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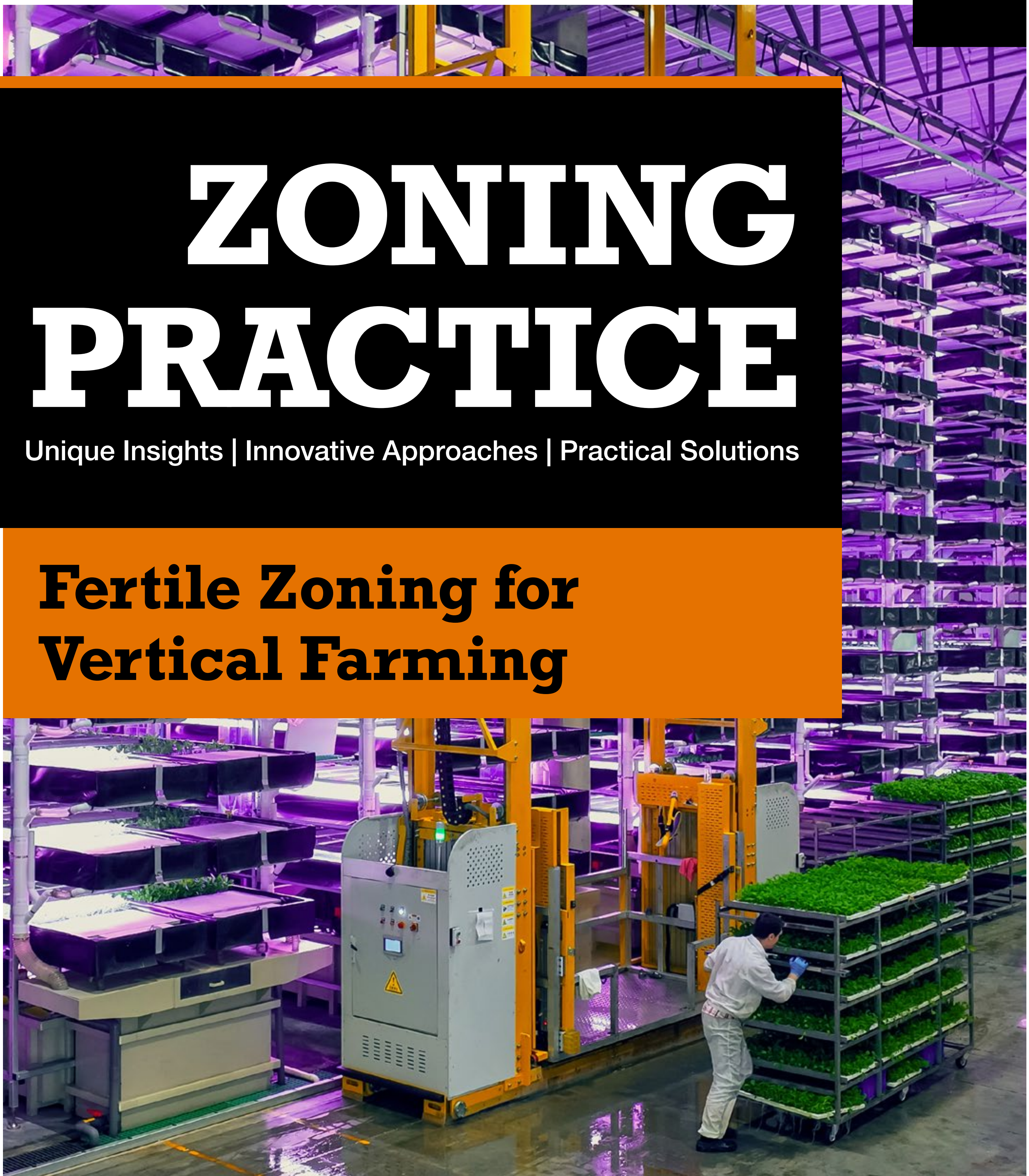


Fertile Zoning for Vertical Farming

By Derrick Rhys Wilson, AICP, and Melissa Ruth, AICP

Vertical farming is a method of growing crops in stacked layers or vertically inclined systems, often inside warehouses, greenhouses, or repurposed urban structures. Instead of relying on soil and natural weather conditions, vertical farming uses controlled environment agriculture (CEA) techniques like hydroponics (growing plants in nutrient-rich water), aeroponics (mist-based nutrient delivery), or aquaponics (combining fish cultivation with plant growth) in concert with artificial lighting, climate control, and automation to grow agricultural products year-round with precise management of water, nutrients, and temperature. This approach uses significantly less land and water than traditional farming and enables food production closer to consumers, making it especially valuable in areas with limited fertile land.

While vertical farming has the potential to transform agricultural production, zoning codes rarely explicitly authorize vertical farms and often contain provisions that functionally prohibit them. To unlock the potential of vertical farming, most communities will need to update their zoning regulations to accommodate new technologies, manage impacts such as energy use and traffic, and encourage local food production without disrupting surrounding neighborhoods and adversely affecting the environment.

This issue of *Zoning Practice* explores how zoning regulations can support vertical farming. It begins with an overview of vertical farming trends, market conditions, and regulatory barriers before examining lessons learned from existing vertical farming zoning regulations and presenting considerations for vertical farming zoning updates.

A vertical strawberry farm in Novosibirsk, Russia (Credit: Ilnar A. Salakhiev/ Wikimedia)

Vertical Farming Overview

While conventional farming and agricultural techniques have existed for thousands of years, vertical farming is a much more recent invention. Since the late 1990s, technological advances have led to many promising pilot projects in the U.S., which if scaled up, might provide a range of environmental, community, and societal benefits. However, so far, market barriers have frustrated efforts to dramatically expand vertical farming.

History

The history of vertical farming in America reflects the gradual evolution of ideas about urban agriculture, technology, and food security. Early concepts emerged in the early 20th century, when architects and planners envisioned multistory buildings dedicated to food production to address urban crowding and resource constraints. These ideas remained largely theoretical until the late 1990s and early 2000s, when advances in hydroponics, artificial lighting, and climate control made indoor, soil-free farming more feasible. The term *vertical farming* gained wider attention in the 2000s, particularly through academic research and public advocacy framing it as a solution to land scarcity, environmental degradation, and urban food deserts (Despommier 2011). In the 2010s, vertical farming operations began to commercialize, with startups establishing sizeable facilities in warehouses and urban industrial spaces to grow leafy greens and herbs year-round. Today, vertical farming in America continues to evolve, driven by technological innovation, sustainability goals, and growing interest in resilient, locally based food systems.

Trends

Since the early 2000s, vertical farming interest and success have fluctuated with high peaks and stark lows. For instance, in the 2010s, there was considerable interest and financial investment in the necessary technology and practices to create successful vertical farming operations, but that was short lived. During the height of the COVID-19 pandemic, vertical farming declined due to a loss of financial backing and oversaturation of a limited market (Gordon-Smith 2025). Post-pandemic, interest and support began rising again. Now, the industry is transitioning from isolated pilot projects into a broader commercial and intensive urban agricultural movement, with growth occurring across regions and sectors.

Concentration in Major Metropolitan Areas

Major metropolitan areas, such as New York City, San Francisco, and Chicago, have been and remain central nodes for vertical farming activity (Soni 2024). For instance, New York City is home to some of the country's largest vertical farming operations, which play pivotal roles in the industry. The key ingredients for concentration seem to be higher population densities, strong demand for local and sustainably grown produce, access to venture capital, and established agricultural-technology (ag-tech) ecosystems that support innovation and distribution. The concentration of facilities in major metropolitan areas reflects the alignment of vertical farming with urban food security priorities and sustainability planning.

Repurposed Buildings

Vertical farms often operate out of repurposed urban warehouses, former industrial buildings, and other underutilized commercial spaces. Such repurposed spaces are growing in popularity due to the ability to reduce startup costs, leverage existing transportation and commercial networks, maximize building vertical space, and offer

The Plant, a vertical farm in a repurposed former industrial space in Chicago's Back of the Yards neighborhood (Credit: [Plant Chicago/Flickr](#))

year-round production without reliance on traditional arable land, making them particularly attractive where farmland is scarce or costly. Additionally, vertical farming in repurposed buildings is primed to increase as surplus office space evolves into different uses (O'Brien 2023).

Signs of Regional Diversification

Growth in vertical farming is not exclusive to a few major metropolitan areas. There has been an uptick in activity in the Midwest, South, and West (Monark Ventures 2026). Some places are starting to specialize in certain agricultural products, leading to regional diversification. While leafy greens and herbs are prevalent across the country, some regions, particularly those with more investment in vertical farming and varying consumer demand, like New York and California, are diversifying and differentiating (Table 1). Although vertical farming crop yields are an estimate and not as clearly documented as conventional agricultural methods, regional markets show steady compound growth across all U.S. regions.

Retail and Distribution Expansion

Vertical farming is expanding beyond direct farm-to-consumer or local retailer models into mainstream grocery supply chains. Partnerships between vertical farming companies like Plenty Unlimited, Inc. and Bowery and national retailers, such as Walmart and Whole Foods, signal a strategic shift toward broader commercial distribution (Walmart 2022; Anwah 2023). These deals expand reach into regional markets and embed vertical produce into conventional retail channels, enhancing visibility and scale.

Technological Innovation and Automation

A defining trend is the increasing integration of advanced technologies—such as automation, robotics, artificial intelligence (AI), and internet of things (IoT) systems—to improve efficiency, reduce labor costs, and optimize growing conditions. General industry research indicates that most commercial vertical farms use some form of automation in planting, irrigation, nutrient delivery, lighting, or harvesting. Meanwhile, larger commercial vertical farming operations, especially those serving research and development roles, are heavily automated, often exceeding 70–90 percent operational automation, particularly for monitoring, watering, nutrient dosing, and environmental controls (Lempert 2023). Ultimately, these technologies that help monitor and adjust key variables like light, nutrients, and climate in real time are becoming core to scalable operations, minimizing human involvement and reliance on optimal climate conditions.

Table 1. Regional Crop Diversification

State	Leafy Greens	Herbs	Microgreens	Cooking Greens	Fruits	Medicinal
California	✔	✔	✔		✔	✔
New York	✔	✔	✔		✔	
Florida	✔	✔	✔			
Texas	✔	✔		✔		
Illinois	✔	✔	✔			

Vertical Farming Benefits

Although vertical farming is a recent phenomenon, there is growing evidence that it could confer significant community and societal benefits. Early efforts have already led to innovations in crop production and nutrient delivery, increasing yields and providing food stability in communities with harsh climates or short growing seasons. Vertical farms have also served as platform for workforce development and community investment, similar to traditional community gardens.

Environmental Benefits

Vertical farming has the potential to dramatically increase agricultural efficiency while reducing ecological harm. Through stacked production systems, vertical farms can yield 10 to 20 times more food per square foot than conventional agriculture, allowing food to be grown in urban or nonarable areas and easing pressure on forests, wetlands, and other sensitive ecosystems (Sil and Sahoo 2025). These systems also conserve water at a significant rate, using 70–95 percent less than conventional farming by recirculating it in closed loops, making vertical farming especially valuable in water-challenged regions (Despommier 2011). Additionally, vertical farming eliminates contaminated agricultural runoff by preventing fertilizers and pesticides from entering waterways, thus improving water quality and protecting aquatic ecosystems (Resh 2013). The controlled indoor environment further reduces or eliminates the need for chemical pesticides, resulting in healthier food, safer working conditions, and lower environmental contamination.

Climate Benefits

Vertical farming has the potential to strengthen climate resilience and reduce emissions by enabling year-round crop production independent of weather, droughts, or seasonal changes, thereby insulating food systems from climate shocks. Its proximity to urban consumers shortens supply chains, cutting transportation distances, fuel use, refrigeration needs, and food spoilage, which in turn lowers greenhouse gas emissions (Wildeman 2020). Additionally, vertical farms can integrate renewable energy sources such as solar, wind, geothermal, or recovered waste heat, creating opportunities to further decarbonize food production (Tuomisto 2019).

Economic Benefits

Vertical farming has the potential to deliver high productivity and predictable yields through tightly controlled growing environments, which reduce operational risk and improve revenue stability. The industry also generates skilled urban employment in fields such as automation, data analytics, and facility management, which can contribute to workforce diversification and local economic growth. By repurposing underutilized urban infrastructure such as warehouses and brownfield sites, vertical farming can create new economic value while avoiding the costs associated with urban expansion.

Vertical farming has the potential to dramatically increase agricultural efficiency while reducing ecological harm.

Social Benefits

Vertical farming has the potential to strengthen food security by enabling localized, decentralized production that reduces dependence on long and vulnerable global supply chains, improving resilience during disruptions such as pandemics or conflicts (Kozai 2013). Its proximity to consumers increases access to fresh produce in food deserts, dense urban centers, and remote or harsh climates, allowing harvest-to-sale times of just hours and supporting better nutrition and public health (Specht et al. 2014). Additionally, controlled growing environments ensure consistent quality and significantly reduce the risk of foodborne contamination, leading to higher consumer trust and fewer food safety incidents.

Technological Benefits

Vertical farms have the potential to serve as advanced platforms for crop research and development. Their controlled environments can support the creation of climate-resilient plants, pharmaceutical crops, and functional foods (Allegaert 2020).

An automated system for moving plant trays in vertical farming facilities (Credit: [QmcBeQ3G7DZCmY84uPgT/Wikimedia])

Vertical Farming Challenges

Like many nascent industries, vertical farming faces some serious obstacles to scaling up. Vertical farms must manage high operating costs, while navigating technological advancements, consumer awareness and preferences, and uncertain regulatory environments.

High Capital and Operating Costs

Vertical farming faces significant financial barriers due to high upfront and operational costs. Building climate-controlled facilities with LED lighting, hydroponic or aeroponic systems, and automation can require investments ranging from hundreds of thousands to millions of dollars (SFP 2025). Additionally, energy use associated with artificial lighting and climate control systems represent a major portion of ongoing expenses, constraining profitability unless operators implement energy-efficient or renewable solutions.

Technical and Operational Challenges

Vertical farming faces operational and technical challenges due to the complexity of CEA, which requires skilled labor, advanced monitoring, and continuous maintenance to manage light, temperature, humidity, CO_2, and nutrient delivery. Consequently, vertical farms are currently best suited for high-value, fast-growing crops like leafy greens, herbs, and microgreens and not staple grains or large-scale fruits and vegetables (Stanghellini and Katzin 2024).

Economic and Market Barriers

As alluded to above, capital and production costs for vertical farms are often substantially higher than traditional agriculture. This often necessitates premium pricing for produce, which can restrict accessibility to certain consumer segments and limit market penetration.

Market awareness and consumer acceptance also pose barriers. Many consumers are unfamiliar with vertically farmed produce, and some perceive it as "unnatural" or "lab-grown," which can reduce willingness to pay or adopt these products (Van Gerrewey, Boon, and Geelen 2022). Education and marketing are therefore critical to build trust and highlight the benefits of vertical farming, such as freshness, sustainability, and reduced pesticide use.

Finally, supply chain integration remains a practical challenge. Vertical farms often struggle to establish efficient distribution channels to wholesalers, supermarkets, or restaurants. Unlike traditional agriculture, which benefits from established logistics networks and economies of scale, vertical farms frequently operate at smaller scales and require high-frequency, short-distance deliveries to maintain freshness. This lack of streamlined logistics can reduce operational efficiency and increase costs, further affecting profitability.

Environmental and Sustainability Constraints

While vertical farming does optimize land and water use, it faces significant sustainability challenges due to its high energy and material needs. Maintaining climate-controlled environments, artificial lighting, and water circulation requires substantial electricity, often from nonrenewable sources (Birkby and Soto-Velez 2024). Additionally, facilities rely on LEDs, pumps, sensors, automated systems, and hydroponic or aeroponic infrastructure, all of which require resource-intensive manufacturing processes involving metals, plastics, and electronic components. Over time, the disposal, replacement, or recycling of these materials can generate waste and emissions. These factors can offset the environmental gains achieved through reduced land conversion and water conservation.

Regulatory and Policy Barriers

Vertical farming offers innovative solutions for urban food production, but regulatory and policy barriers can significantly impede its development and expansion. Many vertical farms are established in repurposed urban spaces such as warehouses, factories, or underutilized buildings. While this makes efficient use of urban infrastructure, it also introduces challenges related to building codes, fire safety standards, and zoning regulations. Compliance with these requirements can be time-consuming and costly, potentially delaying project implementation or limiting the types of structures suitable for conversion.

Compounding these challenges is the lack of standardized regulations for vertical farming operations. Unlike traditional agriculture, which has well-established regulations for land use, safety, labeling, and operational standards, vertical farming remains largely unregulated and inconsistent across regions. This regulatory uncertainty can deter investors, lenders, and partners who may perceive higher risk in financing or supporting vertical farm projects, slowing market development and innovation.

Financial incentives for vertical farms are also limited. Traditional agriculture benefits from extensive subsidies, tax credits, and grants, whereas vertical farming receives comparatively little policy support. This places smaller farms at a disadvantage, as the high capital and operational costs of vertical farming make profitability challenging without external support.

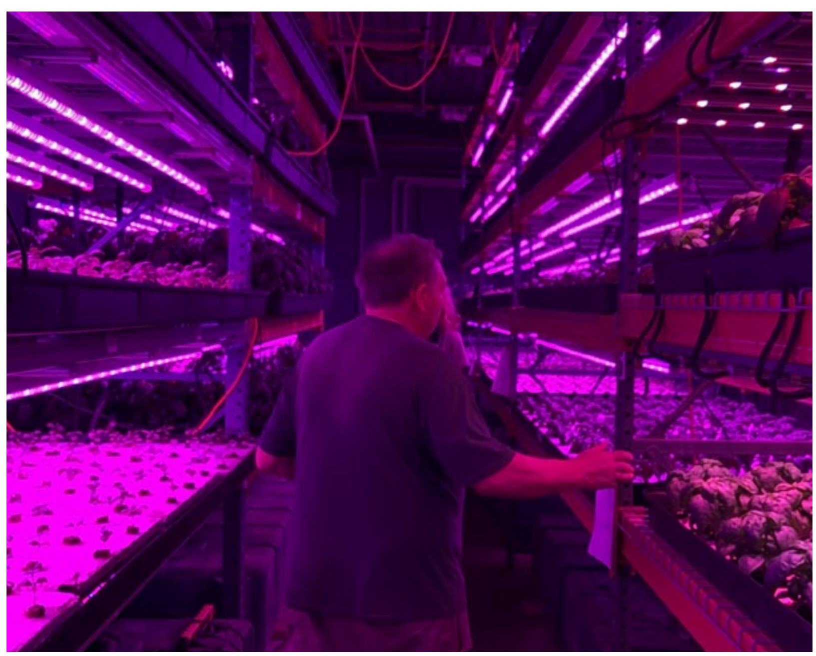
Zoning Gaps and Barriers

Vertical farming operations typically have different physical characteristics than those of outdoor urban farms and different operational characteristics than those of food processing and production facilities. Absent explicit use permissions and zoning standards, zoning administrators face a dilemma about which misfit regulations to apply to vertical farms.

Lack of Clear Definitions

Very few local jurisdictions define, or even reference, *vertical farming* in their zoning codes. However, broader categories, such as *urban agriculture* or *small-scale farming*, have become relatively common over the past 20 years. Where defined, *urban agriculture* and *small-scale farming* often encompass a variety of production, processing, and distribution methods, including community gardens, urban farms, rooftop and indoor growing, and

A vertical farm in Detroit's Brightmoor neighborhood (Credit: Nicolás Boullosa/Flickr)



small-scale commercial production and processing. While this approach does provide for some flexibility, without an explicit acknowledgment of vertical farming practices, prospective operators don't know how local officials will interpret the code until they submit an application.

Local zoning codes that explicitly define urban agriculture often allow this use in most zoning districts without minimum lot sizes or maximum operational sizes. In Western states, urban agriculture is not only permitted but often encouraged to support local agriculture and farming history. However, not all vertical farming operations are the same or have the same impact. Some vertical farms do operate like other agricultural operations with the focus on crop production for general sale, whereas others have more of a research and development focus with little, if any, retail or wholesale activity. Absent clear definitions that are inclusive of vertical farming practices, and that differentiate or anticipate scale of use, zoning administrators may classify vertical farms as an industrial use or as a distinct undefined use, requiring a discretionary use permit.

Scale and Operational Characteristics

In most communities, zoning regulations are provided for traditional agriculture or industrial uses with little anticipation of innovative indoor food production. Where present, local zoning regulations for urban agriculture are often misaligned with the physical and operational characteristics of vertical farms. These regulations may authorize tool sheds, hoop houses, farm stands, or other accessory structures, while remaining silent on whether the entirety of the use may be operated indoors or integrated into the architectural features of a multi-story structure (e.g., terraces or balconies).

Some vertical farming operations occupy a portion of a building and generally fit into the scale of the neighborhood. Others can occupy a large industrial warehouse. Regulations in many communities rely on the existing lot and block pattern as a natural cap on the scale of operations, but this approach may be insufficient to ensure appropriately scaled vertical farming operations since they use more intense cultivation practices and, by definition, occupy both ground and air space.

The former City Slicker Farms at Union Plaza Park in Oakland, California (Credit: S an editor/ Wikimedia)

Zoning Precedents

There is no standard approach to zoning for vertical farming. Some smaller communities—like Jackson and Laramie, Wyoming—have classified proposed farms under preexisting broad industrial categories. In contrast, Murray, Utah, and Honolulu, Hawaii, amended their regulations in response to vertical farming applications.

Jackson, Wyoming

Jackson is a small mountain town located in western Wyoming just south of Grand Teton and Yellowstone National Parks. In 2010, the town issued an open call to reimagine a small, underused parcel of land next to a downtown parking structure. This eventually led to the creation of Vertical Harvest, a vertical hydroponic greenhouse built alongside the parking structure. The facility opened in 2016 and has become a valued community asset known for high-quality produce, partnering with Jackson Hole Food Rescue, Food Bank of Wyoming, and Slow Food in the Tetons, alongside multiple local restaurants (Vertical Harvest 2026).

The town's Land Development Regulations (LDRs) provide just a single definition for agricultural uses, encompassing cultivation of soil for crop production, growing of ornamental or landscaping plants, greenhouses, and livestock uses (§6.1.3.B). However, while *agriculture* is permitted by right in the Public/Semi-Public zone, local officials classified Vertical Harvest as *light industry*, requiring a conditional use permit (§4.2.1.C). As part of the conditions of approval, the town required black out screens in the evening to protect the surrounding neighborhood from artificial light shining through the glass facade of the structure.

Laramie, Wyoming

Laramie is a small city located in southeastern Wyoming about an hour from Cheyenne, Wyoming, and Fort Collins, Colorado. Perhaps most notably, it is the home of the University of Wyoming. Similar to Jackson, Laramie only lists *agriculture* as a use in their use table and does not specifically address vertical or indoor farming operations (§15.10.000.E). The definition of *agriculture* is broad, encompassing "farming, ranching, dairying, floriculture, horticulture, pasturage, viticulture, grazing, animal and poultry husbandry and the necessary accessory uses for packing, treating, storing, and shipping of farm products" (§15.28.030.A.11).

In 2016, Plenty, Inc., with the cooperation of the university, developed a vertical farming research facility. This facility was a testing site for a variety of growing techniques and variables to support indoor farming. Due to the nature of this specific facility, local officials classified Plenty's facility as a *research facility* (§15.28.030.A.306), rather than an agricultural use. Laramie permits *research facilities* in many nonresidential districts as either a conditional or permitted use (§15.10.000.E).

The planning department has the right tools and experienced staff to prevent conflict.

Murray, Utah

In 2019, Murray, Utah, a first-ring suburb of Salt Lake City, amended its Standard Land Use Code to define *indoor farming*, after receiving an inquiry for a vertical farming operation, according to planning commission meeting minutes. Until the amendment, Murray did not permit indoor farming within the city, but other neighboring jurisdictions did.

Murray opted for a simple approach—clearly listing *indoor farming* as a conditional use in multiple zone districts and defining the use broadly to encompass a range of potential farming uses, including vertical farming (§17.146.040; §17.152.030; §17.160.030; §17.168.050; §17.173.030). The code stipulates that *indoor farming* "includes crops grown wholly indoors for commercial distribution to other locations and/or retail sale on site" (Ordinance 8716 §8121). According to staff testimony during the adoption hearings, the city opted not to include "conditions that would control height, pesticide use, water usage, electrical use, etc. because the conditional use permit will review these concerns and could vary depending on the scale and scope of the operation” (Murray 2019).

While this simple approach paves the way for vertical farming, which was previously neither permitted nor prohibited clearly, it does place a potential burden on smaller vertical farming operations by requiring a potentially lengthy public review process. Multiple local and community indoor gardens and vertical farms operate in other cities in the Salt Lake Valley, but the specific project prompting the 2019 amendment has not materialized.

Milwaukee is often considered a leader in the field of urban agriculture largely due to municipal support for the local urban agriculture sector as well as innovations from local farmers.

Chesterfield County, Virginia

Chesterfield County is a rapidly growing suburban county south of Richmond, Virginia, that blends established residential communities, expanding employment centers, and significant natural and historic resources along the James and Appomattox Rivers. While the county’s new zoning code does not define vertical or indoor farming as a distinct use, it does define *plant nursery or greenhouse, wholesale* (**§19.2-83**) and specifies that all indoor wholesale plant nurseries or greenhouses are permitted by right in employment districts (**§19.2-30-42**). In 2023, Plenty, Inc., opened a vertical strawberry farm in Chesterfield County under the wholesale plant nursery or greenhouse designation in an industrial district, which the county has subsequently rezoned as an Employment Center district.

Honolulu

Honolulu is a vibrant island-bound combined city and county that serves as Hawaii’s cultural, economic, and governmental center. In early 2025, local officials updated the city and county’s Land Use Ordinance to address small-scale agriculture and the preservation of rural character (**Ordinance 25-2**). Among other items, the amendment defined *vertical farm* as “cultivating, maintaining, and harvesting crops in indoor environments such as warehouses or tunnels in stacked layers using hydroponic, aeroponic, or aquaponic techniques” and explicitly excluded aquacultural practices from this term (**§21-10.1**).

Honolulu’s code classifies vertical farms as a form of *crop raising* under the broader use category of *crop production*. However, it only permits vertical farms in Agricultural and Country zoning districts (**§21-5.30**; **§21.5-40.1(b)**). Even with the updated regulations, vertical farms continue to be a contentious use, largely due to concerns about impacts on community character and other small-scale agricultural operations.

Milwaukee

Milwaukee is located along Lake Michigan and has a rich industrial heritage, strong cultural identity, and growing arts and food scene. While the city’s zoning code does not reference vertical farming, multiple vertical farms have operated in the city under the code’s existing *community garden* and *commercial farming enterprise* designations (**§295-201.106&112**; Skeo Solutions 2012).

The city permits both community gardens and commercial farming enterprises by right in all industrial districts (**§295-803**) and with a special use permit in all commercial districts (**§295-603**). It also permits community gardens as a special use in downtown districts (**§295-703**). The code does not require any parking or impose other use-specific restrictions for either community gardens or commercial farming enterprises.

Milwaukee is often considered a leader in the field of urban agriculture largely due to municipal support for the local urban agriculture sector as well as innovations from local farmers. Vertical farms have operated in Milwaukee since 2010, first with Growing Power, followed by Sweet Water Organics (Skeo Solutions 2012; Carriere 2024). Growing Power and Sweet Water Organics farms utilized indoor greenhouses and vacant industrial spaces to support local food options. While both farms closed by 2017, they paved the way for new innovations like Hundred Acre, an indoor vertical hydroponic growing system established in 2022. Hundred Acre now provides fresh produce to local restaurants as well as local grocery stores.

Fenway Farms on the rooftop of Fenway Park in Boston (Credit: [GREGG SQUEGLIA/Flickr])

Boston

Boston is a historic coastal city recognized globally for its universities, healthcare institutions, and cultural influence. In 2024, the city updated its zoning code to add definitions and standards for a wide range of urban agriculture uses, practices, and structures (§89). While it defines *vertical agriculture* as a specific practice rather than a standalone use, its definitions and regulations for *urban agriculture*, *urban farm*, *hydroponics*, *aquaponics*, and *controlled-environment agriculture* encompass many vertical farming techniques.

The code permits *small* and *medium ground-level urban farms* by right in all zoning districts, while larger ground-level farms are permitted by right in industrial districts and subject to conditional review in other districts. Rooftop farms are similarly regulated based on size and zoning context. The zoning code also expressly permits accessory structures and activities essential to indoor and vertical farm operations, including greenhouses, repurposed freight containers, and on-site farm stands, with standards governing siting, height, and location. For larger or more intensive operations, the code establishes a Comprehensive Farm Review process to address compatibility, operational impacts, and safety considerations.

Lessons Learned

While it may not be necessary to call out vertical farming explicitly as a use, lumping vertical farming and similar uses in with overall agricultural uses or industrial uses as general blanket policy may limit the potential for vertical farming operations within commercial and residential areas, or as a supporting use to restaurants. In many of the preceding examples where vertical farming is not specifically addressed, local government staff have approached these technology-forward uses with an air of optimism and interpreted the code in a flexible manner to support local food accessibility. In other examples, local governments have specifically modified their land use codes to allow for and provide standards for vertical farming uses (Table 2).

Vertical farming operations can vary greatly in size. When considering regulations for all agricultural uses, it is important to consider the size, nature, and scale of operations, especially for uses conducted wholly indoors. There is a big difference in impacts to neighboring properties between large warehouse-scale vertical farms like those in Milwaukee and the smaller-scale Vertical Harvest farm in Jackson, Wyoming. There is also a difference both in community perception and land use impact of a retail or consumer-focused grow operation and a research and development vertical farm.

Similarly, it is important to consider permitting and public hearing requirements. In most of the preceding examples, there are limited use-specific restrictions for vertical farming uses. However, multiple communities have opted to permit vertical farming and similar uses as conditional uses, requiring a public hearing. For many smaller-scale operations, the cost and uncertainty of a public hearing process may discourage application.

Zoning Reform Considerations

The most effective zoning reforms to encourage vertical farming focus on flexibility, clarity, and alignment with policy goals.

Permit Vertical Farming by Right

Distinguish between consumer- or retail-focused vertical farming and larger, industrial-scale or research-and-development-focused operations, and provide for clear use allowances for both scales.

Table 2. Additional Zoning References to Vertical Farming as a Permissible Use or Practice

Jurisdiction	Defined Term	Zoning Treatment
Culpeper, VA	Urban farm, indoor (§27-6.50.4.B(2))	Permits vertical farming (as one type of general manufacturing and production use) by right in industrial zones (§27-6-10.1)
Hackensack, NJ	Farming, vertical (§175-2.2)	Permits vertical farming by right in manufacturing districts (§175 Insert 2)
Henderson, NC	Cropbox or vertical farming (indoor farms) (§804)	Permits vertical farming by right in agricultural, residential, and industrial districts (§211), subject to use-specific standards in residential districts (§309.A)
Miramar, FL	Vertical farm (§202.4)	Permits primary-use vertical farming by right in nonresidential districts and as a conditional use in many residential districts, subject to extensive use-specific standards, and accessory-use vertical farming by right in all commercial and residential districts, subject to use-specific standards (§405.3.2)
Moline, IL	Agriculture, cultivation, indoor (§35-3904(f)(1))	Permits vertical farming (as one type of indoor agriculture cultivation) by right on upper-floors in some mixed-use districts, without floor restrictions in other mixed-use districts, and with a special use permit in one civic district (Table 3904-1)
Wilmington, DE	Indoor commercial horticultural operation (§48-2)	Permits vertical farming (as one type of indoor commercial horticultural operation) by right in heavy commercial (§48-197(c)), light manufacturing (§48-246(b)), waterfront manufacturing (§48-336(b)), waterfront manufacturing and commercial (§48-337(b)), and low-intensity waterfront manufacturing and commercial recreation (§48-338(b)) districts

Allowing vertical farming as a by-right use in industrial, commercial, and mixed-use zones—rather than requiring a discretionary use permit—reduces regulatory uncertainty and speeds project development for large projects. In practice, clear definitions help avoid situations where vertical farms are reviewed as heavy industrial uses, creating delays or conflicting staff interpretations.

Support Adaptive Reuse

On the large-scale research and development side, reforms that support adaptive reuse are critical. Allowing agricultural production in warehouses, vacant retail spaces, and underutilized buildings enables cities to repurpose existing infrastructure, lower startup costs, and revitalize neighborhoods. Relaxing ancillary standards like parking minimums, setback requirements, and architectural standards further support these conversions.

Authorize a Mix of Uses

For both research-and-development-type operations and consumer- or retail-focused operations, zoning that enables mixed-use integration—such as combining vertical farms with residential, retail, or educational spaces—helps embed food production into existing communities. Particularly in urban areas, allowing rooftop and building-integrated farms can expand growing capacity without additional land consumption.

Focus on Specific Impacts

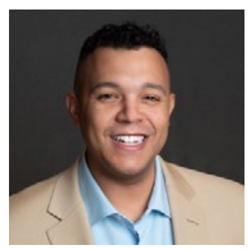
Finally, performance-based zoning approaches—focused on impacts like noise, traffic, and energy use rather than land use categories—provide flexibility for innovation while protecting community interests. Together, these zoning reforms can create a supportive regulatory environment that lowers barriers to entry, attracts investment, and accelerates vertical farming growth across the country.

Conclusion

Vertical farming represents a promising shift toward more sustainable, resilient, and localized food production. By growing crops in controlled indoor environments, vertical farms can significantly reduce land use, water consumption, and dependence on pesticides while enabling year-round production, regardless of climate conditions. This approach is particularly valuable in urban areas and isolated rural areas, where proximity to consumers shortens supply chains, lowers transportation emissions, and improves access to fresh produce.

Despite these advantages, vertical farming in the U.S. continues to face challenges, including regulatory constraints, high startup costs, energy demands, and the need for continued technological innovation to achieve long-term profitability. As advancements in LED lighting, automation, and renewable energy integration continue, these barriers are gradually being reduced. Overall, vertical farming is not a replacement for traditional agriculture, but it is an important complementary component that should be regulated adequately because of it's potential to improve food security, support environmentally conscious goals, and positively impact American agricultural practices.

About the Authors



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