

# The Vertical Farm

Solutions for a new millennium of  
population growth and agricultural  
production



# The Coming Urban Crisis



Statistics show that if current population growth continues, the Earth's population will increase by almost 3 billion people by the year 2050. Over 80% of that population will live in urban centers, making food distribution a pre-eminent issue as the world continues to develop.

The vertical farm is the solution.

# The Vertical Farm

New agricultural techniques, both prospective and in current development, will soon allow the development of vertical farming – vast urban structures designed to feed large populations while maximizing the use of the land that it is on.

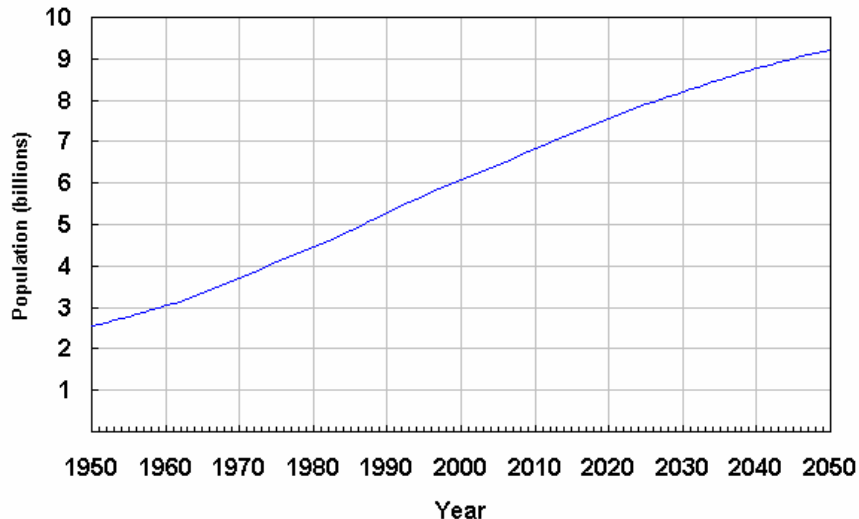
These farms will be distributed *throughout* major urban centers, allowing distribution to be reduced to a level where it's as easy as carrying the food away.

This revolution in agricultural development promises a brighter future for the world.



# Population Focus

World Population: 1950-2050



Source: U.S. Census Bureau, International Data Base, April 2005 version.

The world has never endured a population shift on the order of the one that it will be required to survive. Good agricultural distribution will be absolutely essential.

We claim that the vertical farm is the solution. In a manner imitating the “Green Revolution” of the last half-century, agricultural techniques are about to undergo a quantum leap.

# Problem Statement

The solutions to problems of such vast scope are beyond the reach of a small group. Our group was tasked with the issue of *separation management*; the demand placed upon us is to create a system that filters *blackwater* (sewage, human waste, etc.) from clean water, allowing waste products to be reused as water, fueling the organic cycle.



# Functional Requirements

- The processing system must integrate into an urban environment. The system must be safe, both for those who work with it and residents of the surrounding community, and must be integrated into an urban environment.
- Water needs to be used as a replenishing agent.
- Sludge needs to be provided for new soil production.
- The treatment plant should be small and easily integrated into the farm system.



# Design Alternatives

## ORGANIC SYSTEM

An organic separation system will rely, to the greatest degree possible, on nonmechanical methods of filtration. While a certain amount of technological might must be thrown behind any modern answer to this problem, this solution set is specifically tooled toward the concept that functioning *organics* are the best method of achieving production.

## INORGANIC SYSTEM

However, many components of the vertical farm are purely mechanical and man-made. From elements as crucial as the structural architecture to the recirculating functionality of the powerful methane digesters, technology is often what keeps the building moving. With that in mind, it seems foolish to exclude mechanics from any possible solution.



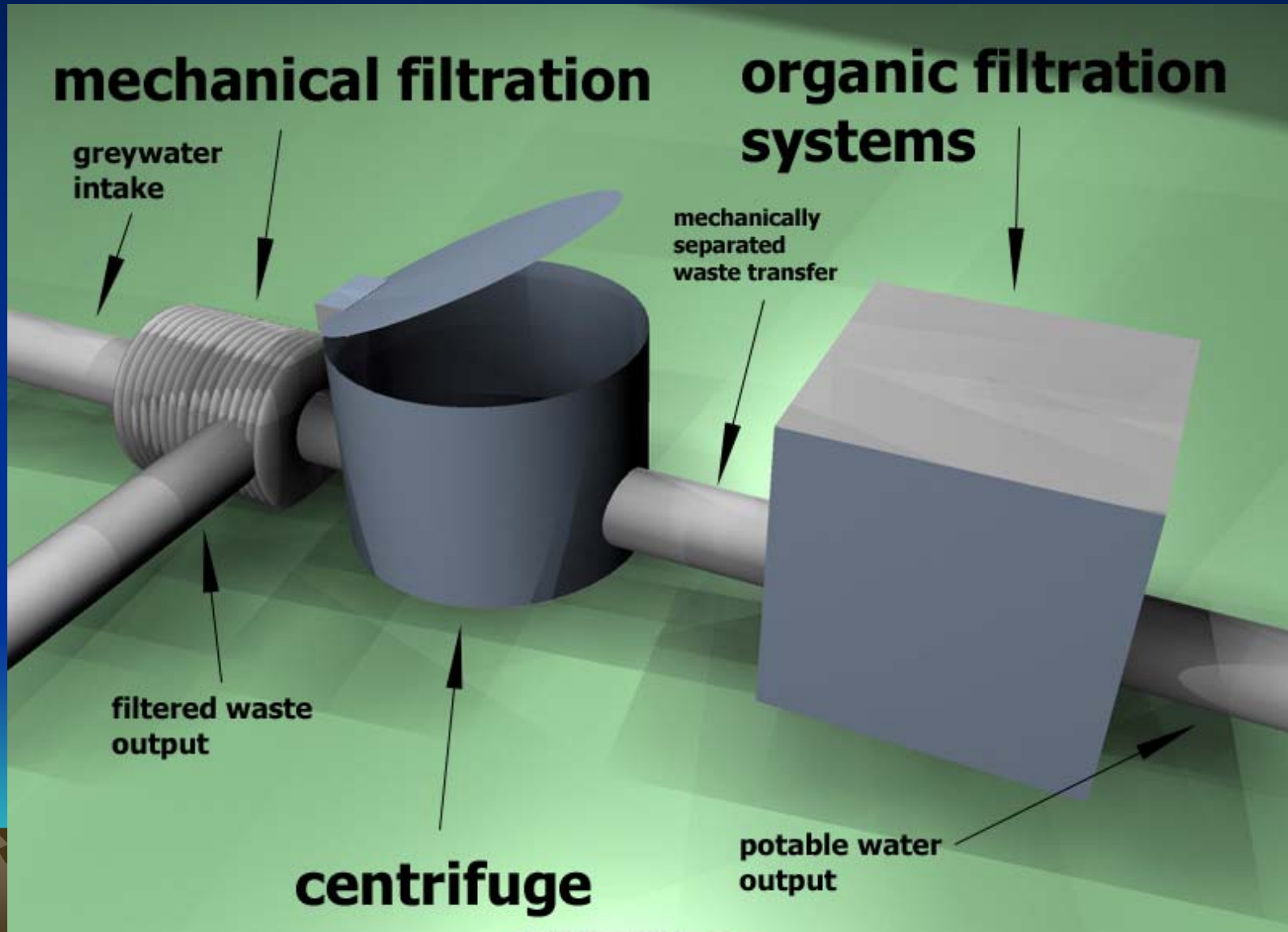
# Choice of Alternative

For our final project, we selected a primarily organic system, although our solution also relies on technological methods.

The greatest potential for filtration, according to our research, seems to come from plant life (including genetically engineered plants) that can be integrated into a functioning, partially mechanized system.



Our final design integrates both of the proposed systems for maximum throughput and functionality.





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