

Four myths about vertical farming debunked by an expert

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Vertical farms look hi-tech and sophisticated, but the premise is simple—plants are grown without soil, with their roots in a solution containing nutrients. This innovative approach to agriculture is [growing](#)

in global market value and expected to reach US\$23.23 billion (£18.55 billion) [by 2029](#).

Typically, this soilless cultivation happens in huge greenhouses or warehouses, with plants stacked high on rows and rows of shelves. Parameters such as lighting, temperature and humidity can be controlled by [computer systems](#), so vertical farming is sometimes called controlled environment agriculture.

There are three types of vertical farming. In hydroponics, plant roots are held in a liquid nutrient solution. In aeroponics, roots are exposed to the air and a nutrient-rich mist or spray is applied to the roots. In aquaponics, nutrients from fish farm waste replace some or all of the chemical fertilizers being delivered to plants through hydroponics.

There's huge scope to produce a lot of food using these methods of cultivation but there are four key myths about vertical farming that need to be dispelled:

1. Vertical farms will dominate

Some people may worry that vertical farming puts traditional field cultivation at risk, but this could not be further from the truth. At present, it's only profitable for a limited range of small, fast-growing and high-value plants such as lettuce and leafy greens to be grown in this way.

Vertical farming costs are expected to fall due to economies of scale and standardization of processes, so a wider range of crops could be grown. But there is an ethical issue to consider: just because something can be grown in this way doesn't mean it should be. Vertical farming of grain crops, such as wheat, is technically possible but requires so much energy that it's not cost effective.

While vertical farming uses land efficiently—through stacking, it fits in more crops per unit area—it cannot compete with the sheer scale of food production required globally. It's a complementary mode of food production, which can increase food production and resilience within UK supply chains. Growing more lettuce on vertical farms reduces the need to import salads from abroad, cuts food miles and decreases reliance on overseas field production which may be vulnerable to droughts.

Vertical farms can support traditional agriculture by providing space to develop new crop varieties or grow the nursery phase of young trees and crops which are later planted out into fields. By freeing up substantial areas of land, vertical farming offers space for other food production, bioenergy plans or reforestation and restoration of ecosystems. It can enhance conventional farming, but won't ever totally replace it.

2. Vertical farming will feed everyone

Although this is a nice idea, it's not currently a reality. Most vertically grown crops are sold at a premium. Simple economics means that because the product costs more to make, it must be sold for a higher price. Vertical farms have high capital expenditure because of the infrastructure required: climate-controlled growth rooms, soilless systems, lighting, heating, cooling and ventilation. They are energy intensive, even if run on renewables such as solar. Their operational expenditure is also high because of the energy costs of running the systems and because more highly skilled workers are needed.

[Some researchers suggest](#) that city-based vertical farms can help address nutritional food deserts. This could be true, as they produce food close to consumers, but to scale this up, costs must come down. The innovative [Robin Hood business model](#)—charging wealthier people more and giving discounts to less fortunate people for the same product—could

provide equitable access to everyone in urban areas.

3. Vertical farming isn't sustainable

This argument typically derives from the fact that vertical farms require electricity to run. They do, but a decarbonized grid running on 100% renewables makes this point moot. Many [commercial vertical farms](#) already [source their electricity](#) from renewable energy providers. Conventional field production of crops also has associated emissions, through the use of diesel tractors and so on.

In some ways vertical farming can be more sustainable than field production. It is a closed-loop recirculating system which means water and fertilizer is reused many times. There is no effluent run off into the environment, unlike farming—whereby if it rains, any excess agricultural chemicals run off the crops and end up in the soil, groundwater or rivers.

Many of the UK's [leafy greens](#) are currently grown abroad in water-stressed areas and they require irrigation that exacerbates any water shortages. Field agriculture uses [vast amounts of](#) herbicides (weedkillers) and pesticides (chemicals that kill [insect pests](#)). The controlled environment of vertical farms reduces or eliminates the need for these synthetic chemicals. If pests become an issue in [vertical farms](#), natural predators such as ladybirds can be introduced to kill aphids.

4. Vertical farming isn't natural

Naturalness is subjective. Vertical farming essentially uses technology to mimic process and environments that exist in nature. It does not manipulate or defy natural processes.

In field cultivation, crops grow in soil and use the sun for photosynthesis. They access nutrients from both the soil and fertilizers. In vertical farming, LED lights mimic sunlight, and can even be programmed to improve light ratios and help the plants grow faster with higher levels of nutrition. The fertilizers used are composed of the exact same elements as those used in the field.

Vertical farming won't save the world or feed the poor. But it is a complementary method of producing food closer to end users, with more control and a higher land use efficiency. It can build systemic resilience within our food system because vertical farm yields won't be vulnerable to extreme weather events due to climate change. It can enhance local food security that might otherwise be at risk from increased political unrest abroad.

Vertical farming is currently limited in the crops that it can produce economically, but by incorporating these technologies into the transition to more regenerative and nature-based farming practices, it could have wider environmental benefits.

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