provides a continuous harvest by safeguarding it from adverse weather conditions. The company adds this particular new crop to its already existing Magic Sun's production of traditional and USDA-certified organic greenhouse tomatoes.

#### Europe Dominates the Market

Europe is the most prominent vertical farming market across the globe. The reduction of carbon emissions as well as security in terms of food have made vertical farming essential to the region. In addition, an ever-increasing urbanization coupled with a shortage of arable land, especially in countries like the Netherlands, Germany, and the UK, are further driving the vertical farming trend in the region. Moreover, the region is advancing its farming systems with the integration of leading technologies such as IoT,

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robotics, and artificial intelligence to increase productivity and efficiency of resource utilization in the sector.

Vertical farming has witnessed a surge in importance within the European community as local consumers have shifted to a new preference for the crop, especially one that is grown completely without pesticides. Additionally, public as well as private investments in research and development into new products have helped create new ideas for developing solutions in vertical farming, thus enabling Europe to take the lead worldwide.

In September 2024, Inagro vzw and Urban Crop Solutions BV, in order to build three vertical farming towers at Agrotopia Ireland Limited, inaugurated their first vertical farming tower. The tower uses dynamic LED lighting in conjunction with natural sunlight as a technique for enabling space-efficient agriculture. This integrated system of multi-layer cultivation and dynamic lighting with natural sunlight has maximized space usage, thus marking a very important turn in sustainable agriculture for food production in cities.

Future Market Scenario (2025 – 2032F)

□ Vertical farming is likely to be an important factor in future urban sustainability efforts, providing smart cities with food production.

□ Owing to developments in technology and economies of scale, vertical farming is going to become increasingly affordable and eventually accessible for everyone.

□ Companies will be increasingly fostering alliances with technology providers, retailers, and governments for scaling their operations and enhancing market access.

Key Players Landscape and Outlook

Vertical farming is a dynamic market with a landscape of major players emphasizing innovation, efficiency, and sustainability. The landscape involves the big agricultural technology companies, the young startups, and research organizations which are using new solutions in hydroponics, aeroponics, and smart monitoring systems to enhance productivity. Additionally, they are encouraging energy efficiency with the latest LED lighting systems and renewable energy sources to reduce operating costs and environmental damage.

The market outlook seems positive for such players, fueled by the increasing global demand for sustainable food solutions, especially in urban areas. Companies are extending their geographical scope, targeting emerging markets in Asia-Pacific and the Middle East while scaling up in mature markets such as Europe and North America. Continued investments in R&D and technological advancements are likely to supplement the existing crop diversity and system automation, thus making vertical farming economically viable. As the market expands, competition will increase, and players are expected to focus on strategic alliances and new business models to stay ahead of the competition.

In February 2024, FarmByte Sdn Bhd and Archisen Pte Ltd formed a joint venture to establish a technologically driven indoor vertical farm in Johor Bahru, Malaysia. With an estimated capital of USD 8.22 million, the 52,000-square-foot farm envisions producing more than 306,000 kg of leafy vegetables annually. The project will achieve economic growth, employment generation, and promotion of sustainable agricultural practices across the region.

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20.4.10. FarmByte Sdn Bhd

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