

Indoor Agriculture & The Smart City

Fueling a Robust Food System for California

Andrew Blume
Indoor Agriculture Entrepreneur
BlueHouse



What Type Of Water Will Help
Plants Grow Best?

Tap
Recycled
Polluted
Distilled
Bottled
Rain



Andrew Blume's Journal
March 30, 2000



You give us water, we will give you good life.
That is our promise to you.

MWD's Water Quality Checklist-

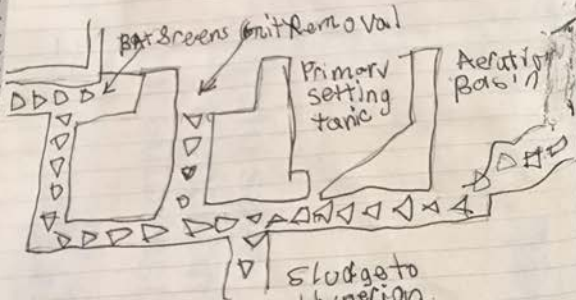
Help support Gov. Davis' effort to

eliminate

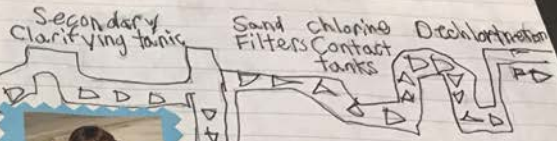
MTBE by the first quarter of 2000.

MTBE is a gasoline additive that makes water
undrinkable





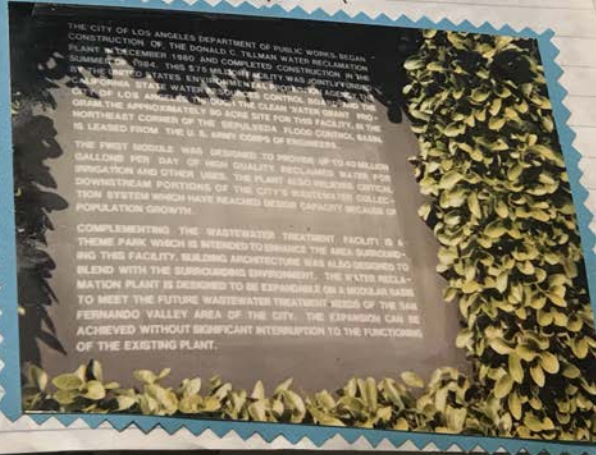
Sludge to Hyperion treatment plant for Solids processing



Backwash water to Hyperion treatment plant



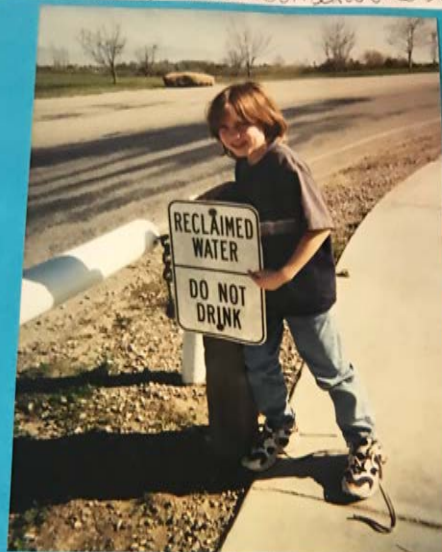
Recycled



Collecting reclaimed water.

F
E
A.

6



2019/03/02



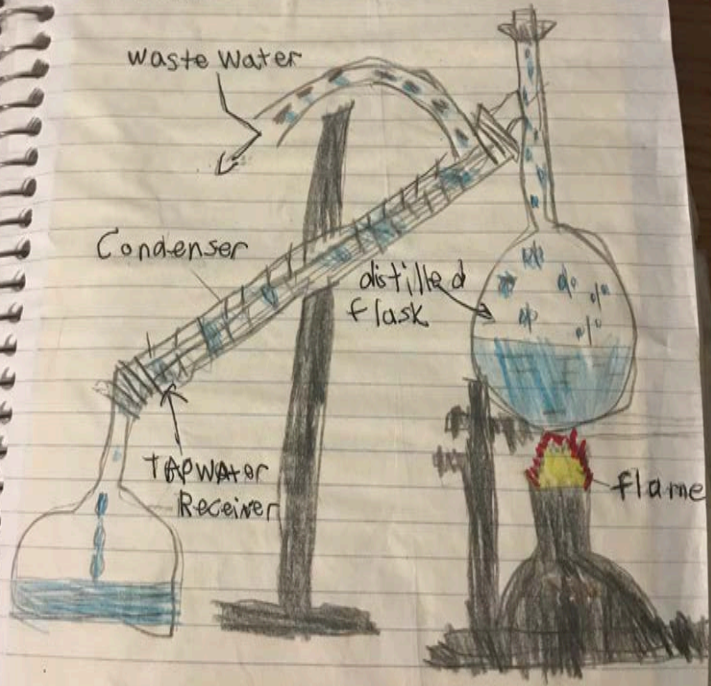


Collecting Polluted Water



Feb. 19

Water being Distilled



and recycled water





My Background



Association for
Vertical Farming



AGRITECTURE
CONSULTING

LACI



- Former North America Regional Manager
- Former Business Development Director
- Former Food & Agriculture Cluster Lead
- Director of Business Development

Global Agriculture Problems



Rapid Population Growth & Urbanization

Expected 10 billion people globally and 75% urban population by 2050
Increasing demand for food by 70% (United Nations FAO, 2017)



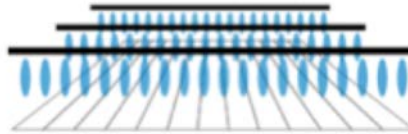
Food Transport

Leads to significant food waste & greenhouse gas emissions



Pesticide Use

Leads to 75% of world polluted water



Freshwater Use

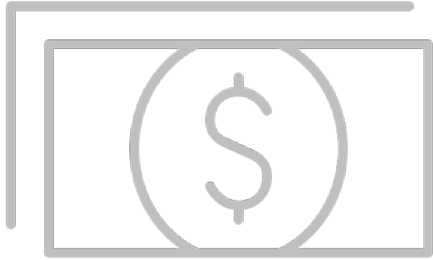
80% of all freshwater is used in agriculture



Global Warming

Threatens global food supply
Accelerate Soil Erosion

CEA Farming Benefits



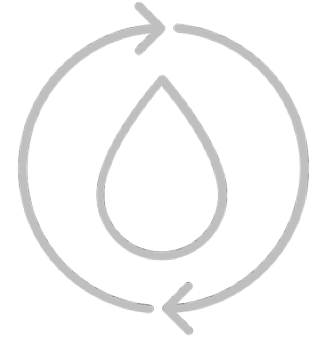
Economic

- Year-Round Production Independent of:
 - Climate,
 - Region
 - Weather Events
 - Pest Outbreaks
- 2 to 3x Faster Growth
- Efficient Land Use



Food Quality

- Locally Grown, Fresher Greens for Consumer
- No Heavy Metals or Herbicides
- Limited or No Pesticide
- High Vitamin and Mineral Content
- Optimized Food Safety



Environmental

- Up to 99% Less Water Used
- Less Food Waste
- Less Food Miles

VC Backed CEA Vendors:



Company	Location	Type	Amount Raised	Investors
Freight Farms	Boston	Container Farms	\$12.2 mm	Spark Capital
iUNU	Seattle	Greenhouse Machine Vision	\$6 mm	Initialized Capital, Liquid 2 Ventures, Fuel Capital, Second Avenue Partners
Motorleaf	Toronto	Sensor Controller Hardware & AI	\$1.1 mm	500 Startups, BDC Venture Capital
Agrilyst	New York	Farm Management Software	\$2 mm	Brooklyn Bridge Ventures
Illumitex	Austin	LED Lighting	\$90.8 mm	WP Global Partners
Light Polymers	San Francisco	LED Lighting	\$5 mm	TEL Venture Capital, Tsingda International Venture Capital
Agrilution	Munich	Domestic Hardware	\$2.75 mm	Tengelmann Ventures
Grove	Boston	Domestic Hardware	\$4 mm	Upfront Ventures, Tim Ferriss
Infarm	Berlin	Retail Hardware	\$34.1 mm	Cherry Ventures
Farmshelf	New York	Retail Hardware	\$450 k	Urban X, Sansiri
Square Roots	New York	Farm / Education	\$5.4 mm	Kimbal Musk, Collaborative Fund
Iron Ox	San Francisco	Farm Automation	\$1.5 mm	Y Combinator
Tortuga AgTech	Denver	Farm Automation	\$2.4 mm	Root Ventures
Total			\$167.7 mm	

Investment in CEA Farms:



Company	Location	Type	Size	Amount Raised	Investors
Plenty	San Francisco, Seattle	Vertical Farm	50,000 sq ft / farm	\$226 mm	Softbank, Bezo Expeditions, Schmidt Family Office, Others
Bowery	New Jersey	Vertical Farm	-	\$31 mm	Blue Apron Founder, General Catalyst, First Round Ventures, GGV Capital, others
Aerofarms	New Jersey	Vertical Farm	69,000 sq ft	\$142.9 mm	Goldman Sachs, IKEA, Crown Prince of Dubai, others
Freshbox Farms	Boston	Vertical Farm	~15 shipping containers	-	Henkel
Green Spirit Farms	Michigan	Vertical Farm	-	-	Karlani Capital
Shenandoah Growers	Virginia	Greenhouse	Large	\$8 mm	Advantage Capital Agribusiness Partners, S2G Ventures
Houweling's Tomatoes	California	Greenhouse	Very Large	-	
Windset Farms	California	Greenhouse	Very Large	-	
Bright Farms	Washington DC	Greenhouse	Large	\$57.9 mm	NGEN, WP Global Partners, Catalyst Investors
Edenworks	New York	Vertical Farm	Medium	\$2.3 mm	Founder.Org, Christian Tansey
Podponics (Bankrupt)	Atlanta	Shipping Container Farm	13	\$14 mm	New Ground Ventures, Raj Choudhury
Total				\$483.2 mm	

Celebrities

Joe Montana



Kimbal Musk



Zoey Deschanel



Billionaires

Eric Schmidt



Christoph Henkel



Larry Ellison







\$13.7 BN



\$200 mm

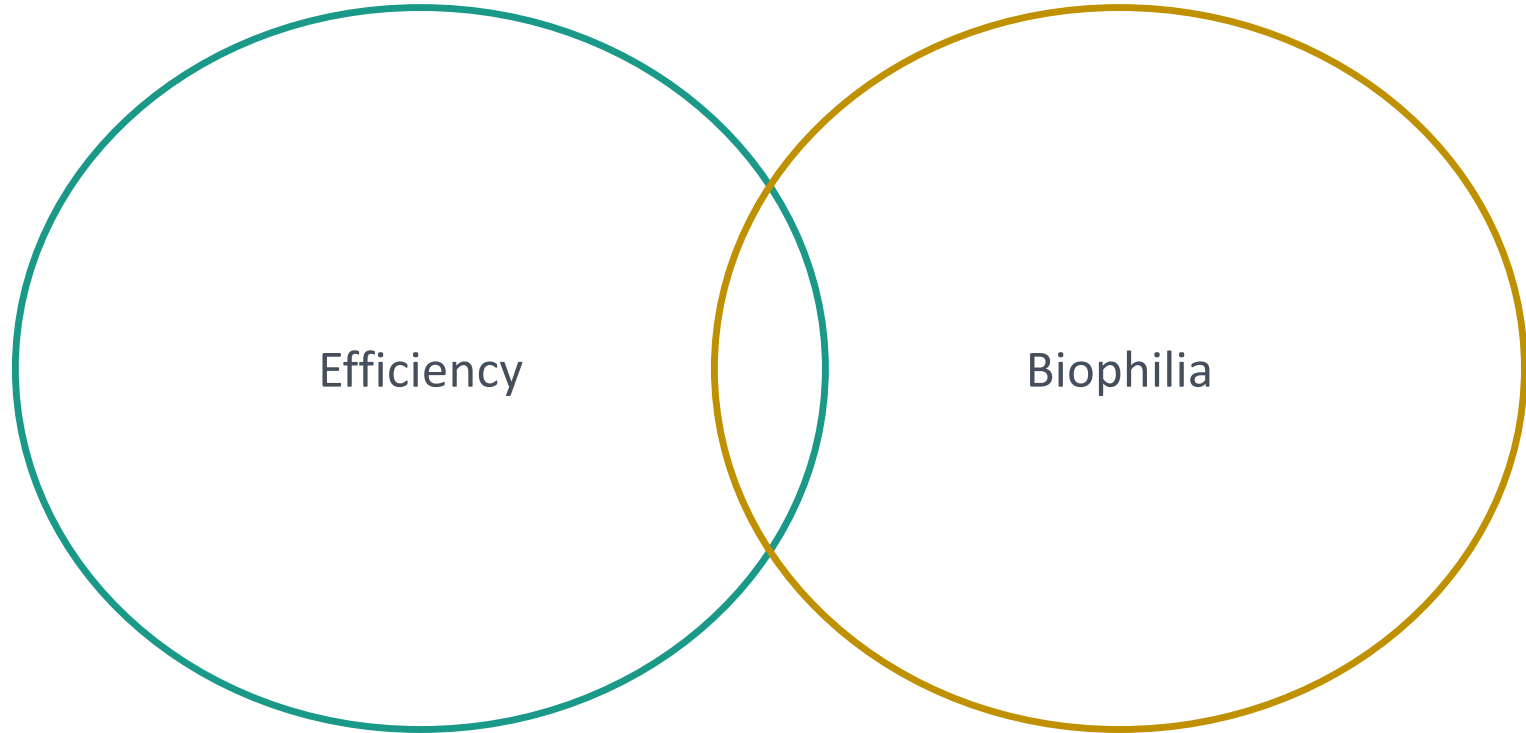
@

\$500 mm
Valuation

\$280 mm

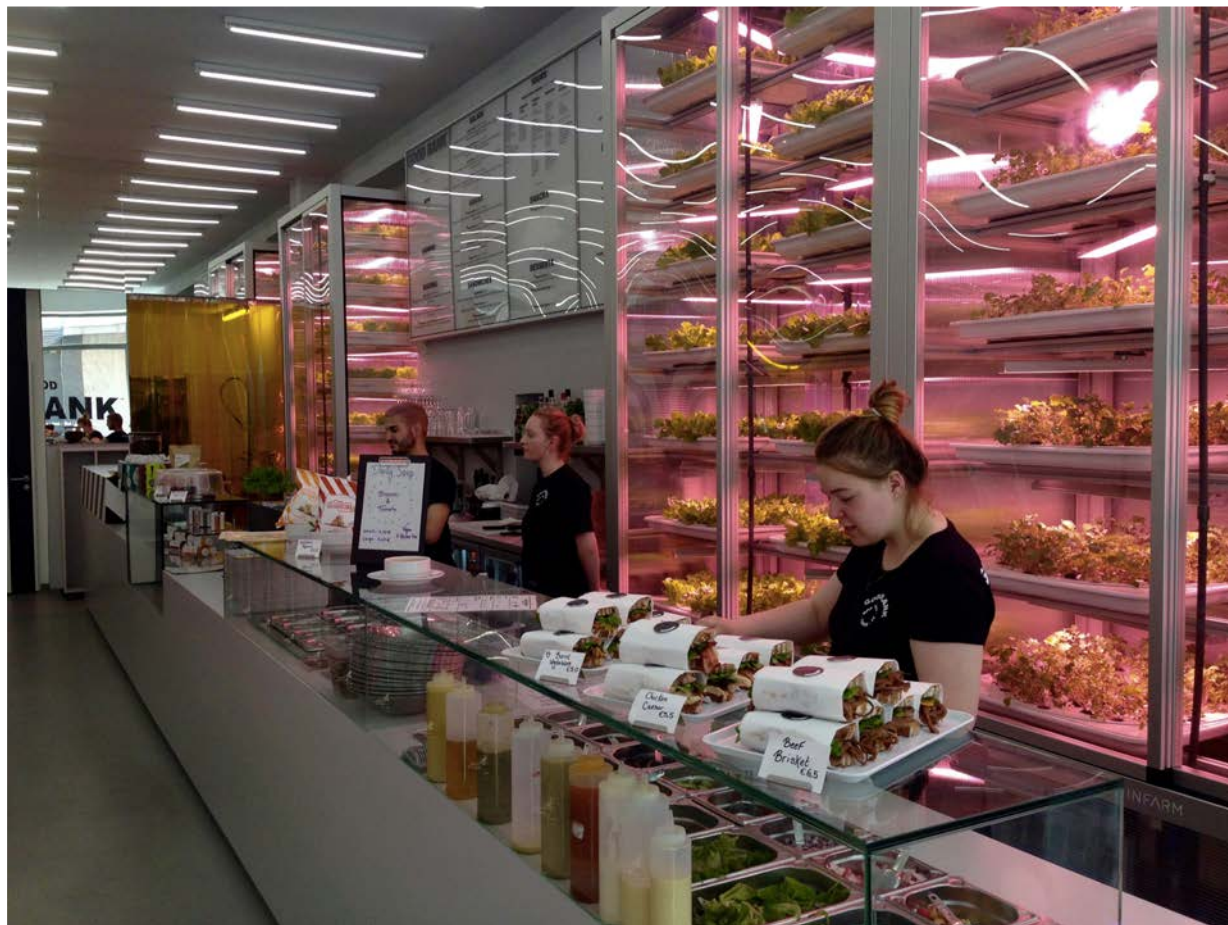














SMALLHOLD

What is Smallhold?

Smallhold is a fabrication studio and the only organic mushroom farm in Brooklyn, NY. They monitor this farm from their studio and through the latest agricultural technology, let us know when the mushrooms are ready to harvest.

How Does it Work?

Smallhold Networked Minifarms are 100% climate-controlled, and apply advanced lighting and water recirculation to these high-density growth chambers. The result? 40 times the output per square foot of a traditional farm with 96% less water usage, longer shelf-life and less packaging.

Doesn't get more local than this!

For more information, visit smallhold.com.

For questions or variety suggestions,
email: hello@smallhold.com.





SF Giants

SF 49'ers

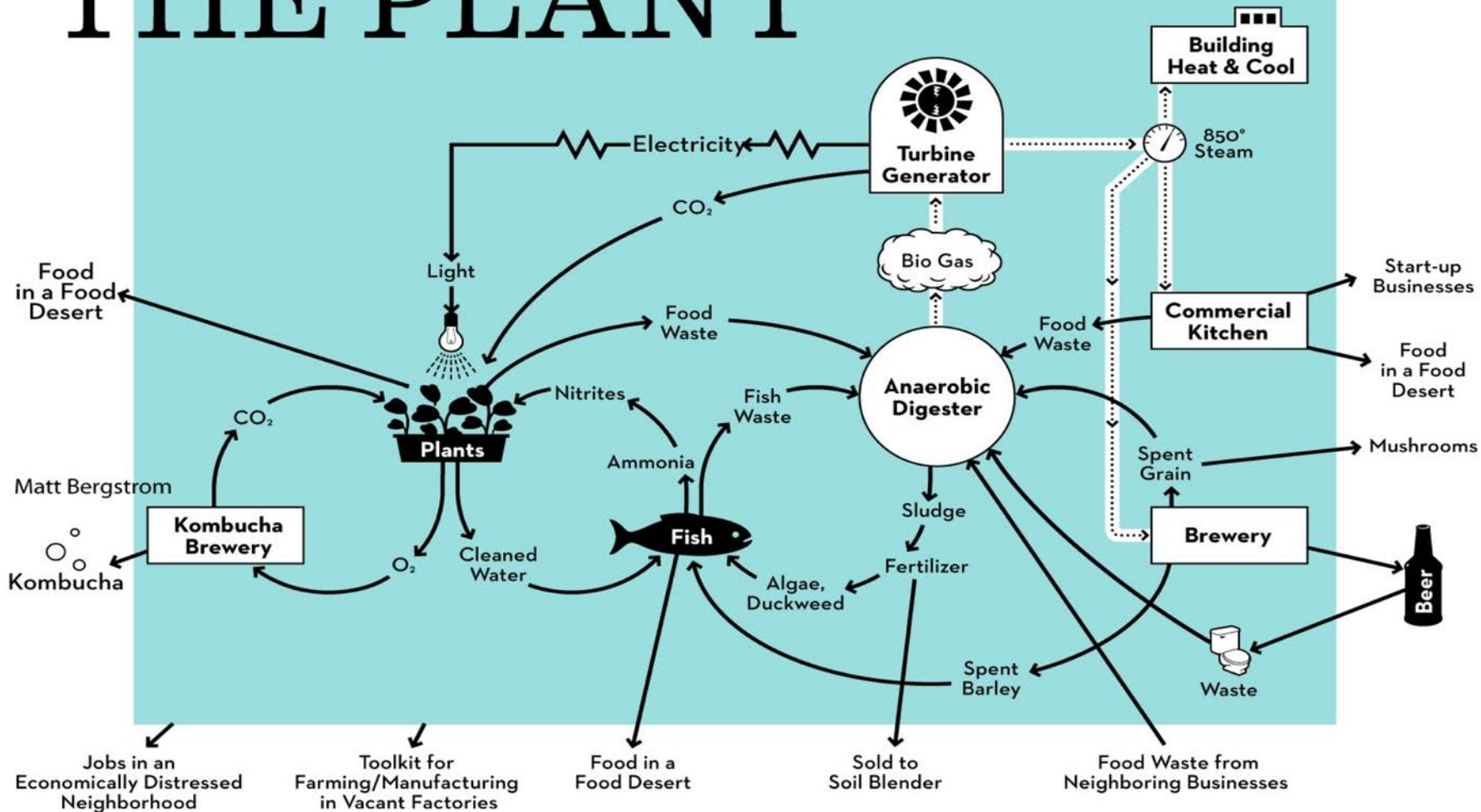
Oakland A's

LA Galaxy





THE PLANT





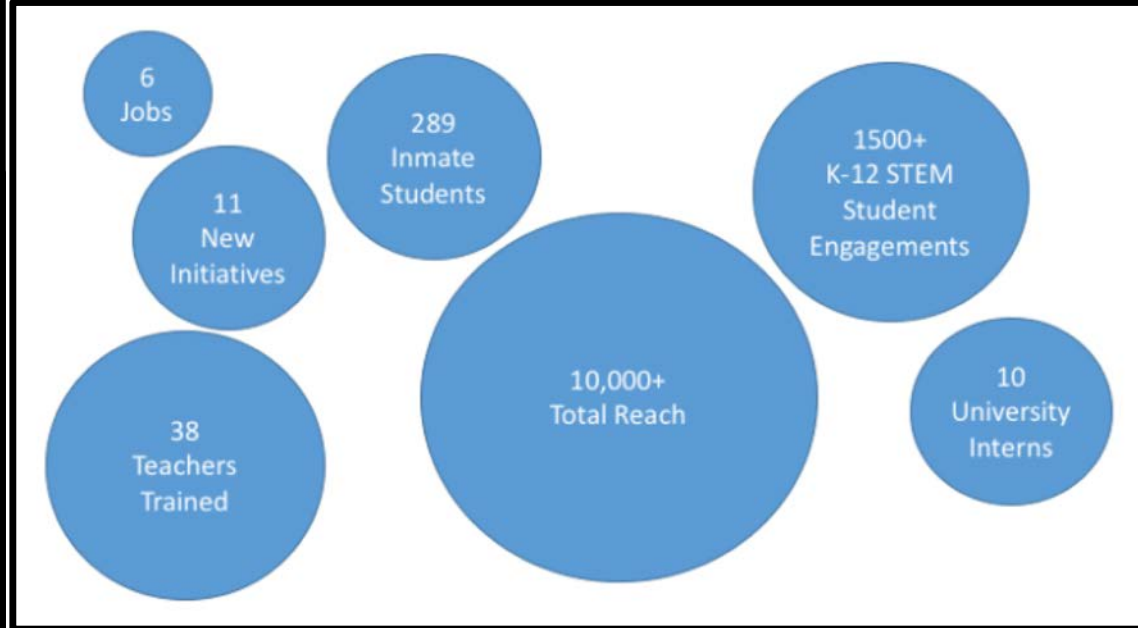
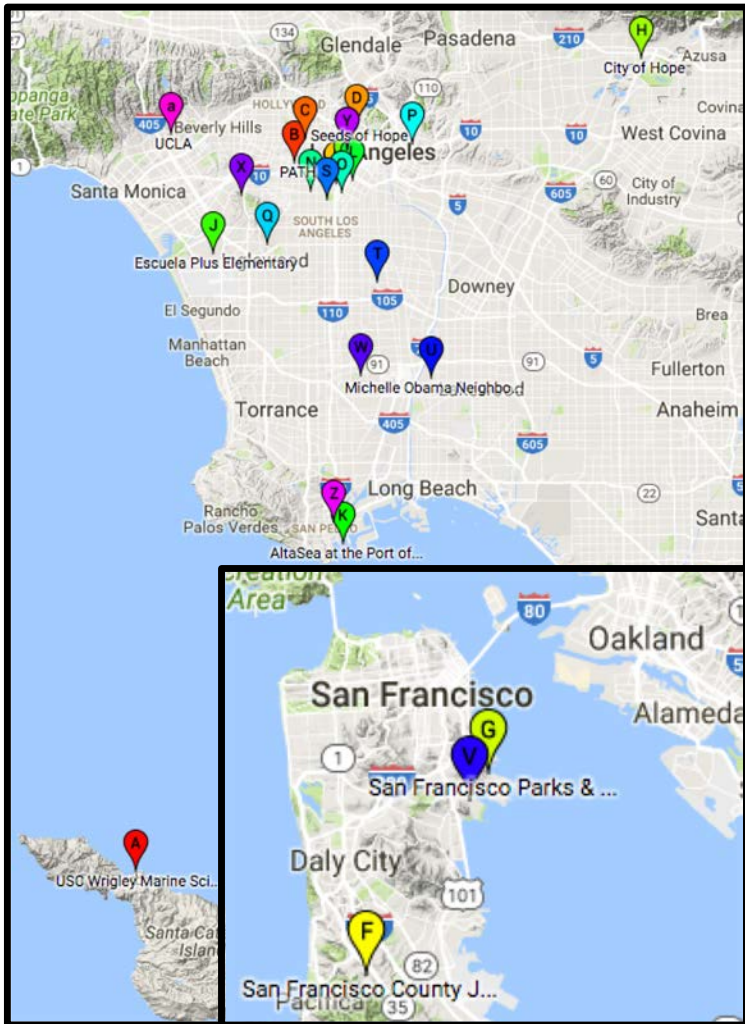


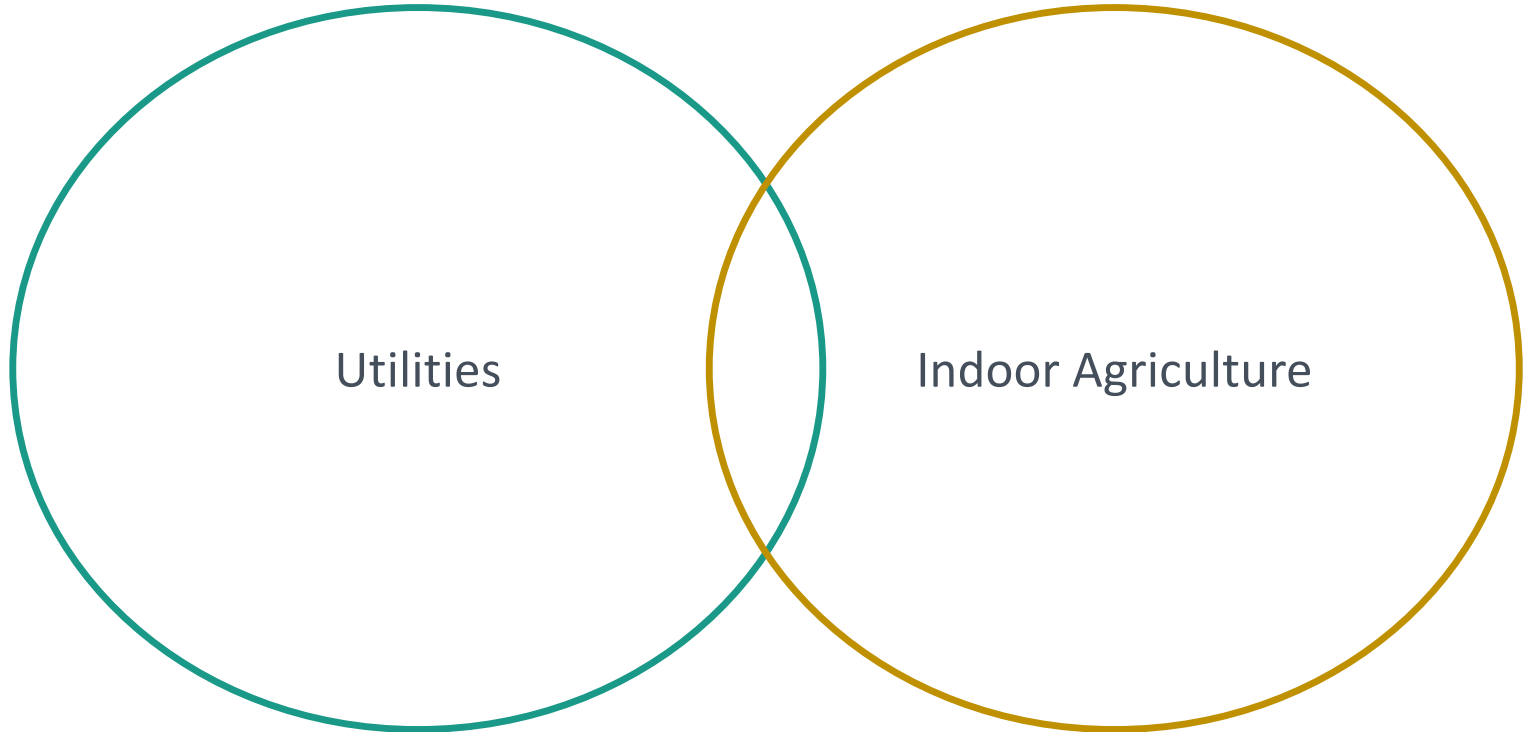


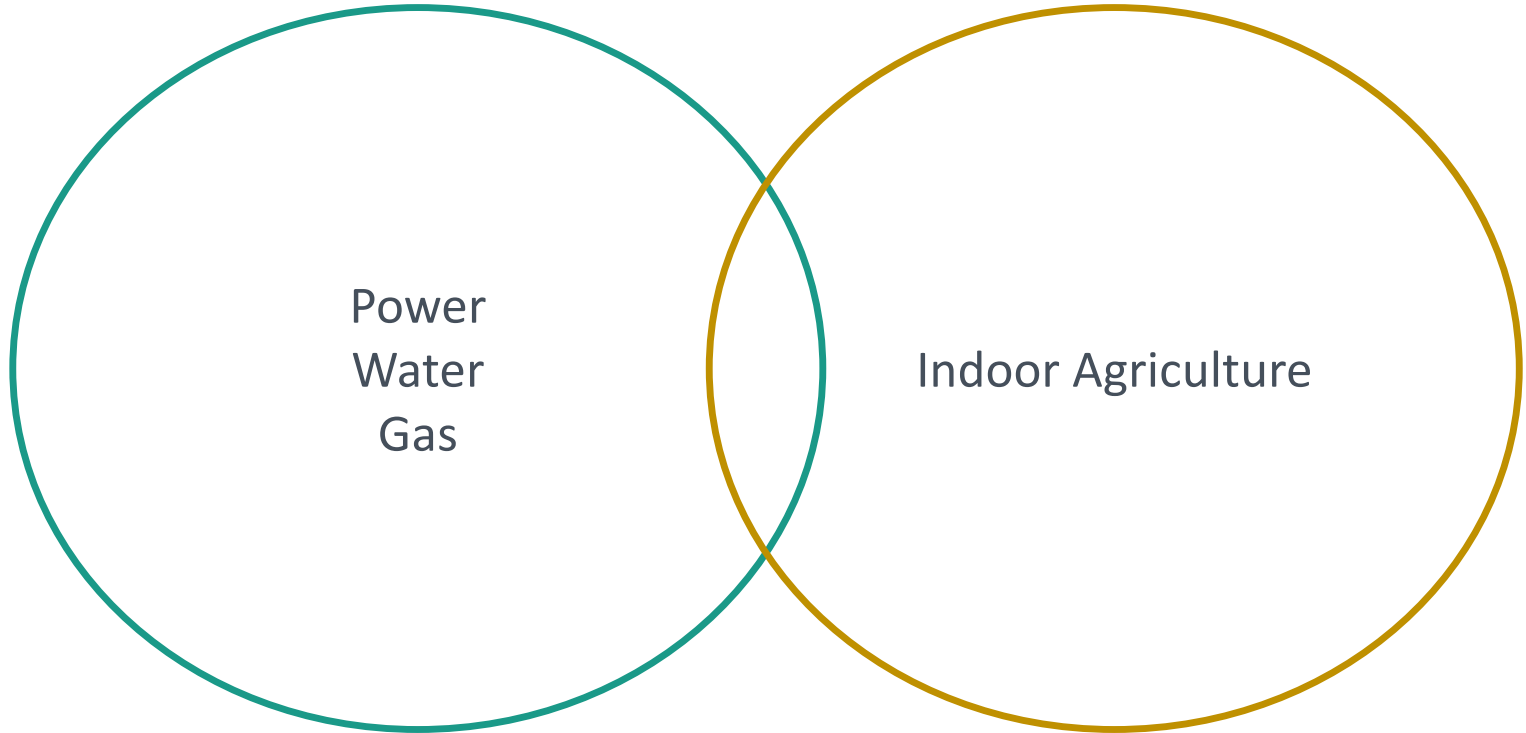




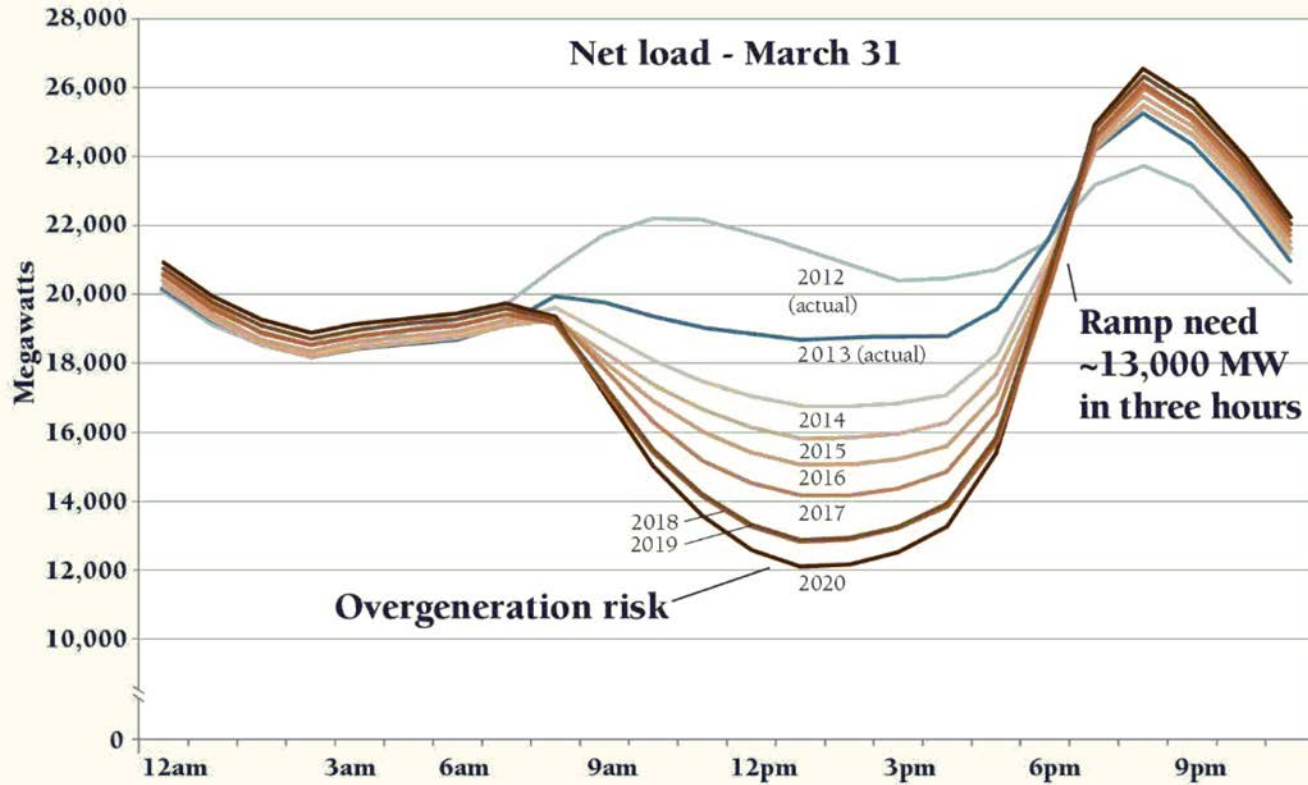
Ourfoods







California Independent System Operator Duck Curve¹







Southern Company

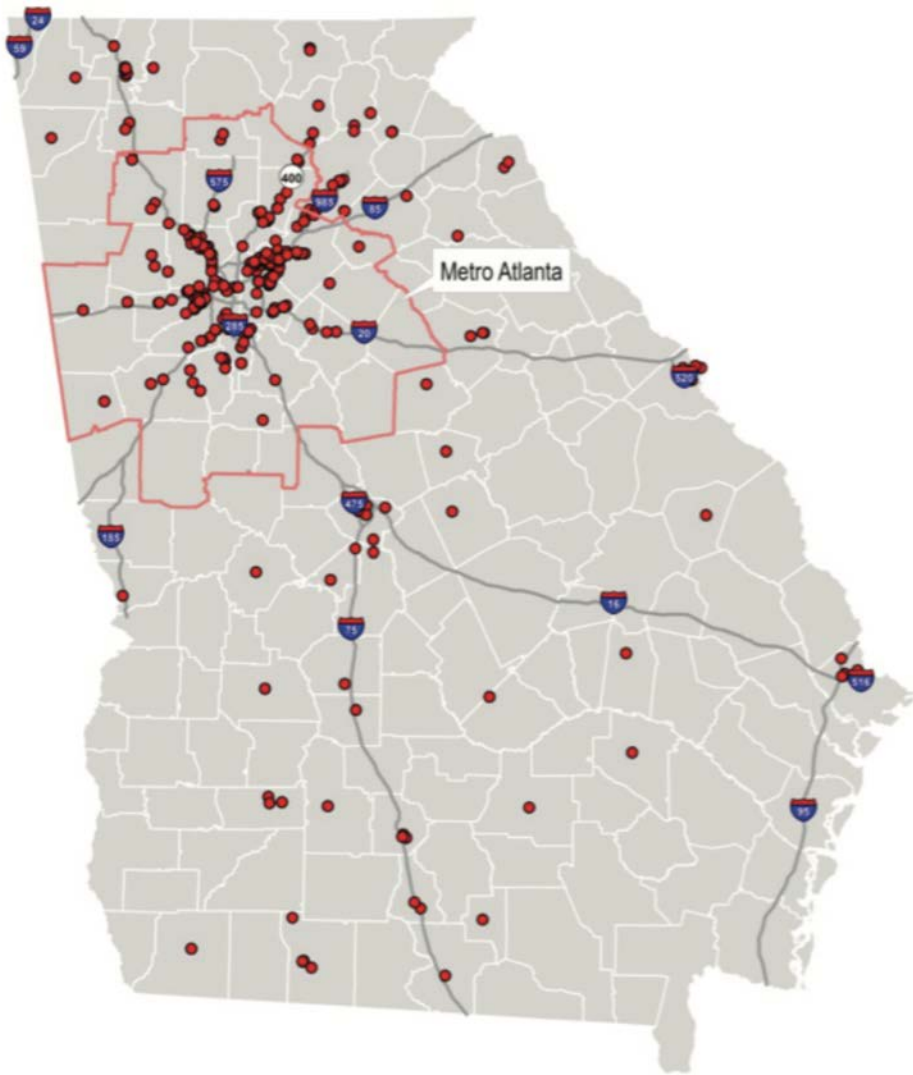
THE **AGLANTA** CONFERENCE

"SMART AG FOR SMART CITIES"

MARCH 27-28, 2018







Indoor agriculture: A comparative analysis of hydroponics and soil-based crop production



Subhrajit Saha, Ph.D.

Assistant Professor

Department of Biology, Georgia Southern University
Statesboro, GA 30460

Project Funded by the **Southern Company/Georgia Power**



Alabama
Power

Vertical Farming Graveyard



Local Garden



PodPonics



FarmedHere

Operations Snapshot – Indoor Vertical

% of Total OpEx

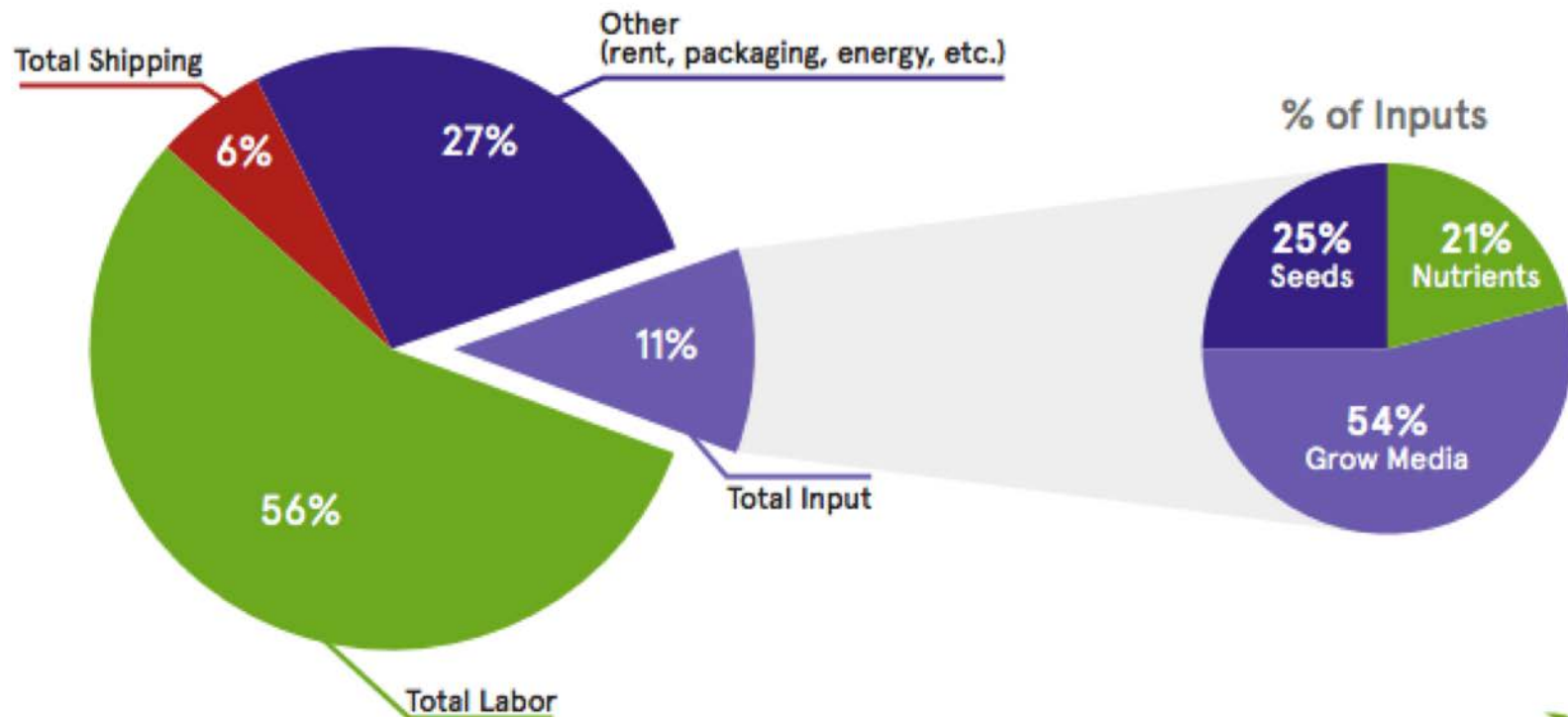




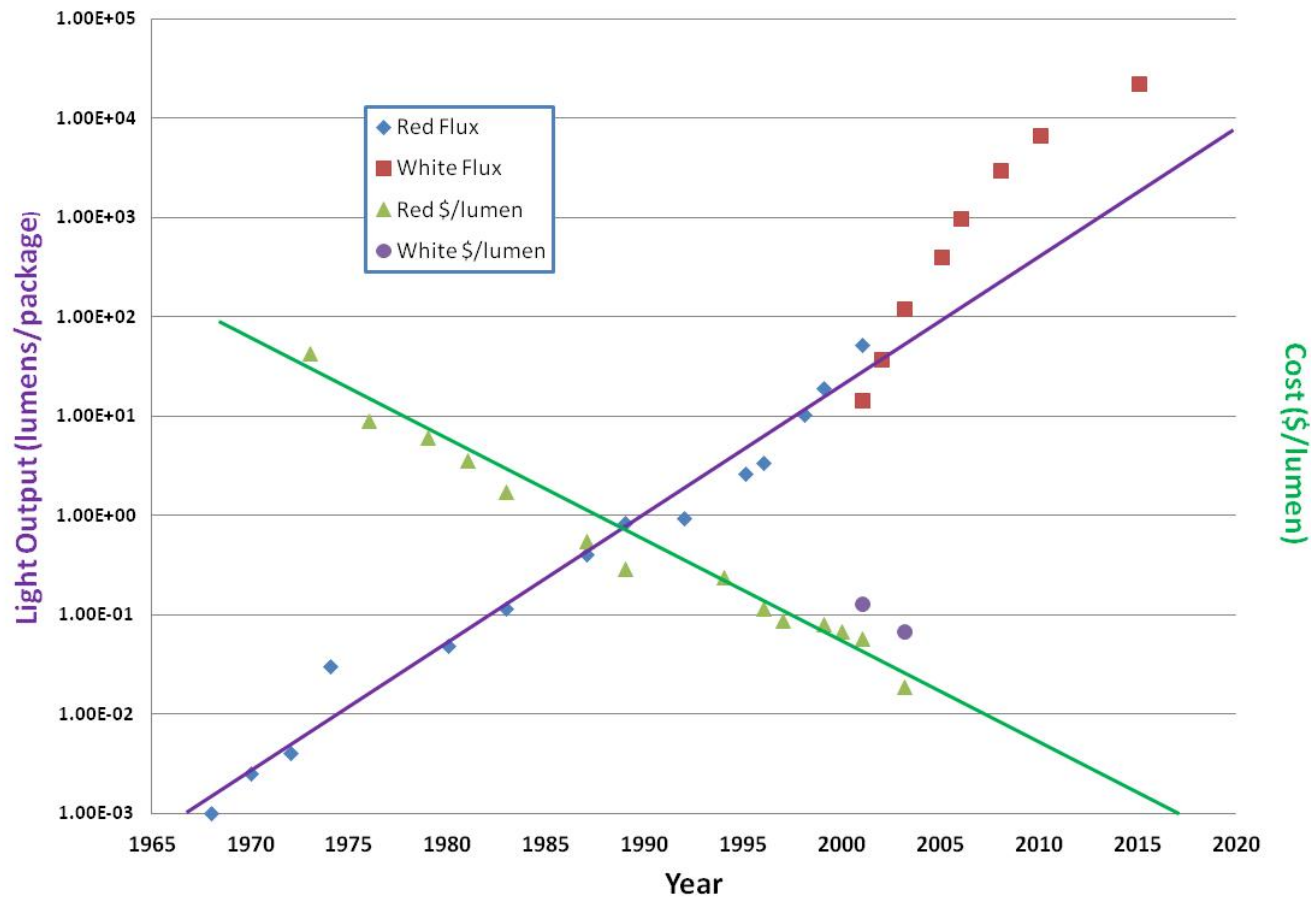
Photo Credit Iron Ox (left) and Tortuga Agtech (right)



Modeling Plants as Batteries



Haitz's Law



Vertical Farm vs Greenhouse



Energy Comparison

Greenhouse	Vertical Farm
7 – 10 Watts /sf	30 – 60 Watts /sf
20,000 sf greenhouse = 140 – 200 kW	20,000 sf cultivation area = 600 – 1,200 kW

GaryCorlett@SCE.com

Georgia Southern Greenhouse

- 540 sq ft greenhouse
- Avg daily electricity consumption is 22kWh
- 22kwh costs \$1.25
(5.6 cents per kWh)



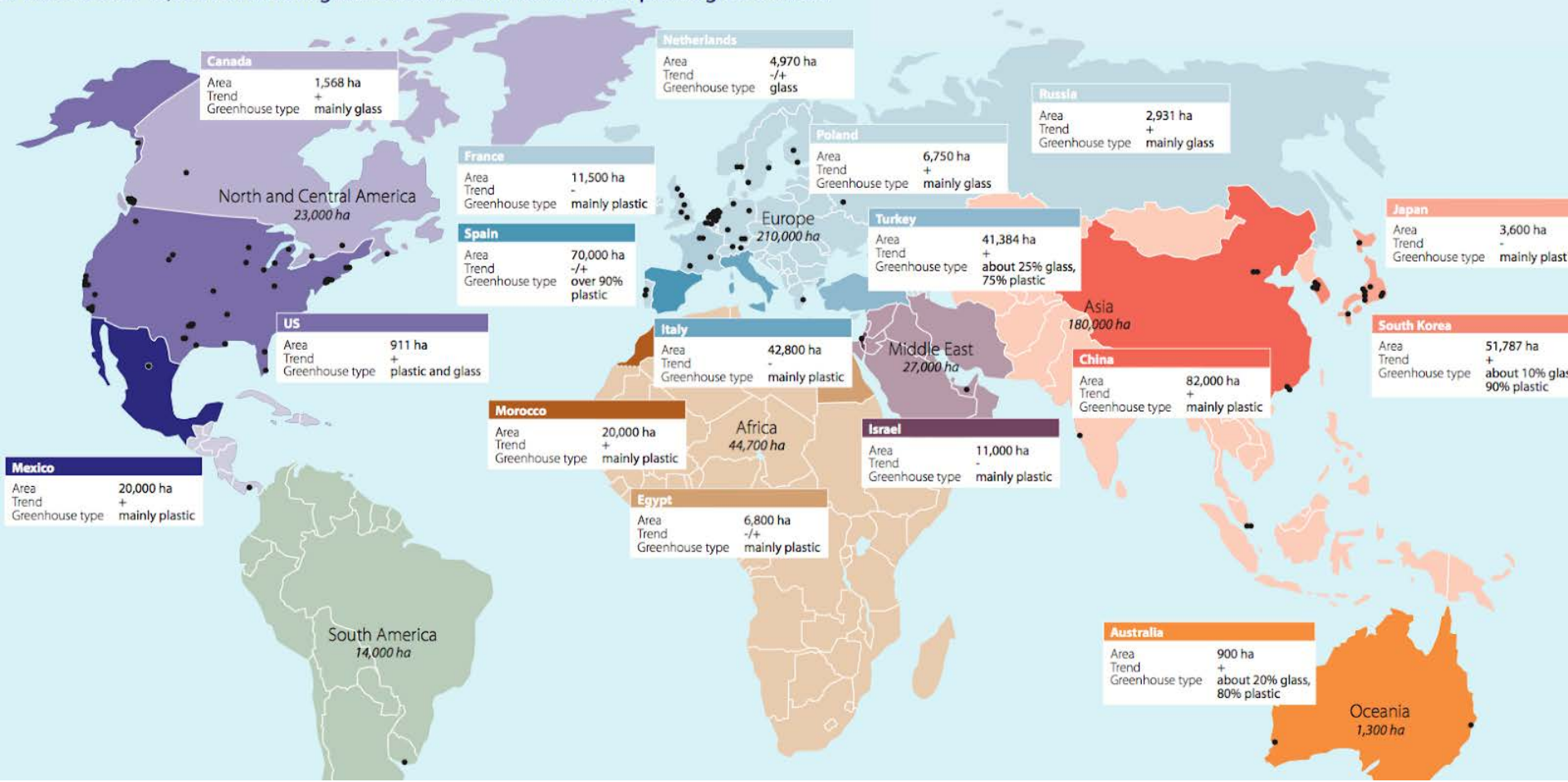


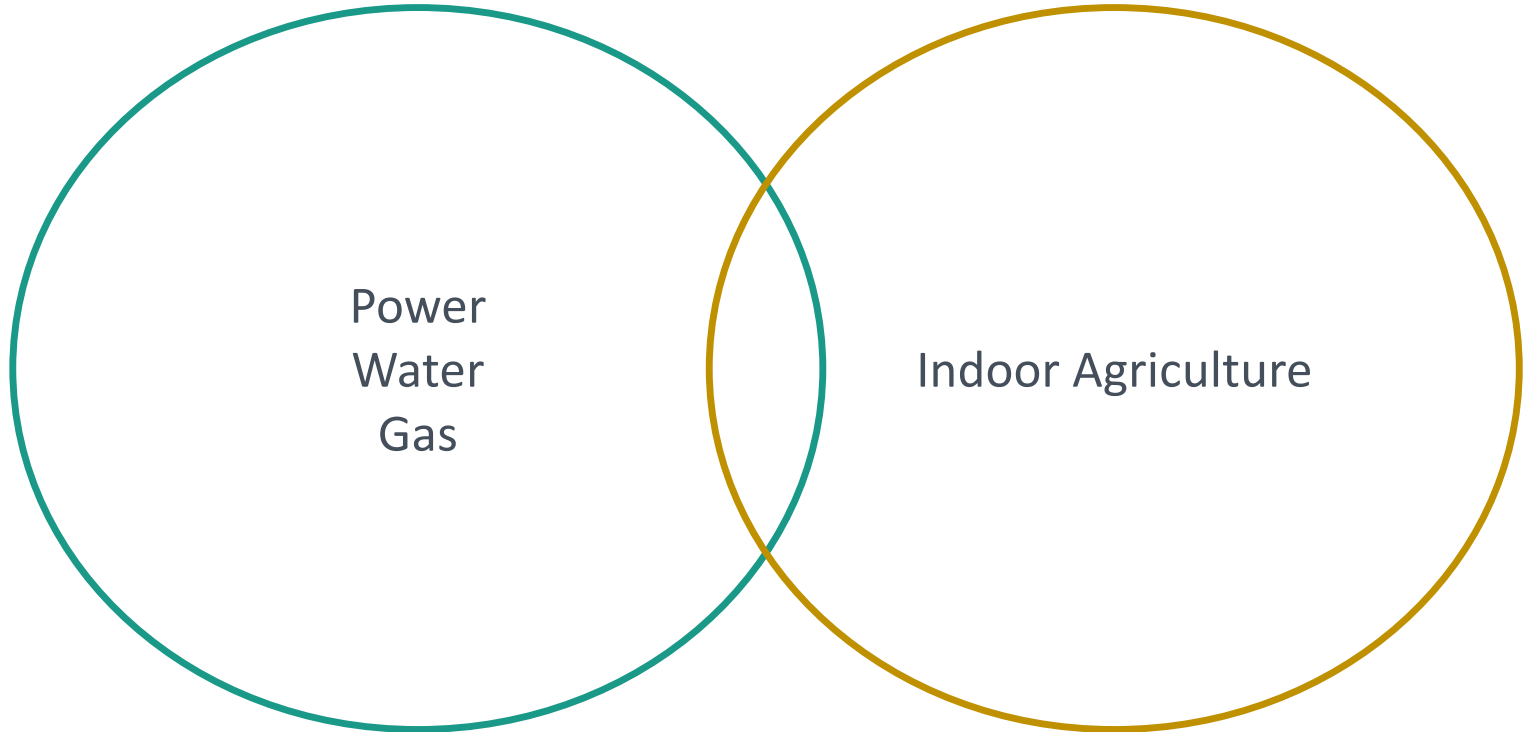
Source Soliculture



Estimated greenhouse vegetable production area and vertical farming concentrations

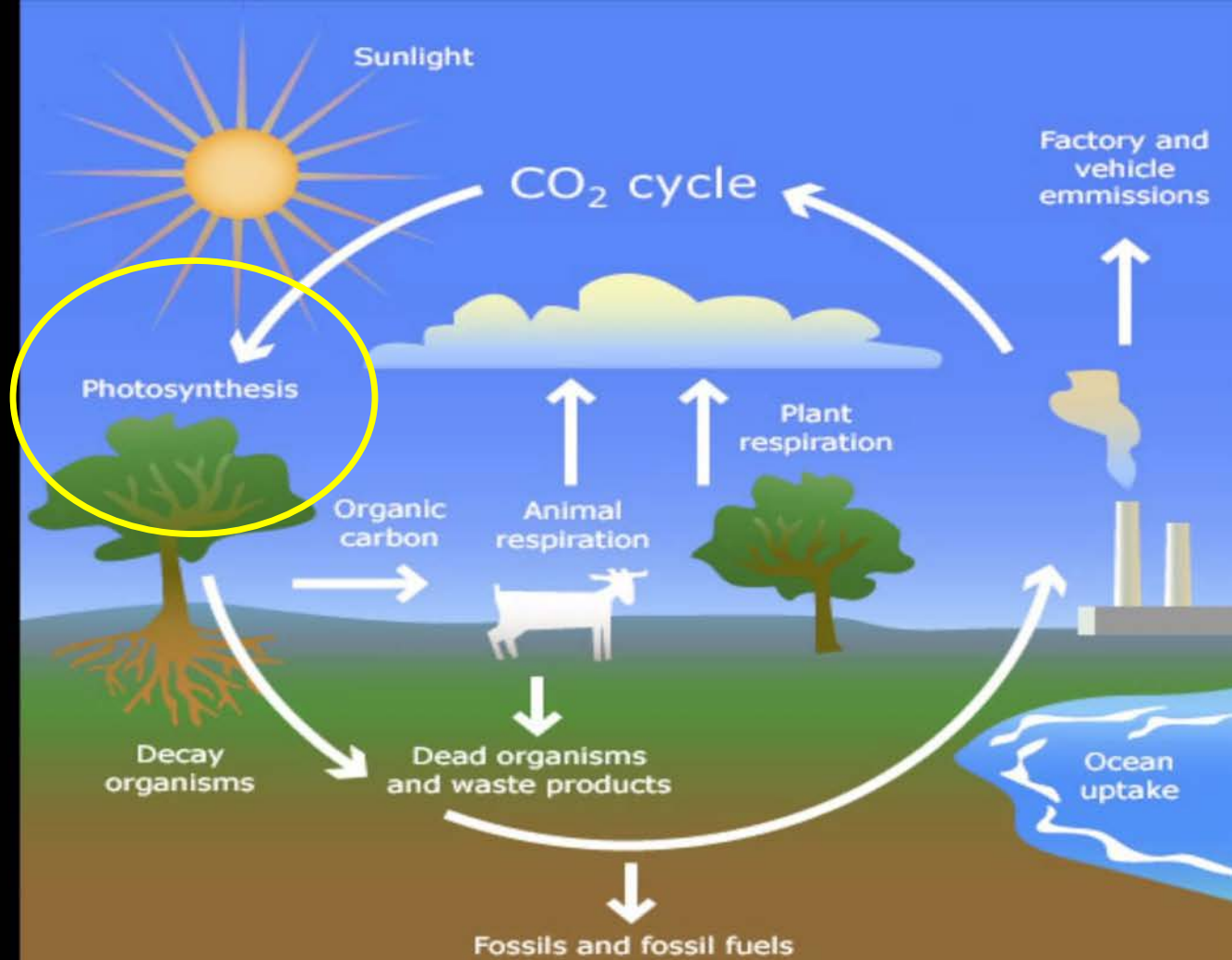
Total global area of vegetables and herbs grown in greenhouses (permanent structures) is estimated at about 500,000 hectares, of which about 40,000 hectares in glasshouses and the remainder in plastic greenhouses.





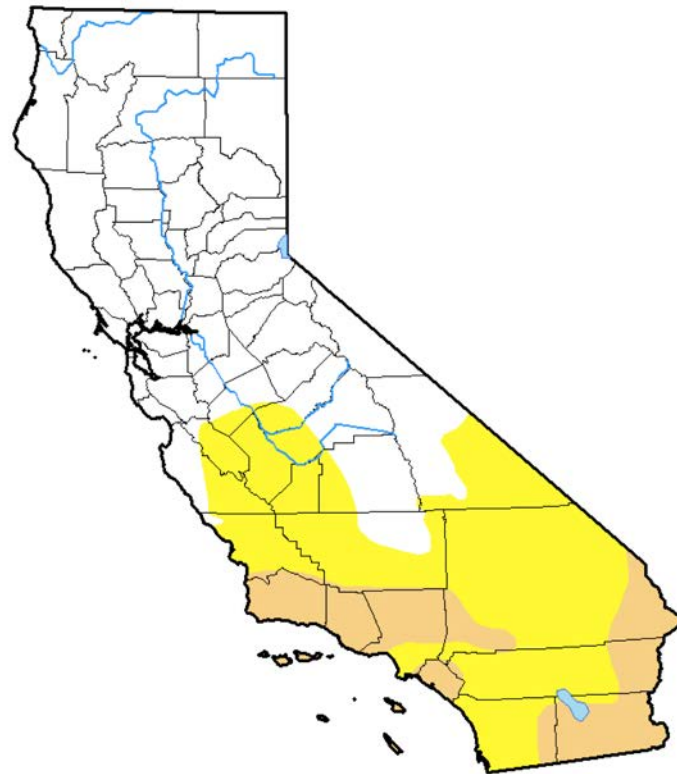
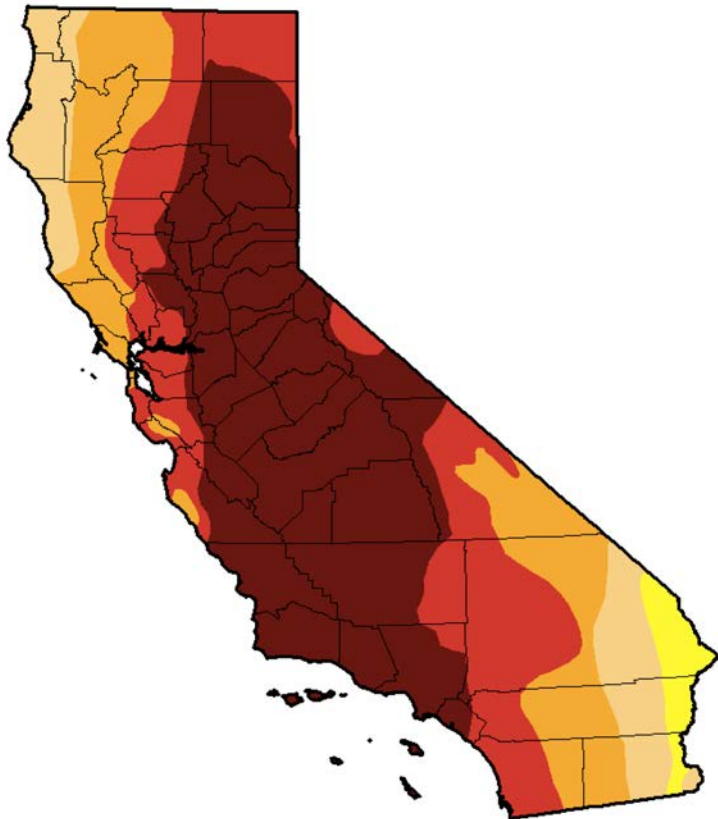
1.15
Therms
/ sq ft

13%



Jan. 2016

Jan. 2018





Hypothetical Small Scale Farm

1. 50 ppm Calcium

2. 50 ppm Phosphorus

3. 50 ppm Nitrogen



1. 65 ppm Calcium

2. 65 ppm Phosphorus

3. 20 ppm Nitrogen



Key Takeaways & Next Steps

1. Water testing rebates, smart metering, & dumping regulations.
2. Host a California AgTech Conference.
3. Support low-tech soil based urban agriculture too.
4. Urban agriculture policy position within local government.
5. Document expounding why California for AgTech.
6. Research, grants, and incentive programs.
7. Rebate programs for lights.

Image Credit: Perkins+Will



Thank you.

Andrew Blume

Indoor Agriculture Entrepreneur

BlueHouse

Andrew@bluehouse.ag

www.bluehouse.ag

