Why Vertical Farming

CHALLENGES IN VERTICAL FARMING

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Presented by

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Pressing Issues

A. 7 billion mouths to feed

B. Climate changes are altering the agricultural landscape

C. Food borne illnesses are on the rise

D. Drinking water is becoming scarce in many places

E. More crops are failing due to plant pathogens and insect pests

F. Half of the world goes to bed hungry every night

G. Half of the world harbors 80% of the intestinal worm infections
Many of these issues have had a negative impact on crop production.
U.S.A. Drought 2012

July 10

July 24

August 7

August 21

September 4

September 18
Estimated $20 billion in crops lost in 2012 due to drought*  
Corn  
Soybeans  
Wheat  
Sorghum  

*USDA
Monsoons and India

“Too much, too soon”
125 million tons of: Potatoes, rice, wheat, corn, soybeans destroyed per year*

*FAO statistic
Deforestation
Causes of Deforestation in the Brazilian Amazon, 2000-2005

Cattle ranching, 65-70%

Small-scale agriculture, 20-25%

Logging, 2-3%

Other, Large-scale agriculture, 1-2%

5-10%

Share of deforested land ultimately converted for extensive agriculture

1980s 80%

1990s 60%

1) Other includes fires, mining, urbanization, road construction, dams; 2) Logging generally results in degradation rather than deforestation, but is often followed by clearing for agriculture; 3) Data from Holly Gibbs 2009
More issues:

Food Miles
Crop loss due to shipping and storage
Winter
No soil (Middle East, Iceland, Australia)
Floods

Confluence of Mississippi and Missouri Rivers, August 1993. Extensive floods in the Mississippi River Basin during the spring and summer of 1993 caused $20 billion in damages. (Photograph, Srenco Photography, St. Louis, Mo.)
Alternatives to traditional agriculture abound
Some Are Outdoors
Urban Indoor Farming Is On The Rise

Gotham Greens Headquarters. Brooklyn, New York
So, why not increase production by going vertical?
This idea has become viral
7,610,000 “hits”, Sept. 20, 2012
28, 700,000 “hits”, Sept. 20, 2012
Until finally some were built
Vertical Farms

Korea
Japan
Singapore
Sweden
U.S.A.
……and its not all about food!
Lumitex LEDs

Texas Plant-Expressed Vaccine Consortium
San Antonio, Texas
The more we farm vertically, the less outdoor farming will necessary
Fewer outdoor farms means more hardwood forests can grow back

Hubbard Brook Project

DMZ

A Sand County Almanac
With Essays on Conservation
Aldo Leopold

Photographs by Michael Sewell
Introduction by Kenneth Brower
### Rating Energy Technologies’ Potential to Lower Atmospheric Carbon Levels

“High Potential (4-5)” vs “Low Potential (1-2),” Over Next 25 Years

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<th>Technology</th>
<th>High Potential</th>
<th>Low Potential</th>
<th>Net*</th>
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<tr>
<td>Solar electric (photovoltaic cells)</td>
<td>74</td>
<td>9</td>
<td>65</td>
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<tr>
<td>Solar hot water &amp; passive solar</td>
<td>74</td>
<td>9</td>
<td>65</td>
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<td>Off-shore wind farms</td>
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<td>Land-based wind farms</td>
<td>62</td>
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<td>Co-generation (electricity &amp; heat)</td>
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<td>Tidal/wave energy</td>
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<td>Low-head hydro (small-scale)</td>
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<td>2nd generation bio-fuels from forest/fuel waste</td>
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<td>13</td>
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<td>Next-generation nuclear power technology</td>
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<td>1</td>
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<td>Biomass from forests</td>
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<td>Clean coal technology: new build</td>
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<td>-2</td>
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<td>Currently-available nuclear power technology</td>
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<td>3</td>
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<td>Human-powered vehicles</td>
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<td>-17</td>
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<td>Large-scale hydroelectric</td>
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<td>-17</td>
</tr>
<tr>
<td>First generation bio-fuels from crops</td>
<td>21</td>
<td>52</td>
<td>-31</td>
</tr>
</tbody>
</table>

*High potential (4-5) minus “Low potential (1-2)"

The white space in this chart represents “average potential (3),” and “DK/NA.”
Because, ...........
...in the end,...
...its all..
emphasising nature in the built environment
A COMMUNITY OF POSSIBILITIES
What do we still need to learn in order to make vertical farming an affordable reality?

That is the theme of this conference!
Thank You