

LOW CARBON FOOTPRINT AGRICULTURE PRODUCTION

SUSTAINABLE CITIES OF THE 21ST CENTURY 2ND ANNUAL GREEN TRADE
NETWORK SUMMIT

Solsustech Incorporated

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Who We Are: *Sol-Sus-Tech*:

- Agriculture Solutions, Sustainability and Technology
- Reducing use of natural resources and increase efficiencies in food production and distribution

What's happening today?

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- Why are we taking a hard look at sustainability?
 - What is a city in the 21st century-what do we think of?
 - What challenges need to be addressed?
 - Who plays a role in developing solutions?

Challenges and Solutions

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- The Chicken and Egg
- Depends on how far down the road we look

Challenges

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- Increasing population
- Increasing food needs/ distribution sources
- Decrease in *usable/available* land
- Decrease in usable/ available fresh water
- Increase demand in energy resources
 - ▣ Coal fuel, solar, hydro etc.
- What does this mean for air and water *quality?* (see *Chicken*)

Who does this impact he most?

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- Lets look at agriculture
- It uses almost 80% of the worlds fresh water
- Covers over 1 Billion acres of land in the US alone
 - ▣ Consumes 300 Billion lbs of fertilizer annually
 - ▣ And 2.5 Billion lbs Pesticides and herbicides
- Of all the industry's worldwide- Agriculture has the biggest impact on world health, trade and politics
- Our food system is responsible for 1 /3 of global greenhouse emissions.

Timeline

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- ❑ **The world's food production needs to double by 2050 to feed the world's growing population.**
- ❑ But over this period, climate change, reduced access to water and changing land use are likely to make growing crops harder rather than easier.
- ❑ Scientists are trying to find new ways of using fewer resources to produce more food

Timeline-the last 18 months

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- An unprecedented spike in food prices due to higher transport costs and fertilizer prices for food producers.
 - ▣ As the food price shock took hold, there were riots worldwide - the government fell in Haiti - and a prompt return to protectionist policies as 40 countries imposed special measures to try to protect both their farmers, and those who could no longer afford to eat.
- In total, 36 countries sent out appeals for food aid.

Chicken or the egg?

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- Do we try and create more *usable resources*
 - *Wind, solar, etc*
- Or do we try and restrict resource use in Industry
 - Ex. Auto industry and fuel efficient cars
 - small tractor syndrome
- Or consumer areas specifically .
 - Water restrictions on car washes, low flush toilets, light bulbs etc...

On the flip side...

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What are some other alternatives?

- ❑ More farm land? US acreage increased by 2 million acres including conservation land
- ❑ Genetically Modified Food?
 - ❑ Public reception- technology
- ❑ Water desalination plants
 - ❑ Costly- not favorably located
- ❑ Alternative fuel?
 - ❑ Too much crop land has already been transferred to biofuel production exacerbating food shortages

Consumers are looking for change

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- Agriculture:
 - Use consumer pull through the market
 - US organics industry contributes \$4 billion in consumer dollars as part of the \$400 billion dollar fresh food industry
 - Implementing new local growing facilities capture the niche

Change for the better

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Just these items saved
450 gallons of water
were produced on less
than 1 ft² of land.



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WOW!

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So... how did you do it?

It's a simple system of existing technologies in a new package called controlled environment agriculture centers. These CEAC's can be placed anywhere.

Some of the first were placed in Abu Dhabi several decades ago and we now have a prototype for Mars

A look at CEAC's

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- The winning ticket for these structures is that they use a mix of concentrated agriculture growing techniques with hydroponic irrigation systems.
- This combination in an environment controlled for temperature, humidity, light, Co2 and other factors produces much more in less space with less resources.

Lets compare

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Traditional field grown methods

- ❑ Produces 1.2 lbs/ft² of (tomatoes). Consumes 1.2M gallons/acre
- ❑ Produce is seasonal and either imported or high priced organic

CEAC

- ❑ Produces 12-14 lbs ft² of tomatoes. Consumes 365,000 gallons/acre
- ❑ Local Produce is grown year round with lower shipping costs and fuel impact

Lettuce

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Traditional field grown

- ❑ Takes about 90 days from seed to harvest
- ❑ Consumes 60 gallons of water per head
- ❑ Uses 300 lbs fertilizer/acre

CEAC

- ❑ Takes 21-25 days
- ❑ Consumes 1 gallon per head
- ❑ Uses 20 lbs fertilizer/acre

Monetary return in water use

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- For every gallon of water used to irrigate cotton, an average of \$0.001 goes to the grower. For every gallon of water used to irrigate hydroponic tomatoes. \$0.300 goes to the grower. Additionally the cost of nutrients is decreased bringing the rate to <\$0.30 (University of Arizona Introduction to controlled Environment Hydroponics.)
- For every gallon of water used in field grown lettuce production the grower gets \$0.004. For each gallon in hydroponic floating lettuce systems the grower gets \$0.252

The ripple effect

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- The average piece of produce travels over 1600 miles from farm to plate.
- Lettuce and other fresh cut commodities require cooling- coolers are expensive and huge energy consumers because produce is grown elsewhere
- Intense use of fertilizers in traditional production creates huge chemical manufacturing and other B2B industries. (John Deere)

Continued ripple effect

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- CEAC can be located on in urban areas needing only 2.5 acres to provide for metro area.
 - ▣ That means Less emissions from trucks, tractors, wells etc
- Less particulate matter in the air from no plow farming means improved air quality
- Less fertilizers used and almost zero runoff increases groundwater quality and wetlands

Solutions

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- ❑ Controlled environment “greenhouses” can be placed worldwide
- ❑ They can produce more food in less space with less resources
- ❑ The product is high quality
- ❑ They eliminate the need for multiple vendors during the year
- ❑ Employs stable year round work force and reduces the seasonal labor requirements.

Sustainability

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- Controlled environment growing methods can meet the worlds growing population
- They can substantially reduce the demand on the fresh water supply
- They have a significant impact on direct fuel use and a considerable impact on manufactured B2B farm goods
- food produced is healthier, fresher and more traceable.
 - ▣ Less risk of contaminants

Technology

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- What is this technology?
 - ▣ Combination of hydroponic technology and controlled environment structures
- Who developed it?
 - ▣ Hydroponics has been in use for over 2000 years
- Where is it being used?
 - ▣ All continents including the south pole growth chamber and even Mars prototype
- How can this system be incorporated in existing areas or added to new planning developments-
 - ▣ Lets start the discussion

Thank You!

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<http://news.bbc.co.uk/2/hi/science/nature/8192628.stm>

http://www.globalchange.umich.edu/globalchange2/current/lectures/food_supply/food.htm

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