

## Food for Everyone

***Agriculture has come a long way in the past century. We produce more food than ever before — but our current model is unsustainable, and as the world's population rapidly approaches the 8 billion mark, modern food production methods will need a radical transformation if they're going to keep up. But luckily, there's a range of new technologies that might make it possible.***

### **What is Vertical Farming**

Indoor farm that rely solely on artificial lighting. These farms grow crops entirely indoors inside of a warehouse or shipping container. In some of these farms, crops grow along vertical columns, and in others, they grow horizontally in stacked rows like the stories of a skyscraper. One advantage to relying on LED lights, is that they grow consistently and reliably 365 days of the year, regardless of weather or seasonality. Another advantage is precisely controlling their spectrum, intensity, and duration, which allows us to adjust many variables including flavor profiles, and make our mustard greens spicier or our arugula more peppery, for example.

<https://news.boweryfarming.com/https-medium-com-boweryfarming-a-brief-history-bda861d333d3>

### **Brief History of Vertical Farming**

1970 - Started in Netherlands, but due to costs, the shutter it down

1980 to 1990 - NASA used CEA (Chemical Equilibrium with Application) to grow crops on a martian based prototype in Florida

1999 - Cornell University built an advanced, commercial-scale CEA greenhouse facility in Ithaca, NY, which grew more than 1000 heads of lettuce a day.

### **what works with vertical farming?**

One of the reasons why vertical farming is so ideal, is because Vertical farming eliminates the risk of bad weather and seed contamination by placing strict controls on temperature, light, humidity levels, carbon dioxide (CO<sub>2</sub>), and nutrients, allowing users to create ideal growing conditions for the highest-quality, best-tasting crops. Basically creating a near-perfect environment.

### **Pros of Vertical Farming**

- Preparation for Future: By 2050, around 80 percent of world population is expected to live in urban areas, and the growing population will lead to an increasing demand for food.
- Increased And Year-Round Crop Production: Vertical farming allows us to produce more crops from the same square footage of growing area. In fact, 1 acre of an indoor area offers equivalent production to at least 4-6 acres of outdoor capacity. According to an independent estimate, a 30-story building with a basal area of 5 acres can potentially produce an equivalent of 2,400 acres of conventional horizontal farming.
- Less Use Of Water In Cultivation: Vertical farming allows us to produce crops with 70-95 percent less water than required for normal cultivation.
- Not Affected By Unfavorable Weather Conditions: Crops in a field can be adversely affected by natural calamities such as torrential rains, cyclones, flooding or severe droughts — events which are becoming increasingly common as a result of global warming.

### **Cons of Vertical Farming**

- The cost of building skyscrapers for farming, combined with other costs such as lighting, heating, and labor, can be more than the benefits we can get from the output of vertical farming. For a 60 hectare vertical farm, the building cost can be well over \$100 million
- Difficulties with Pollination: Vertical farming takes place in a controlled environment without the presence of insects
- Labor Costs: In vertical farming, the labor cost can be very high due to the need for highly skilled workers. So, the hourly cost of workers may be significantly higher than for agriculture in general
- Fewer Jobs: Automation in vertical farms may lead to the need for fewer workers
- Lower Worker Efficiency: The layout of a vertical farm may pose a challenge for the workers to reach each layer. Climbing to upper layers takes time and energy, decreasing the overall employee efficiency
- Too Much Dependency on Technology: The development of better technologies can always increase efficiency and lessen costs. But the entire vertical farming is extremely dependent on various technologies for lighting, maintaining temperature, and humidity. Losing power for just a single day can prove very costly for a vertical farm
- Not all plants can be grown: Another thing that makes this idea unattractive for the farmer is limited varieties of vegetables and fruits. In fact, the grower are unable to grow the different varieties of fruits and vegetables in this indoor farming. The reason is that there are only a few varieties of vegetables and fruits that can be produced well in this controlled environment of farm.

<http://www.agrotechnomarket.com/2016/12/the-pros-and-cons-of-indoor-farming.html>

## Customers

There is a book called [The Vertical Farm: Feeding the World in the 21st Century](#), Dr. Dickson Despommier, and he talks about the growing food, water, and energy crisis in the United States. He states that 50% of people live in cities while the remaining live 'somewhere else' where there is lack of water and food. (The size of those places that lack food fills the whole continent of South America - without counting animals)

## Partnership with Wholefoods

According to the *New York Times*, Whole Foods has been "passed over by shoppers who have turned to competitors including Costco, Safeway and even Walmart, all of which are now offering similar products for lower prices." Sprouts Farmers Market and Trader Joe's are also taking customers with lower prices for similar products, according to *CNBC*.

The \$15.7 billion (fiscal 2016) organic food retailer's revenue has been growing at 6.8% on average for the last three years but not as fast as its industry's 7.3%. And while its profit margin (2.8%) beats that of its rivals (1.7%), its net income has been declining at a 2.7% annual rate while rivals have enjoyed 38.6% profit growth over the last three years, according to *Morningstar*.

<https://www.forbes.com/sites/petercohan/2017/04/12/to-grow-faster-whole-foods-must-beat-trader-joes-on-value/#4ab853c36399>

## WHY WHOLEFOODS?

Wholefoods is a company where people went as soon as their paycheck came out. Most people considered it as "expensive organic food" and carried somewhat of a "luxury" vibe and shopping there placed you at some sort of social level, yet it was still a #1 place to go before this past year.

<https://www.quora.com/Why-do-people-shop-at-Whole-Foods>

## Strategy

Install warehouses in communities, approaching to urban cities (ex. Los Angeles) where people can sign up and make an account online, pay a one time fee of \$50, and a monthly fee of \$10 for maintenance, to set up a personal garden at a local vertical farming warehouse and they can basically use their phone app to monitor and track their farm, and when harvested, they can either choose to pick up, get it delivered, or donate to the local community where food is needed.

They are also given an option to pitch in, or donate a farm to a local area where there is lack of food and produce so the community can come to the warehouse to pick up produce an food for their families.

## Market Size

Vertical farming market was valued at \$1.5 billion in 2016, and is projected to reach \$6.4 billion by 2023, growing at a CAGR of 23.6% from 2017 to 2023.

### Competitors?

Companies such as Bright AgroTech and AeroFarms have set out to educate and inform small farmers to grow locally in urban areas, while other firms like Freight Farms and Edenworks lean on unique and innovative growing concepts — such as shipping containers or rooftop aquaponics — to bring the idea to life.

<https://www.digitaltrends.com/cool-tech/future-of-food-vertical-farming/>

AeroFarms is one of the major vertical farming companies in the U.S. Its 70,000-square foot facility in Newark, New Jersey is being called the world’s largest vertical farm and its products are available in grocery stores and supermarkets for \$3.99 a package.

<https://www.thebalance.com/what-you-should-know-about-vertical-farming-4144786>

