

The Rise of Vertical Farming



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As one of the leading advocates for the indoor farming sector, I was excited to see the March 2021 announcement that AeroFarms, a trailblazing vertical farming company, would be going public. Although the AeroFarms transaction was not the first public listing for an indoor farming company, coming almost six months after the Appharvest de-SPAC, it was the first in the vertical farming sector, and attests that indoor farming is one of the hottest investment areas. As I wrote in my previous article on this industry: [“Is Agriculture the next area to experience decentralization?”](#), whereas greenhouse farming has been around for over 150 years, with multiple established companies that have built profitable businesses to date, the vertical farming sector has been around for less than two decades and uses LED lighting, a relatively new technology, to fundamentally change the growing process. If AeroFarms and vertical farming competitors, including Bowery Farming, CropOne, 80Acre Farms, Freight Farms, InFarm, Iron Ox, Plenty, Shenandoah Growers, Square Roots, and TruLeaf, are successful in cost-effectively scaling their technology, they not only have the ability to leapfrog the greenhouse sector, but also can move ahead of the outdoor growing sector as well.

What Is a Vertical Farm and How is it Different than a Greenhouse and Outdoor Fields?

For thousands of years, humans have been growing their food using sunlight. Farming has been optimized to drive high yields from grains, fruits and vegetables. However, vertical farms, which use artificial light, typically LEDs, and no sunlight at all, mark a dramatic shift away from traditional agricultural methods, which could have a long-term impact on how we grow our food. Vertical farms offer tremendous opportunities as companies develop seeds with genetics that are optimized, not just for yield, but also for growing under specialized conditions, such as more reliable and predictable LEDs instead of sunshine. Such controlled indoor environments provide significant advantages compared to the outdoor field, which is subject to the whim of Mother Nature, as well as greenhouses, which still rely on sunlight. This predictability, coupled with the latest seed genetics technology, enable vertical farming companies to grow produce that can have the same look, taste, and texture, irrespective of where it is grown. This will appeal to retailers who are looking to provide high-quality and consistent product offerings to consumers.

The role of seed genetics in vertical farming has come to the forefront during the past year due to the creation of Unfold, a vegetable seed company created from Bayer’s vegetable seed

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germplasm business and capital provided by Leaps by Bayer and Temasek. Additionally, the acquisition of Vindara, which claims to be the first company to develop seeds specifically designed for use in vertical indoor farm environments, by Kalera, a vertical farming company, is another sign of the growing importance of seed genetics for the vertical farming sector.

Challenges Remain for Vertical Farms

Although vertical farming companies have many advantages, they nevertheless have some major challenges to overcome. First, even after integrating the latest energy efficient lighting and HVAC technologies, vertical farms use significantly more power to grow crops than greenhouse growers or traditional farms. Furthermore, many indoor farms are pulling power from the traditional power grid, which likely means they are using significant amounts of fossil fuel. Most consumers believe that buying more locally sourced produce will have a smaller carbon footprint, whereas this might not in fact be the case if the power resource is fossil fuels. Happily, by switching to distributed solar or wind power, indoor farms can benefit from a cost-effective energy source to produce more environmentally friendly products. As consumers demand more information about carbon footprint size on product labels, indoor farms will need to invest in technologies, such as solar, that allow their products to appeal to the new generation of eco-consumers.

Secondly, the vertical farming sector needs to integrate the latest automation and robotics to significantly decrease production costs, particularly labor, which is very expensive in many urban areas where vertical farms are found today. Additionally, many indoor farming companies experience very high staff turnover as low-skilled laborers switch jobs frequently in search of higher paying wages. Until the labor component can be solved, this will remain an impediment for vertical farms to reach cost parity with food grown outdoors.

A third challenge to be overcome for vertical farming is product diversification. On this front, much progress has been made, starting with Plenty's announcement of a joint development agreement to grow Driscoll's proprietary strawberries year-round in Plenty's indoor vertical farms. Additionally, AeroFarms announced a research & development partnership with Hortifrut for next-generation blueberry and caneberry production in vertical farms. Until now, most vertical farming companies have focused on herbs, leafy greens, and microgreens, which is roughly a \$75 billion market, according to AeroFarms. However, with at least 15 indoor farming companies each raising over \$50 million in capital, it is likely that the leafy green market could get saturated over the next decade with so many competitors chasing after the same market. The AeroFarms and Plenty deals mark the entrance of vertical farms into the lucrative berry sector and with it, a new \$100 billion market opportunity, according to AeroFarms. It will be interesting to see if other indoor farming companies can enter into similar agreements to get access to unique germ plasm to grow other types of produce indoors.

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The final challenge, which CleanTech companies have faced for the past two decades, is access to capital. In the short term, vertical farming companies need to find equity to help finance growth while these businesses continue to grow and become cash flow positive. Over time, however, it is essential for vertical farming companies to access lower-cost working capital, equipment financing, and project finance. The good news is that, as vertical farms build their second and third commercial-scale farms, they are likely to be considered bankable in the eyes of investors and get access to cheaper debt capital.

Are we seeing the first signs of SPAC-a-Palooza in the AgTech & FoodTech sector?

AeroFarms' decision to go public via a merger with Spring Valley Acquisition Corp (NASDAQ: SV), a special purpose acquisition company (SPAC), opens a window to new capital sources, which is particularly important for an industry that is as capital intensive as indoor farming. As part of the transaction, AeroFarms raised \$125 million in equity through a private-investment-in-public-equity (PIPE) transaction, which valued the company at \$1.2 billion. AeroFarms is now positioned to be a potential industry leader with access to considerable amounts of cheaper capital from the public markets. Additionally, as industry consolidation begins over the next few years, AeroFarms has both highly liquid public stock, as well as cash, to buy acquisition targets. Given that other vertical farming companies will need to respond to this advantage, I expect that most will likely pursue the public listing route.

The big question now is not whether the AeroFarms deal will herald a new era for public listings for indoor farming companies, which is all but certain to happen, but rather whether we are entering a period of public market activity for the broader AgTech & FoodTech sector. According to AgFunder, global investment in AgTech & FoodTech reached an all-time high of \$15.8 billion in 2020. A consequence of the failings of the food & ag supply chain, worsened by COVID-19 during the past year, was that investors have been drawn to ag biotech, alternative protein, food waste mitigation, indoor farming, and robotics & automation companies that are using technology to drive innovation throughout the food & ag value chain. Furthermore, more AgTech & FoodTech companies are generating meaningful commercial revenue and have developed sustainable business models that provide a realistic path to profitability.

Given the growing interest from investors, including environmental, social and governance (ESG) & impact, in private AgTech & FoodTech companies over the past couple of years, it is reasonable to ask whether the sector will follow a similar trajectory as the mobility sector, which had its best year ever, with over 15 public listings in 2020. In this instance, companies covering all parts of the mobility supply chain, including electric and hydrogen fuel vehicles, battery storage technologies, refueling infrastructure, and autonomous driving solutions, have gone public, including ChargePoint, Fisker, Lordstown Motors, Luminar, QuantumScape, Velodyne Lidar, and Volta Charging. Despite most of these companies having limited commercial revenue, their plans for the next decade offer the promise of high growth and profitability, following a similar roadmap to Tesla, the EV market leader. As I have discussed in

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my previous articles, the number of mobility companies and amount of capital they raised during the past year, makes me believe that we are in the midst of a paradigm shift in how highly capital-intensive CleanTech companies, including indoor farms, are financed. Considering that so many of the mobility companies have already gone public in the last year, the fact that SPACs, including many with a focus on ESG and sustainability, raised more capital in Q1 2021 than all of 2020 (according to NASDAQ), means that there are plenty of public market investors who will be searching for exciting new areas. As more AgTech & FoodTech companies accelerate revenue growth and show a path to cost parity with existing product offerings, they will be well positioned to capture the same level of interest and the accompanying funding that mobility companies have received from public market investors.

ABOUT THE AUTHOR:

Adam Bergman is managing director of EcoTech Capital, a boutique investment bank at the intersection of technology innovation and climate change. Bergman is a sustainability executive leader with over 20 years' experience raising capital and executing M&A transactions. He also provides strategic advice and financial guidance to senior executives and boards on strategic partnerships and growth strategies. As one of the first investment bankers to focus exclusively on the CleanTech sector, starting in 2005, Bergman is a frequent speaker at industry events and publisher of articles on sustainability. During the last five years, Bergman built an industry leading AgTech & FoodTech investment banking practice creating a broad ecosystem to help drive adoption of technology and innovation throughout the broad food & ag value chain. Additionally, Bergman established the AgTech cohort for Wells Fargo's innovation incubator (IN2), which was launched at the Donald Danforth Plant Science Center in St. Louis, MO, in 2018. Over the past 20-plus years, he has worked for leading global investment banks, including Deutsche Bank, Jefferies, JPMorgan, Rothschild, UBS and Wells Fargo, and has completed over \$12 billion in domestic and international financings and over \$25 billion in domestic and cross border M&A, restructuring and strategic advisory transactions. Bergman is a registered representative with securities offered through Finalis Securities LLC, member FINRA, SIPC.