Vertical Farming

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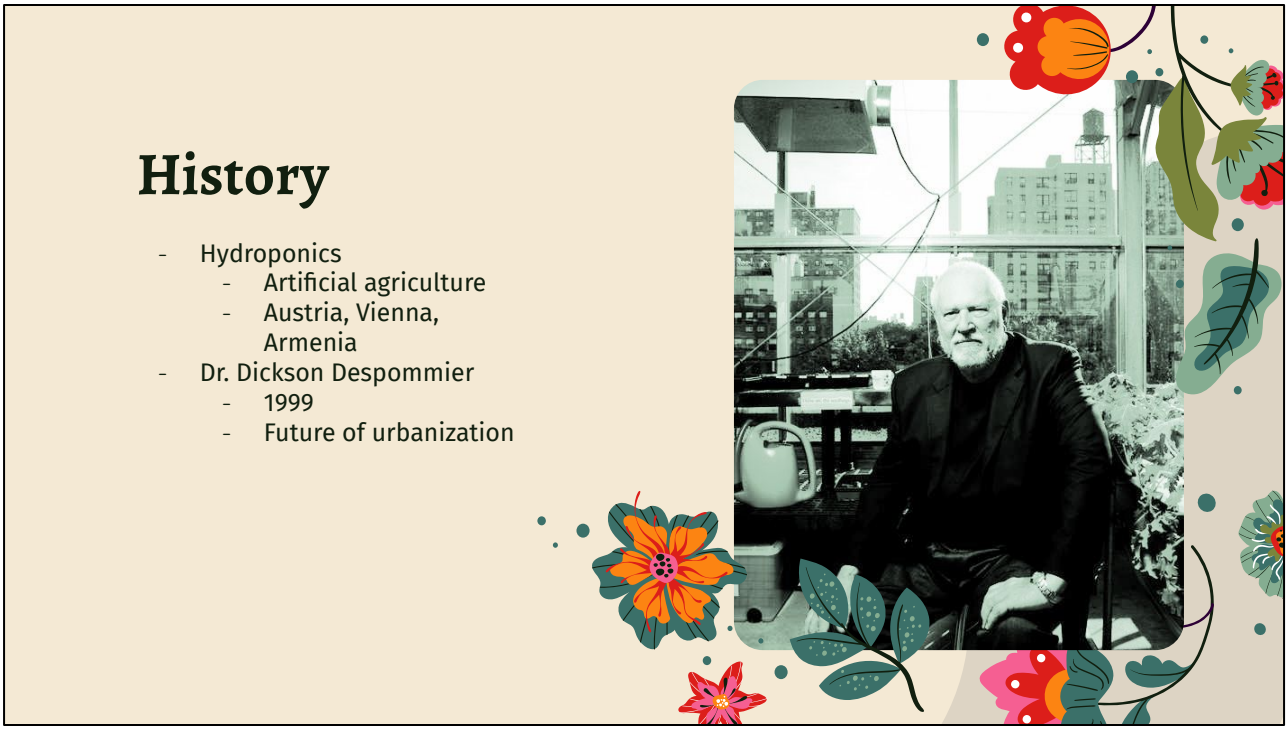
Overview



History:
The idea of vertical farming was first realized by Dr. Dickson Despommier, although the origins of the idea came much before that. Vertical farming is a branch off of hydroponics, which is basically artificial agriculture - plants being grown in a controlled environment. There are earlier historical records of hydroponics being used in Austria, Vienna, and Armenia in the 20th century. Despommier took the idea of hydroponics to a new level when he introduced vertical farming. He realized that traditional agriculture is not very energy efficient and it takes up a lot of space. Vertical farming is meant to continue the production of fresh and local produce, but in an urban environment. He is looking forward to the future of energy efficiency and rapid urbanization as he designs the concept of vertical farming.

Plan and Implementation

What is Vertical Farming?

Why would it be beneficial?

Plan and Implementation

What is Vertical Farming?

- Vertical farming is the practice of growing crops in vertically stacked layers. It uses specialized LED lights to grow plants on a large scale, but not by using traditional agricultural means. Vertical farms can be built anywhere from skyscrapers to abandoned mines, so they are very versatile and the plants can be grown in any environment or conditions.

Why would it be beneficial?

- The main purpose of vertical farming is to create a smaller unit area of land requirement for farming. This means that you can grow more on a smaller area of land. It would impact people everywhere by making food more accessible, and it would impact locals even more, by making local produce more available. It would impact the environment by decreasing deforestation, soil degradation, and habitat loss.

Plan and Implementation

What will vertical farming look like in the future?

- Different ideas
- Found in urban centers
- Every building/specialized buildings
- All sustainable

Plan and Implementation

What is the future for vertical farming? Although everyone has different ideas of what vertical farming might look like in the future, there are some concistencies. One of the main ones is that it will mostly be found in large urban centers and cities. This is where vertical farms would be the most beneficial to the greatest amount of people. Some researchers think that every building will have a vertical farm somewhere in it, whether on the roof or in the basement. Others think that there will be entire building dedicated for the sole purpose of vertical farming. We don't know exactly what it will look like, but we know it will be sustainable and beneficial to the community.

Upsides

Reduced need for farmland

- Traditional agriculture requires a lot of space. You need lots of room to grow all the food you need side by side and that's why vertical farming is so beneficial. Instead of growing outward, you're growing upward. This is good because many cities are growing upwards and so vertical farming will be able to expand as cities expand.

Increased crop production

- Many foods are grown seasonally, but with vertical farming, it would be in a controlled environment so crops could be growing all year round. This would increase food production a lot and would help feed the rapidly expanding population of the world.

Weather disruption

- Billions of dollars worth of crops are lost each year due to natural disasters, such as floods, tornados, and droughts. Because of the controlled environment of vertical farming, we wouldn't have to worry about these issues.

Human health

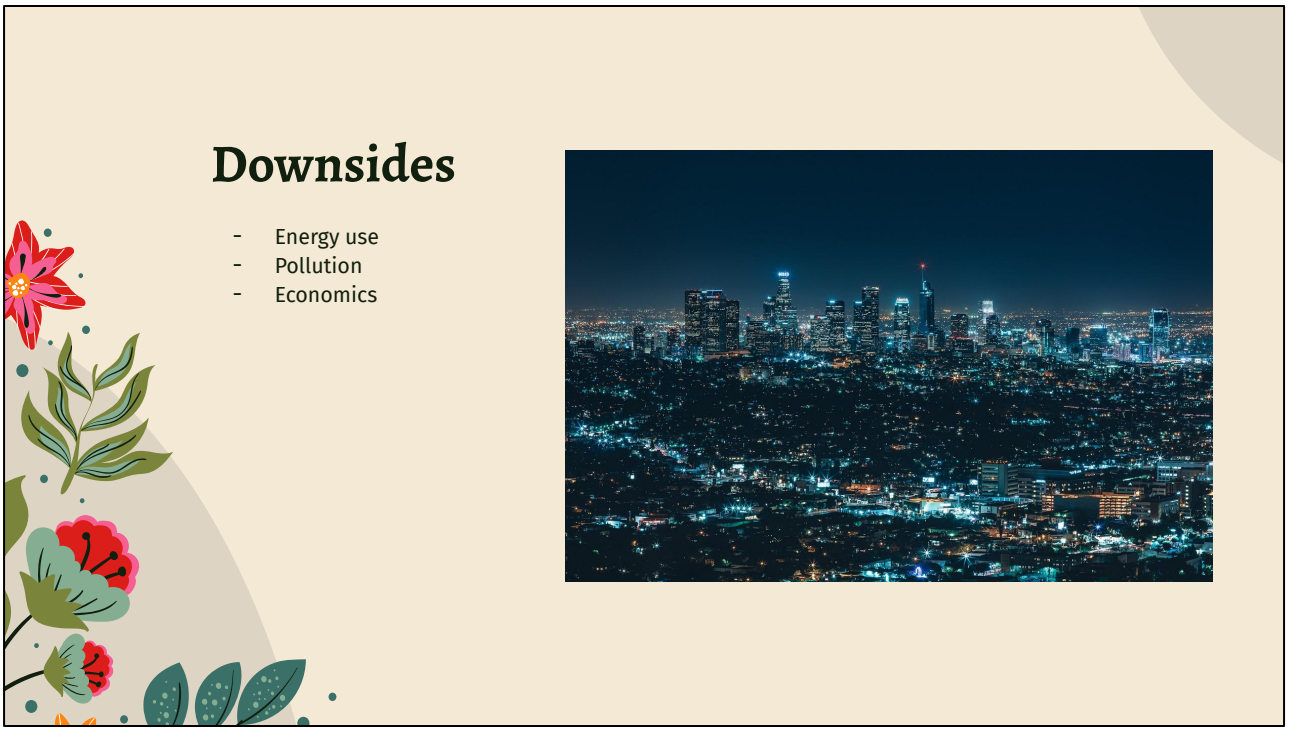
- The way food is produced and sold today makes unhealthy foods cheap and healthy foods more expensive. Vertical farming could change that, especially in urban areas where local, fresh produce is hard to get. If vertical farming caught on, most farms would be in the city (where the majority of the population lives) and people would have access to healthy produce.

Urban growth

- Vertical Farming would cause cities to expand and become more sustainable. If cities and neighborhoods within cities had vertical farms, they could expand more and could be self-sufficient on food.

Energy sustainability

- The waste from vertical farms could be converted into energy by methane digesters and turned into biogas, which could be converted into electricity for the greenhouse, causing a sustainable cycle of energy.



Downsides

Energy use

- When comparing energy of vertical farming to horizontal farming, much more is used on vertical farming. Because of its structure, sunlight can't get to all the layers of the vertical farm stacks, and if it is grown indoors, there would be very little natural light. The solution to this is by growing the plants with lots of high power LED lights to grow the plants with artificial light instead of natural light. This takes a lot more energy and is a major argument of why vertical farming shouldn't be done.

Pollution

- Because of all the energy used for vertical farming, a lot of pollution is created in its wake. Vertical farms could cause there to be more pollution in cities than there already is currently. So unless a solution is found for a more sustainable way to grow the plants, energy and pollution are big factors.

Economics

- Creating new vertical farms would be very expensive-especially at the large scale that is hoped to be achieved. The lights, building space, plants, farmers, and watering technology would all cost a lot. So much, in fact, that it might not pay off in the end and the local communities would be hurt rather than helped.

Summary

Vertical farming will be very beneficial for the future

- Fresh produce in urban areas
- Farming without ruining the environment
- Good for human and environmental health
- Makes crops sustainable and reliable

Summary

Vertical farming will be very beneficial for the future. It will let there be fresh produce grown in urban areas, and allow farming without destroying the environment. It will benefit human and environmental health. It will also cause crops to be sustainably and reliably grown. I think that vertical farming is the future of agriculture.

References

Vertical Farms from Vision to Reality

The Vertical Farm - The Problem

Growing Up: How Vertical Farming Works

Vertical Farm Essay

Landfill Power Generation

Vertical Farming: Does it Really Stack Up?