

How Government can Support Urban Food Production

Dr. Dickson Despommier Columbia University

Peter David Greaves AIA, LEED AP
Dan Albert Associate ASLA, LEED AP

5 May 2010



Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved



Awards:

- AIA Regional - Honor Award
- AIA / COTE - Top Ten Green Project
- AIA Seattle - What Makes it Green Award
- LEED Platinum CI - LEED Gold CS
- AIA Seattle - Honor Award Commendation



Urban Agriculture · Eco-laboratory · VF 2.0



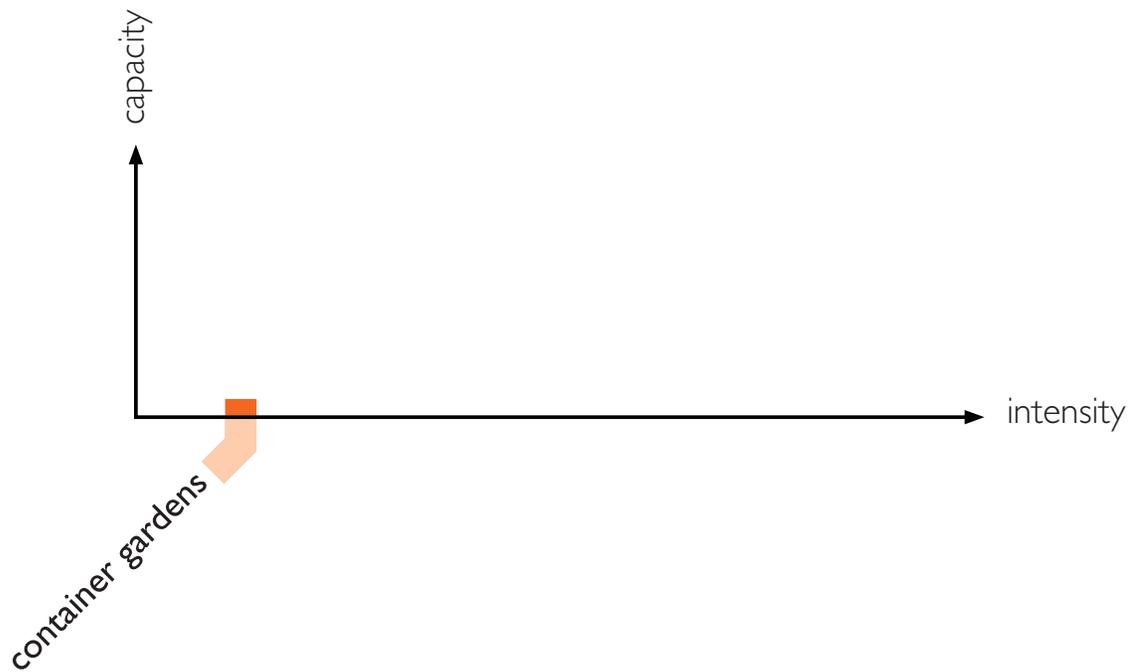
Dan Albert Associate ASLA, LEED AP

5 May 2010

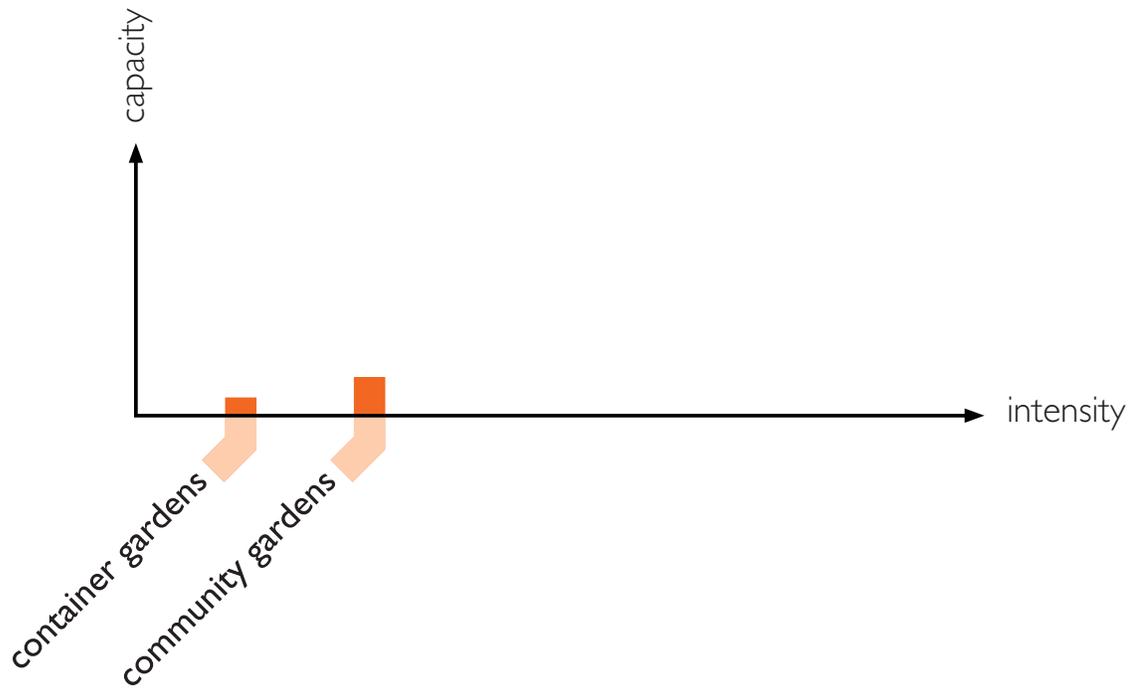


urban agriculture

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved

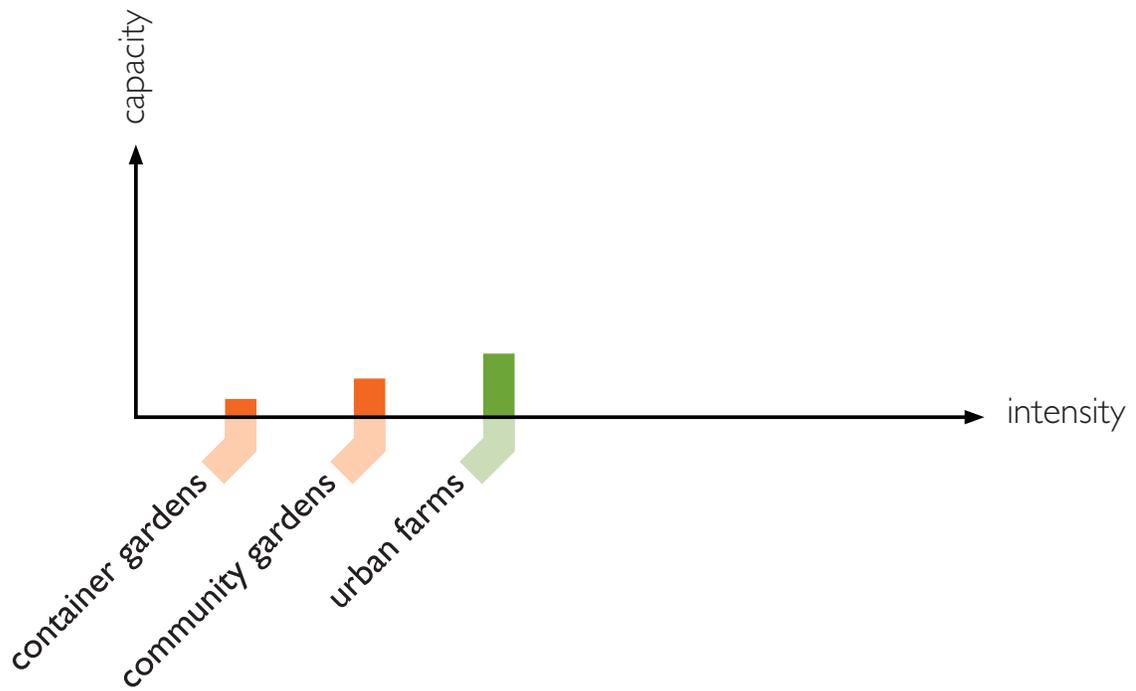


urban food production

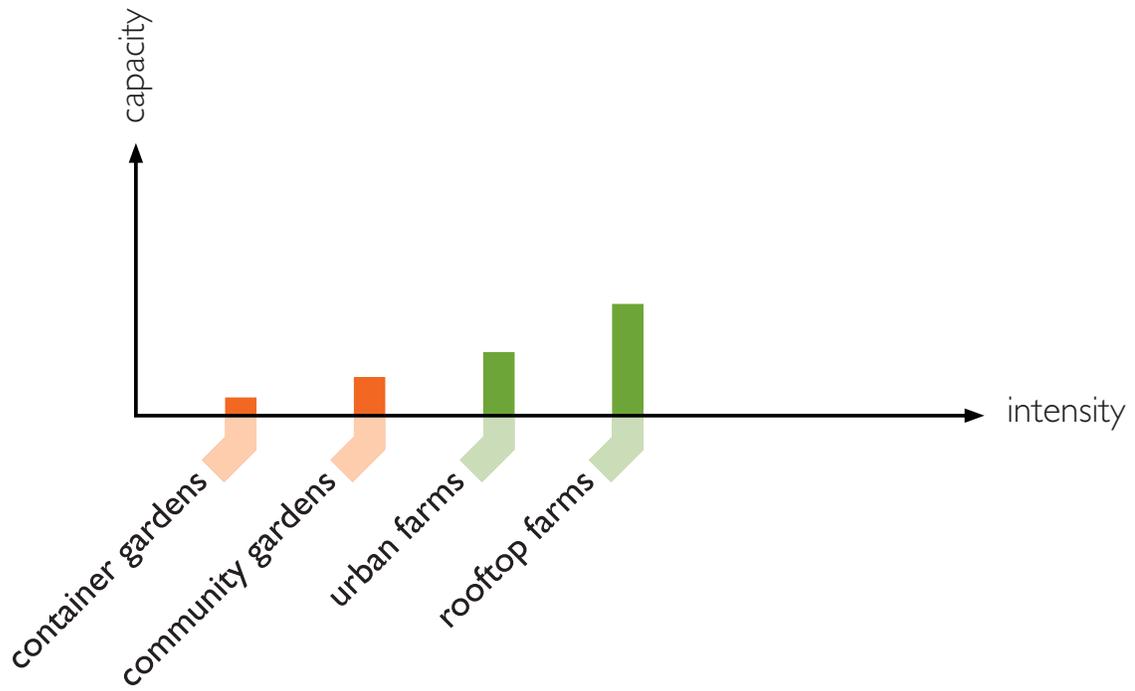


urban food production

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved

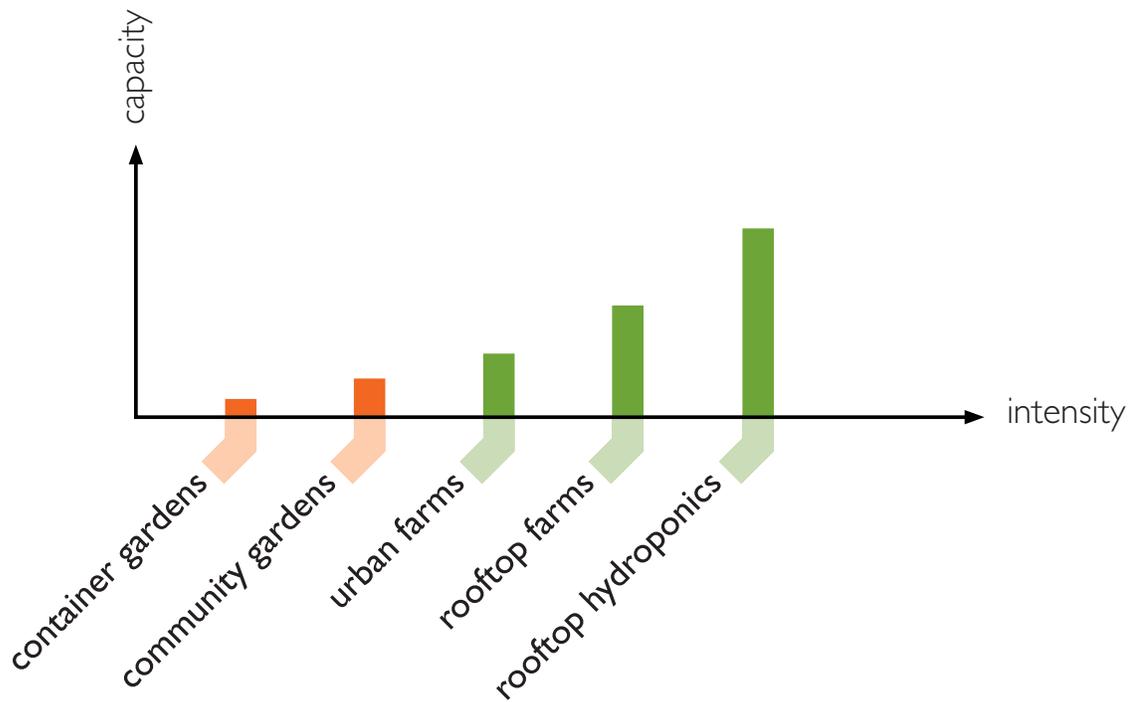


urban food production

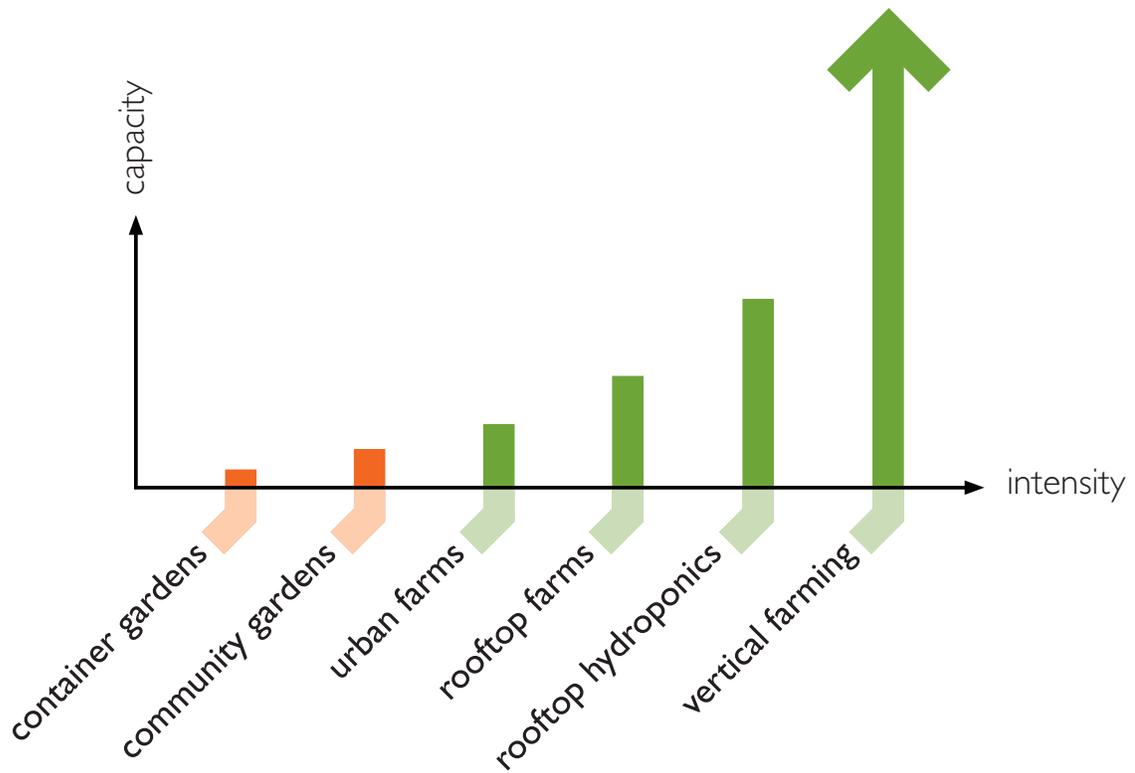


urban food production

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved



urban food production



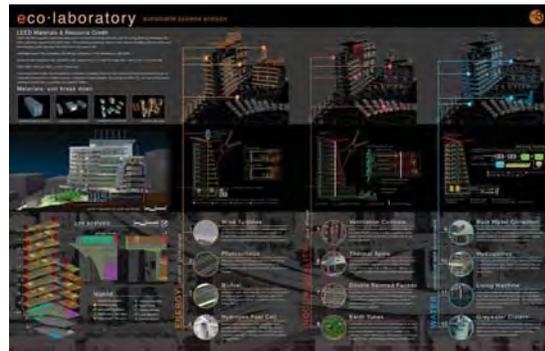
urban food production

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved

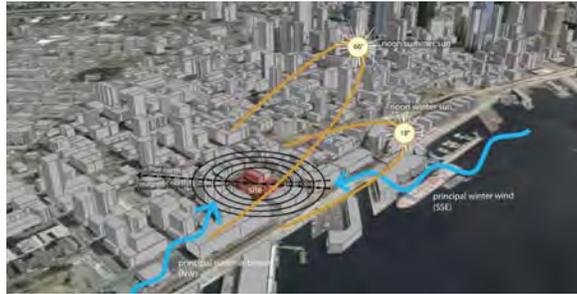


The Living Building Challenge
requires attention to
six prerequisites:

site
energy
materials
water
indoor quality
beauty and inspiration

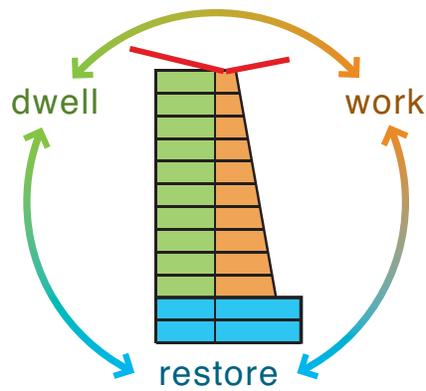


the living building challenge



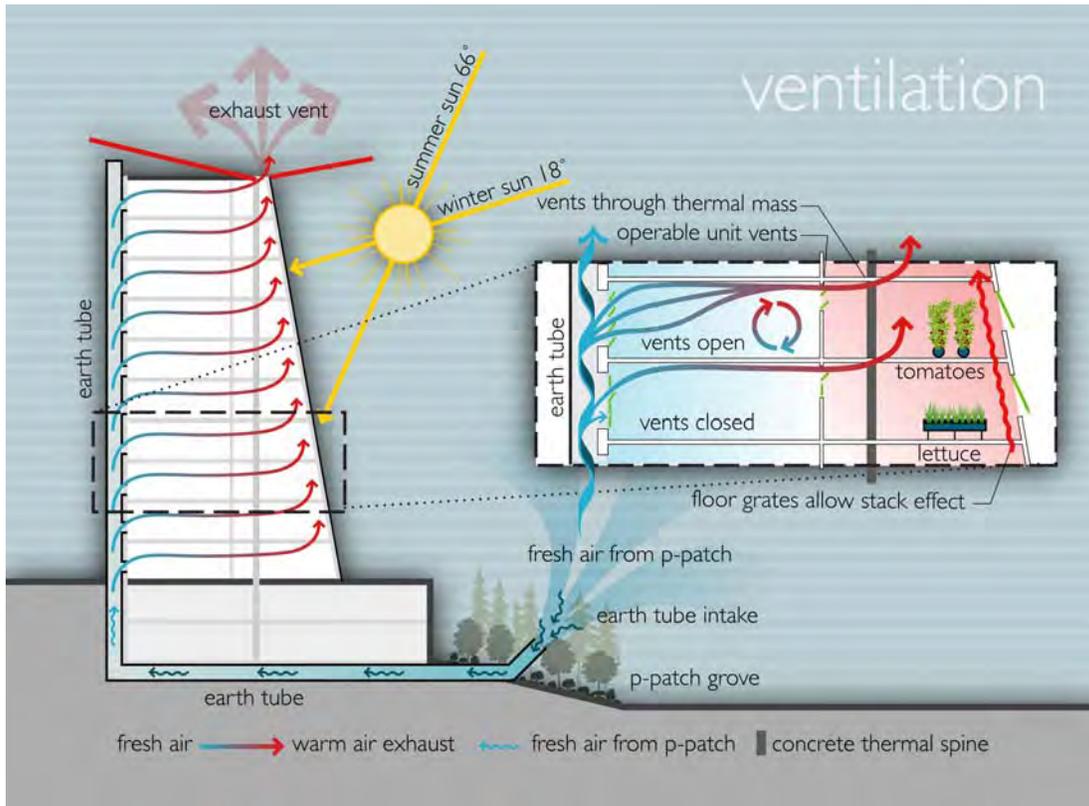
the site

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved

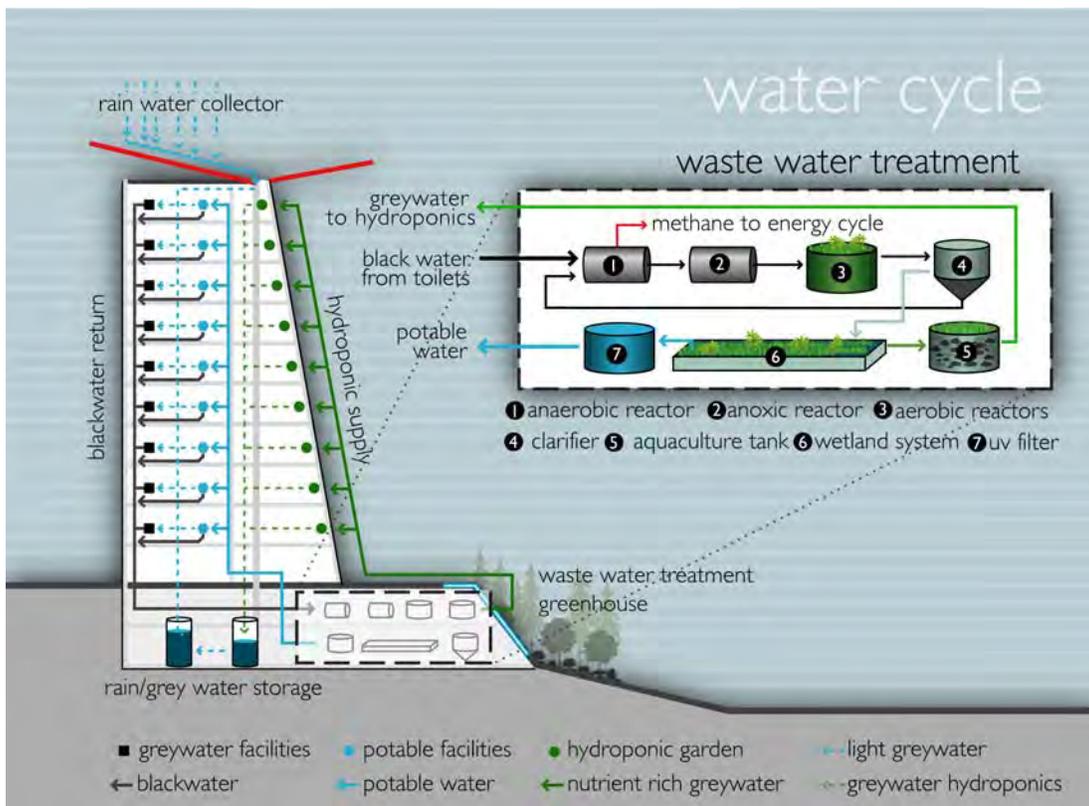


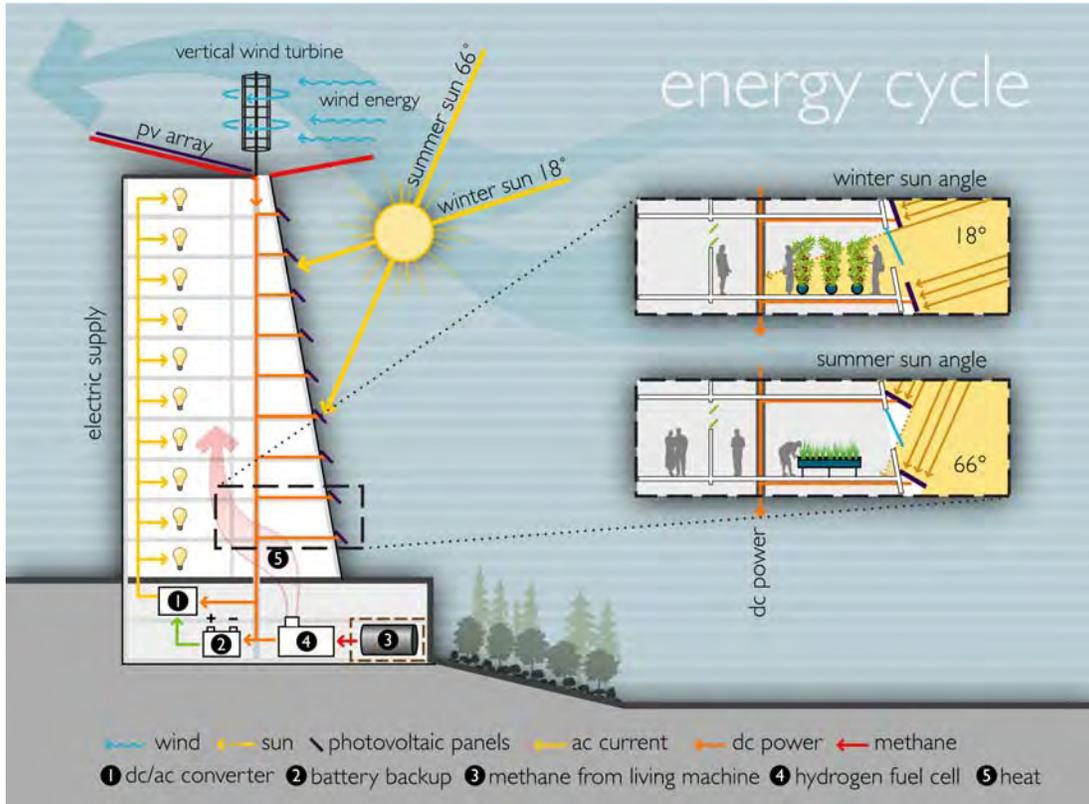
There is **no silver bullet** for sustainability,
 no “magical solution” to create beautiful
 net-zero consumption environments.

concept



Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved





Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved



view north east



section

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved



eco-laboratory - hydroponics



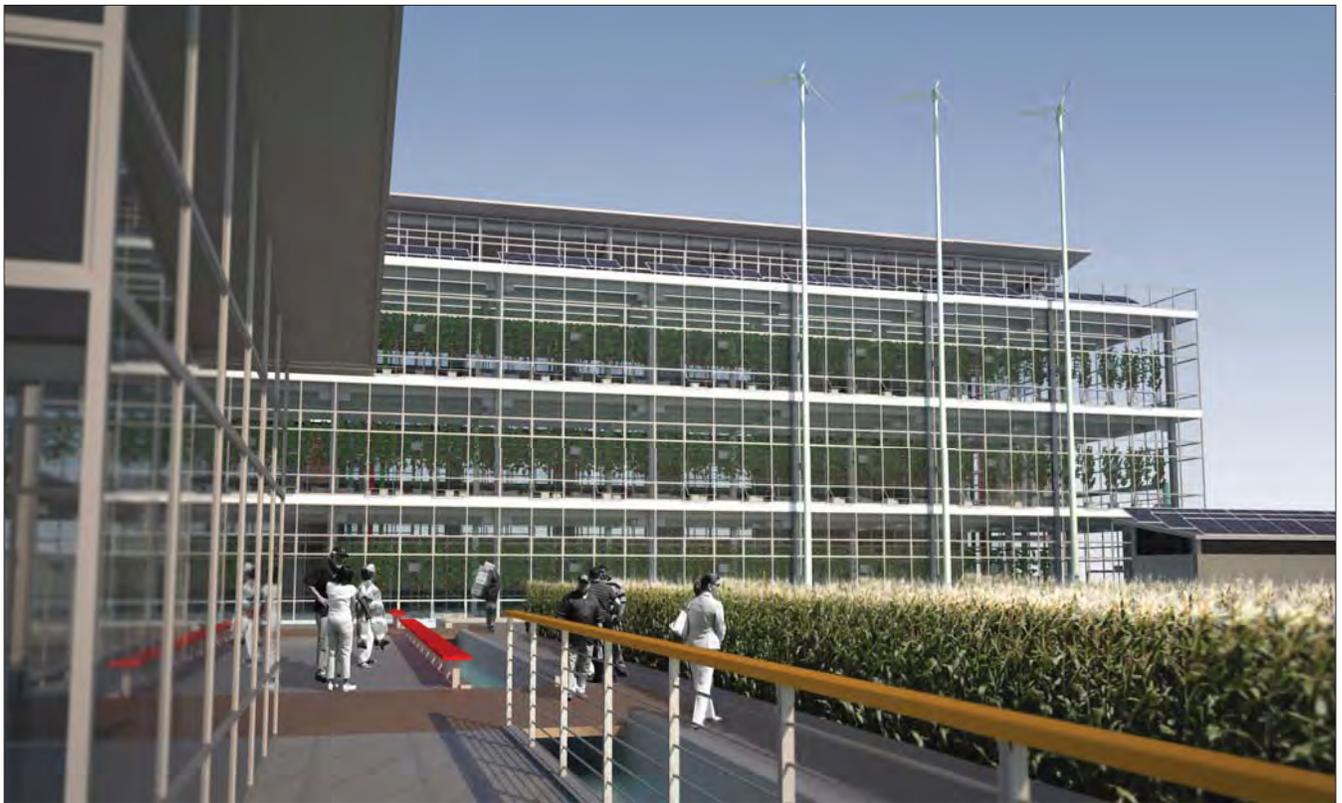
eco-laboratory - hydroponics

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved

concept —→ reality
eco-laboratory VF 2.0

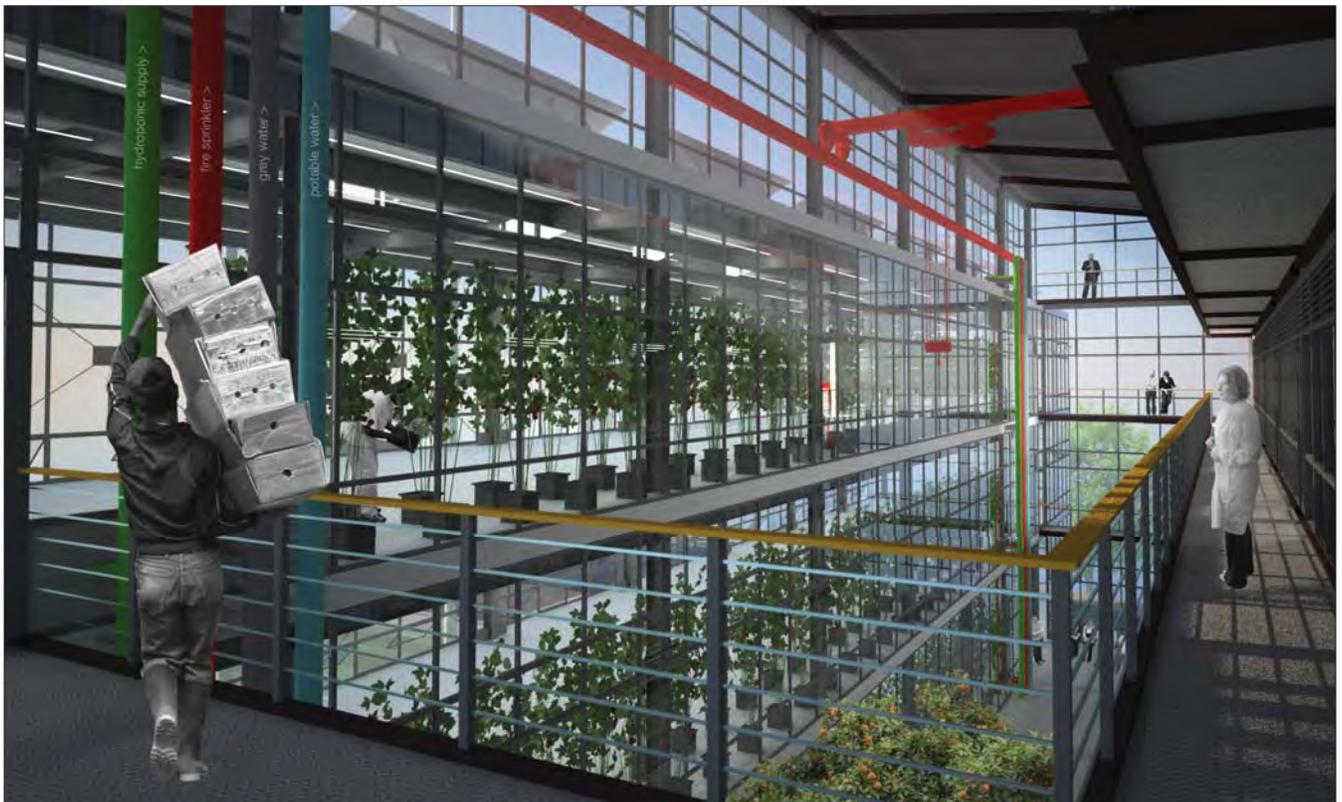
bridging the gap





VF2.0

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved



VF2.0

public awareness:

community gardens - the role of the city

public perception:

“my food must come from the soil”

government motivation:

reactionary policy bolstering existing programs

private motivation:

must be economically viable

issues

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved

research & communication:

public private partnership - design - execution

awareness campaign:

food is food

government participation:

grants - tax incentives - catalyst

private leadership:

economic investment - venture capital

next steps

WEBER THOMPSON



thank you

Copyright © 2008 Weber+Thompson, PLLC All Rights Reserved

The Vertical Farm: Keystone Concept to the Sustainable Eco-city

Green Tools Government Confluence Meeting, Seattle

May 5, 2010



DICKSON
DESPOMMIER,
Ph.D.

EMERITUS PROFESSOR OF
PUBLIC HEALTH,
COLUMBIA UNIVERSITY

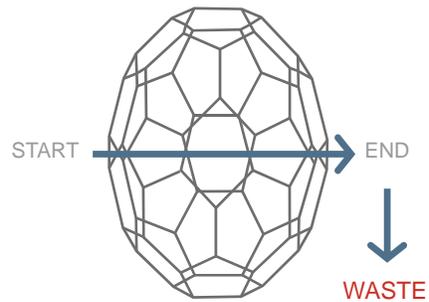
Biosphere



NO BEGINNING, NO END

“Cradle to cradle”

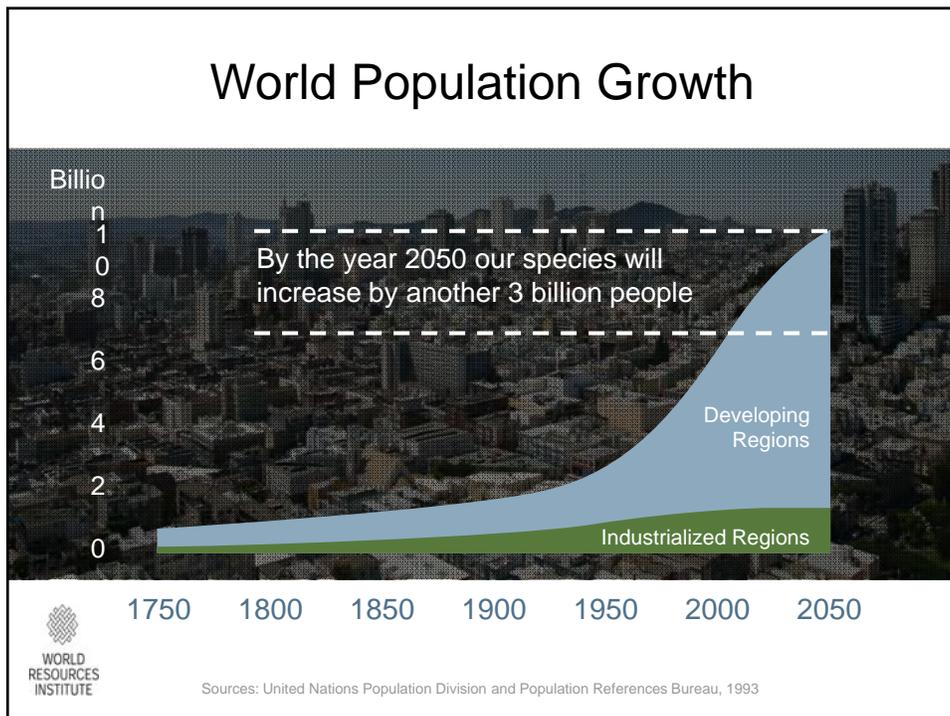
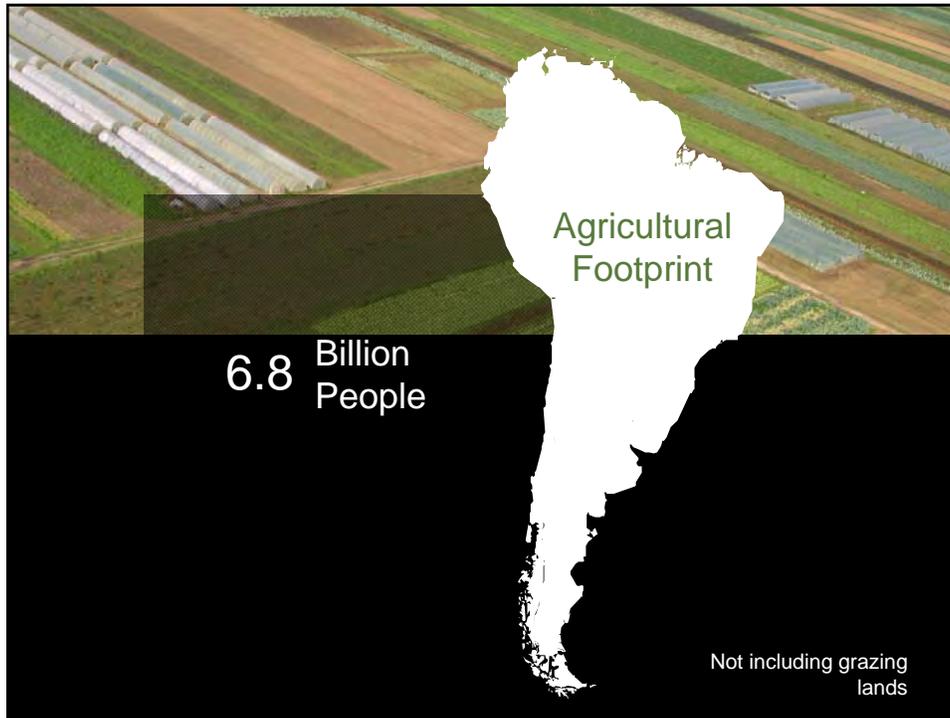
Techno-sphere



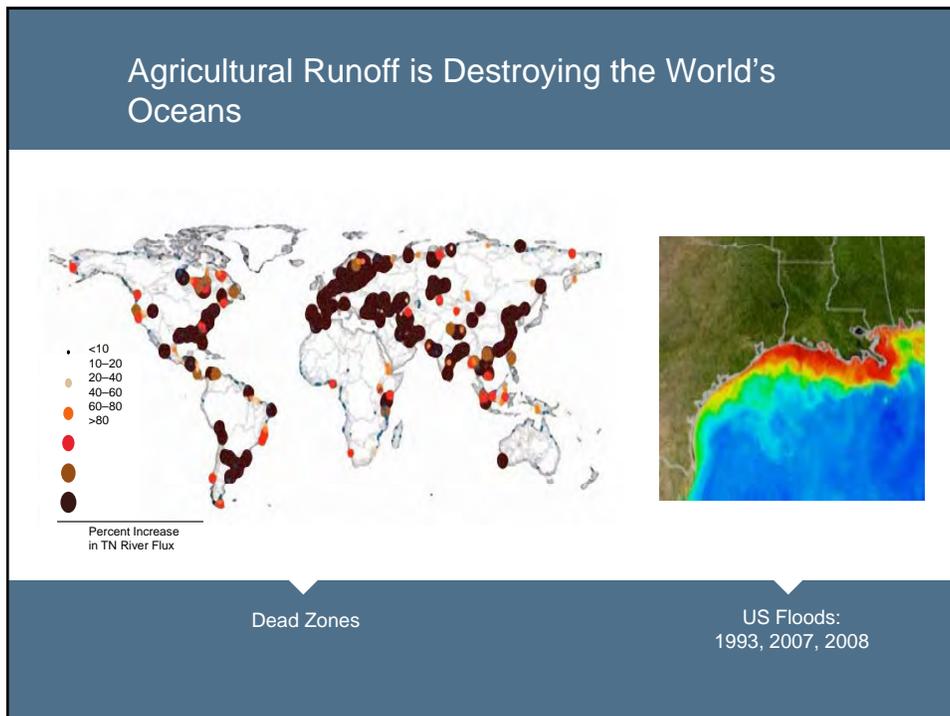
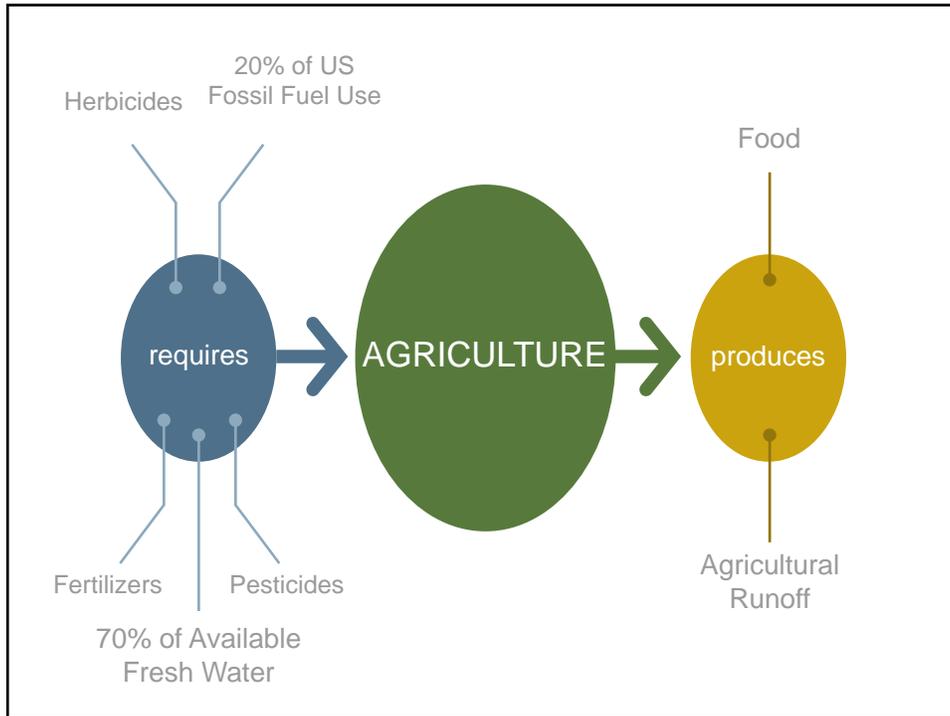
“Cradle to grave”



- ### The Challenges
- ▶ Safe and Abundant Water Supply
 - ▶ Food Safety and Security
 - ▶ Engaging Society in Environmental Sustainability
 - ▶ Reducing Dependence on Fossil Fuels









Within 20 years, 80% of us will live in cities or suburbs

An aerial photograph of a city, likely San Francisco, with a dense urban landscape. The image is overlaid with text and a central graphic.

Provide a sustainable, safe and abundant food and water supply for 10 billion people?

AND

Repair Earth's damaged ecosystems?

Can We?

We Can If We Want
To

The Future of Agriculture: Growing Soilless



Hydroponics

Aeroponics

Drip Irrigation

The Future Is Now



Rice from Japan



Lettuce from Tennessee



Tomatoes



EuroFresh Farms, Willcox, Arizona

Endless Possibilities



Variety Is The Spice Of Life

		Berries Blackcurrant Blueberry Cranberry Huckleberry Loganberries Raspberry Strawberry	Legumes Soybeans Peanuts	Leafy Greens Asparagus Butterhead Lettuce Broccoli Brussels Sprout Cauliflower Celery Charita Lettuce Chinese Cabbage Collared Greens Estelle Lettuce Garlic Chives Green Coral Lettuce, Green Oak Leaf Lettuce, Kale Kuala Lettuce Mizuna Mustard Peas Red Coral Lettuce Red Oak Leaf Lettuce Romaine Lettuce Roxy Lettuce, Spinach	Herbs & Spices Arugula Banana Pepper Bay Leaves Chile Peppers Chervil Chives Cilantro Cinnamon Basil Coriander Curry Leaf Dill Fennel French Tarragon Green Basil Lavender Lemon Basil Lemon Thyme Marjoram Mint Opal Basil Oregano Parsley Rocket Rosemary Sage Sakura Cress Thai Basil Watercress		
		Bush Vegetables Green Bean Tomato-- beefsteak, campari, plum, cherry, globe	Melons Cantaloupe Muskamelon Pumpkin, Watermelon	Root Vegetables Beet Belgian Endive Carrot Onions Potato Radish Sweet Potato			
		Specialty Crops Coffee Grapes Luffa Sponge Olives Sunflower Wheat Grass	Grains Barley Corn, Wheat Rice				
		Vine Vegetables Cucumber Eggplant Okra Squash Sweet Bell Pepper					

Apply these proven indoor agricultural strategies to growing food in buildings located within the urban landscape...

The Result:

Vertical Farming

Advantages of a Vertical Farm

5	ALLOWS RESTORATION OF DAMAGED ECOSYSTEMS
4	USES 70% LESS WATER, NO AGRO-CHEMICALS, NO FOSSIL FUELS
3	NO CROP LOSS FROM SEVERE WEATHER EVENTS
2	YEAR ROUND CROP PRODUCTION
1	NO AGRICULTURAL RUNOFF

Advantages of a Vertical Farm

10	CAN GROW BIO-FUELS, PLANT-DERIVED DRUGS
9	USES ABANDONED CITY PROPERTIES
8	SUPPLIES FRESH PRODUCE FOR INNER CITY DWELLERS
7	CREATES NEW JOBS
6	REMEDiates GRAY WATER



The Vertical Farm: Key to Eco-Urbanization

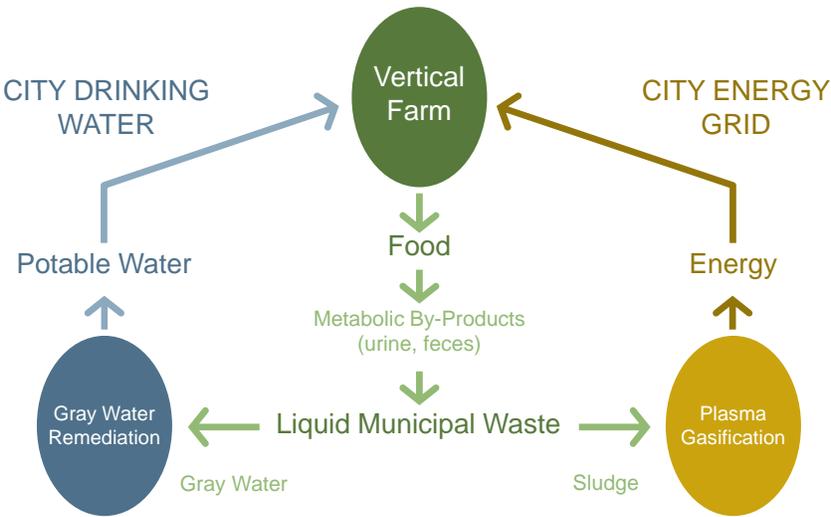


The Vertical Farm is the centerpiece for creating an eco-city in which all human activities reflect ecological process.

Vertical Farm Tool Box



The Sustainable Eco-City (employs cutting-edge technologies)



Can we
actually do
any of
this??

We are already doing it!

Orange County, California



Black water

Grey water

Drinking water

Toilet to Tap: Orange County Turning Sewage Water into Drinking Water

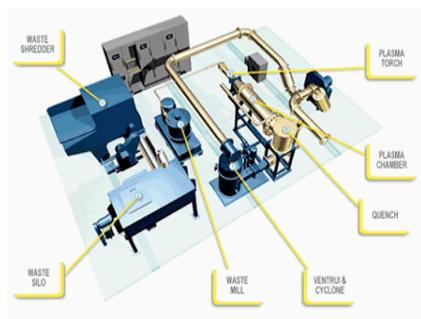
Posted on Mar 14, 2009 by Jennifer Lance in Availability, Drinking
Water, Infrastructure, Purification

The Orange County Water
District is [purifying wastewater
into drinking water](#) at a \$481
million recycling plant. The plant

uses microfiltration, reverse osmosis, ultraviolet light, and hydrogen peroxide disinfection. 70 million
gallons of sewer water is treated a day in Orange County, California meeting the drinking needs of over
500,000 people, including visitors to [Disneyland](#).



Japan has no landfills!



Plasma Arc Gasification

Incineration Facility



Cities That Want Vertical Farms



Chicago
 San Francisco
 New York
 Portland, Oregon
 Las Vegas
 Newark, NJ
 Newark, Delaware
 Kansas City
 Vancouver, BC
 Surry, BC
 Toronto, On
 Milan, Italy
 Singapore
 Incheon, Korea
 Amman, Jordan
 Tel Aviv, Israel
 Doha, Qatar
 Abu Dhabi
 Dubai
 Muscat, Oman

The Bridge - Sports Promenade



Bus Terminal



TITLE

Pla(n)iform:
 An alternative for
 urban growth

ILLUSTRATOR

Ori Ronen &
 Adi Reich

LOCATION

Tel Aviv, Israel

	<p>TITLE</p> <hr/> <p>Pla(n)tform: An alternative for urban growth</p> <p>ILLUSTRATOR</p> <hr/> <p>Ori Ronen & Adi Reich</p> <p>LOCATION</p> <hr/> <p>Tel Aviv, Israel</p>
--	--

 <p>Field Stacking: 40 acres of crops on 6 levels >> 827 tons of fruit and vegetable produce - approximately the consumption of the Neve Sha'anani and part of the Shapira neighborhoods.</p> 	<p>TITLE</p> <hr/> <p>Pla(n)tform: An alternative for urban growth</p> <p>ILLUSTRATOR</p> <hr/> <p>Ori Ronen & Adi Reich</p> <p>LOCATION</p> <hr/> <p>Tel Aviv, Israel</p>
--	--



TITLE

Dubai Pyramid Farm

ILLUSTRATOR

Eric Ellingsen
Dickson Despommier

LOCATION

Dubai



TITLE

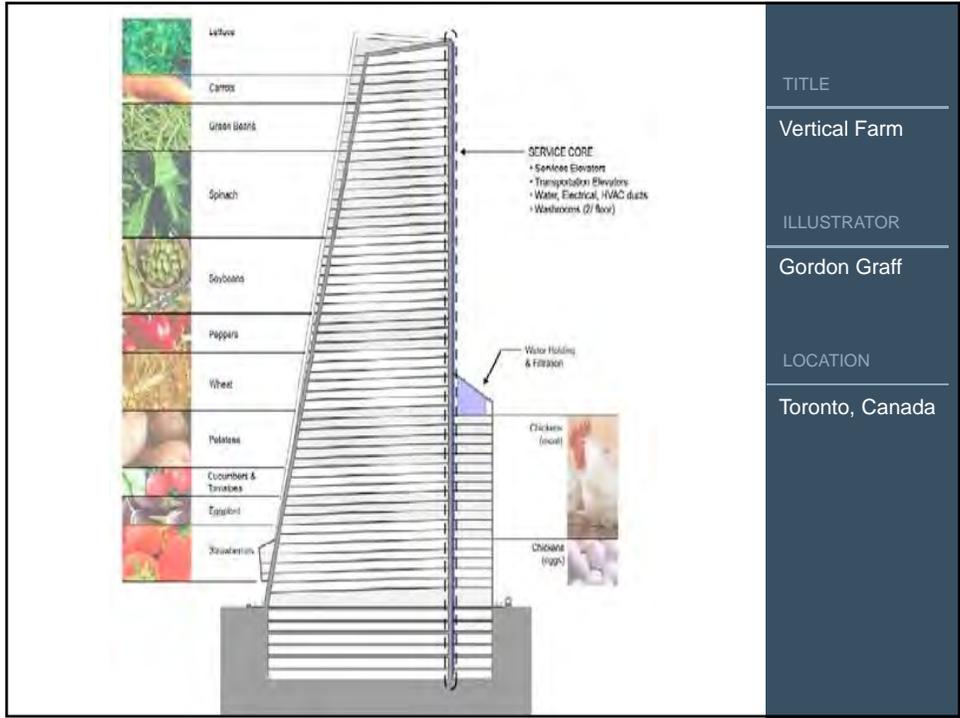
Vertical Farm

ILLUSTRATOR

Gordon Graff

LOCATION

Toronto, Canada



TITLE

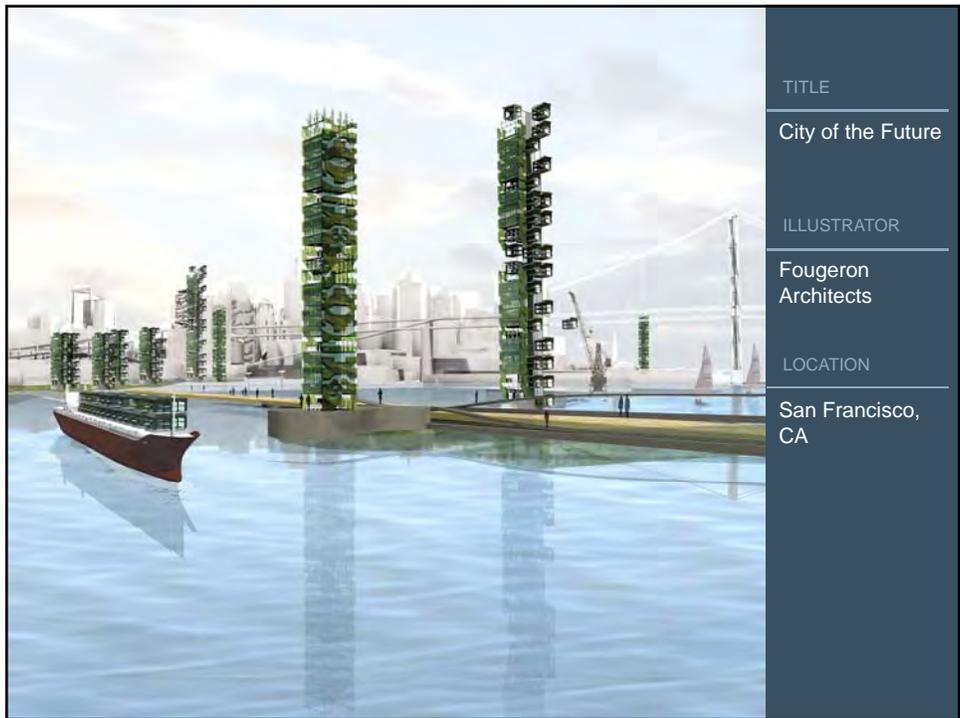
Vertical Farm

ILLUSTRATOR

Gordon Graff

LOCATION

Toronto, Canada



TITLE

City of the Future

ILLUSTRATOR

Fougeron
Architects

LOCATION

San Francisco,
CA



TITLE

Vertical Farm

ILLUSTRATOR

Blake Kurasek

LOCATION

Chicago, IL



TITLE

Vertical Farm

ILLUSTRATOR

Blake Kurasek

LOCATION

Chicago, IL



TITLE

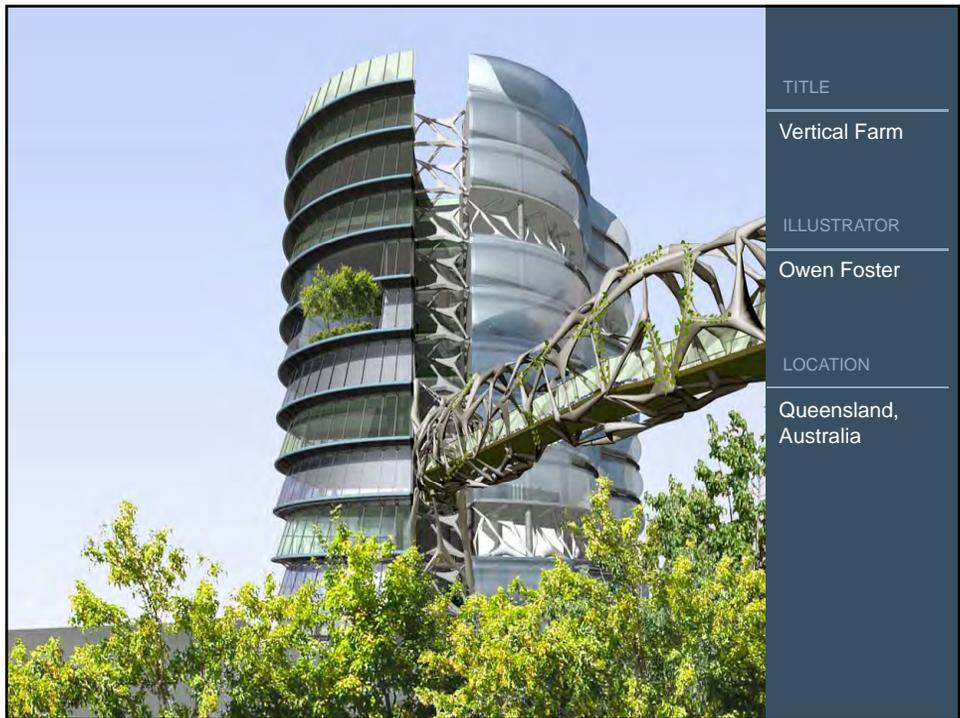
Vertical Farm

ILLUSTRATOR

Blake Kurasek

LOCATION

Chicago, IL



TITLE

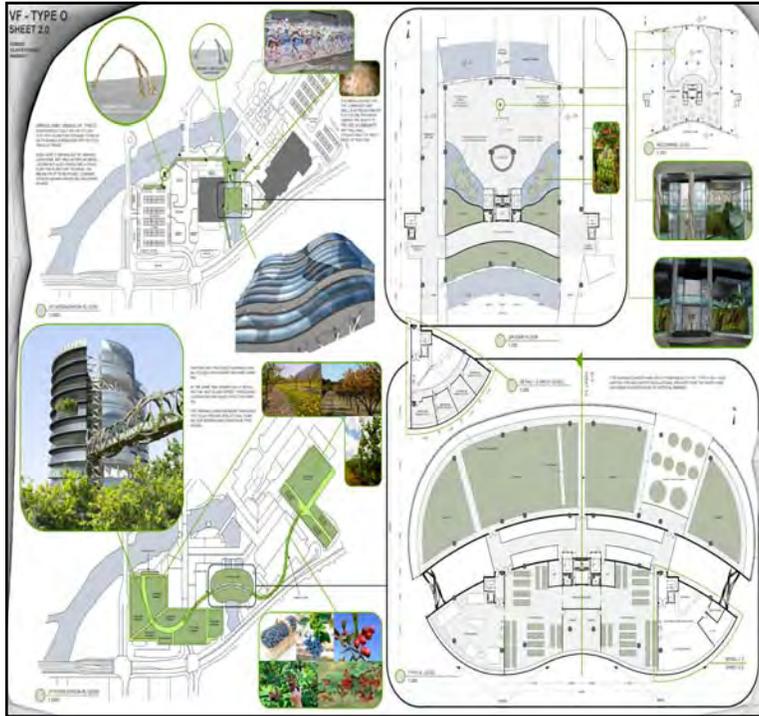
Vertical Farm

ILLUSTRATOR

Owen Foster

LOCATION

Queensland,
Australia



TITLE

Vertical Farm

ILLUSTRATOR

Owen Foster

LOCATION

Queensland,
Australia



TITLE

Urban farm,
urban epicenter

ILLUSTRATOR

Jung Min Nam

LOCATION

New York City



TITLE

Urban farm,
urban epicenter

ILLUSTRATOR

Jung Min Nam

LOCATION

New York City



TITLE

Urban farm,
urban epicenter

ILLUSTRATOR

Jung Min Nam

LOCATION

New York City



TITLE

Experimental Vertical Farm

ILLUSTRATOR

Claudio Palavecino Llanos

LOCATION

Santiago, Chile



TITLE

Experimental Vertical Farm

ILLUSTRATOR

Claudio Palavecino Llanos

LOCATION

Santiago, Chile



Crop Unit
How do you understand a wall where biological factors and wind, light and water flow interact? "Vertical Farming" is a new urban vegetable "Wall in"

TITLE

Experimental Vertical Farm

ILLUSTRATOR

Claudio Palavecino Llanos

LOCATION

Santiago, Chile

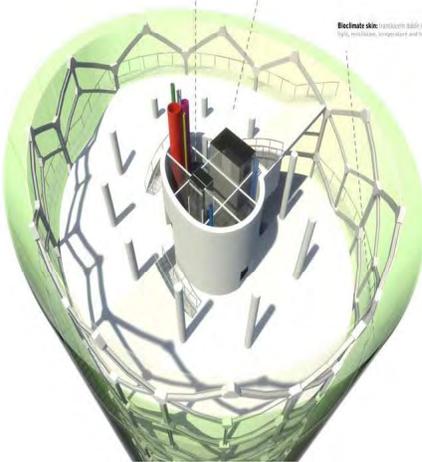
Technology
"Waters and natural flows as design elements: building as a 'living environment'"

The crop and primary transportation between vertical factors which make vegetable habitat maintenance as a living environment. All, humidity and sunlight are used to produce water and energy flow. The external resources which feed the building, in fact, also factors form the operation program and building functioning.

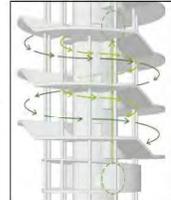
Control area: The full cover where air can circulate to liquid particles that enter pipes, various facilities, bright structures and work ways.

Crop area: Controlled area located in different heights, like an open space. This vertical urban water takes to singular areas by gravitational, and this liquid forms a continuous air flow and efficient light between levels.

Bioclimate skin: translucent solar skin control. Light transmission, temperature and humidity.



+ Humidity
Intensive water runs up by water pumps, then water flows to plants by transpiration, without energy consumption. This process is possible by the special flows between levels. The porous and glass coating, water from evaporation - perspiration from inside vegetation or energy.



Water system to catch water from outside skin. Pipe system to transport by gravitation.

TITLE

Experimental Vertical Farm

ILLUSTRATOR

Claudio Palavecino Llanos

LOCATION

Santiago, Chile

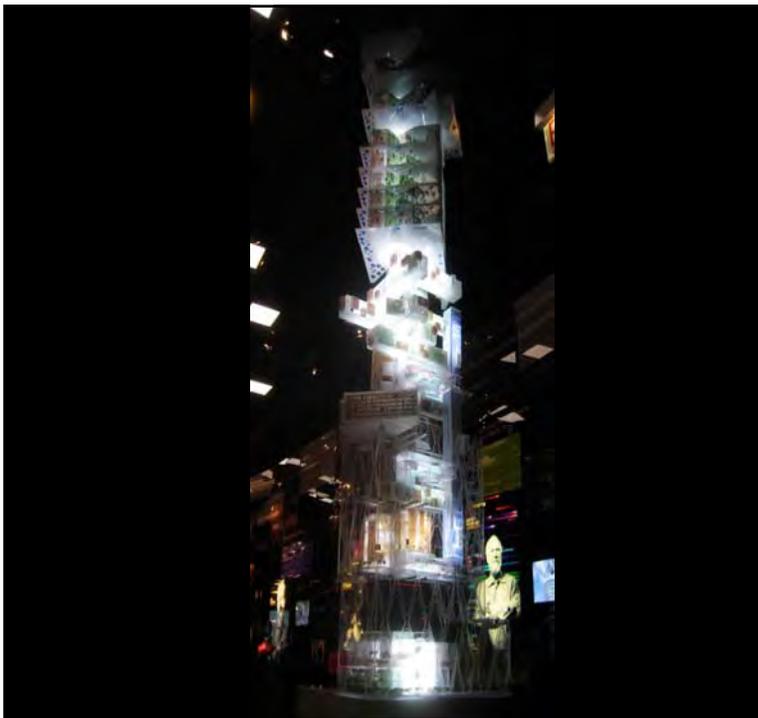


TITLE

Museum of
Science and
Industry

LOCATION

Chicago, IL



TITLE

Illinois Institute
of Technology,
College of
Architecture

DESIGNERS

Vertical Farm
Model Team

LOCATION

Chicago, IL.

How To Begin

Build A Prototype



TITLE

Grade School
Vertical Farm
Project

ILLUSTRATOR

Tom's Students

Weber Thompson - Seattle



Weber Thompson - Seattle



It's time to stop talking...
...and **START DOING!**

Save
Water

Farm
Smart



Get Off The Grid

Help Keep Our
Blue Planet
Green!

