



Southern
Company

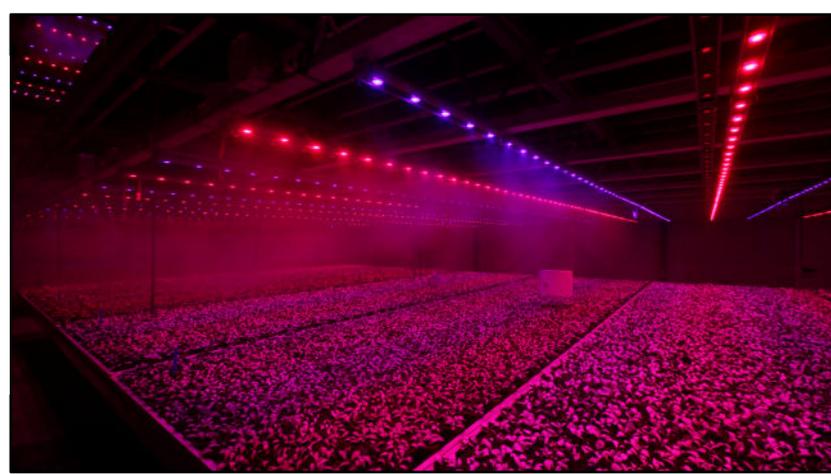
Vertical Farming Georgia Environmental Conference

Stan Vangilder
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Left: Specially colored LEDs achieve faster plant growth

Right: This lab in the Netherlands is testing blue and red LEDs



Left: FarmedHere indoor vertical farm in Bedford Park, Illinois

Right: Legal cannabis growing operation



Left: Japanese farmer grows lettuce in a former Sony semiconductor factory (pic from GE)

Right: A nutrient solution is pumped through towers; no water evaporates or is wasted.

Source of photos:
Gizmodo.com



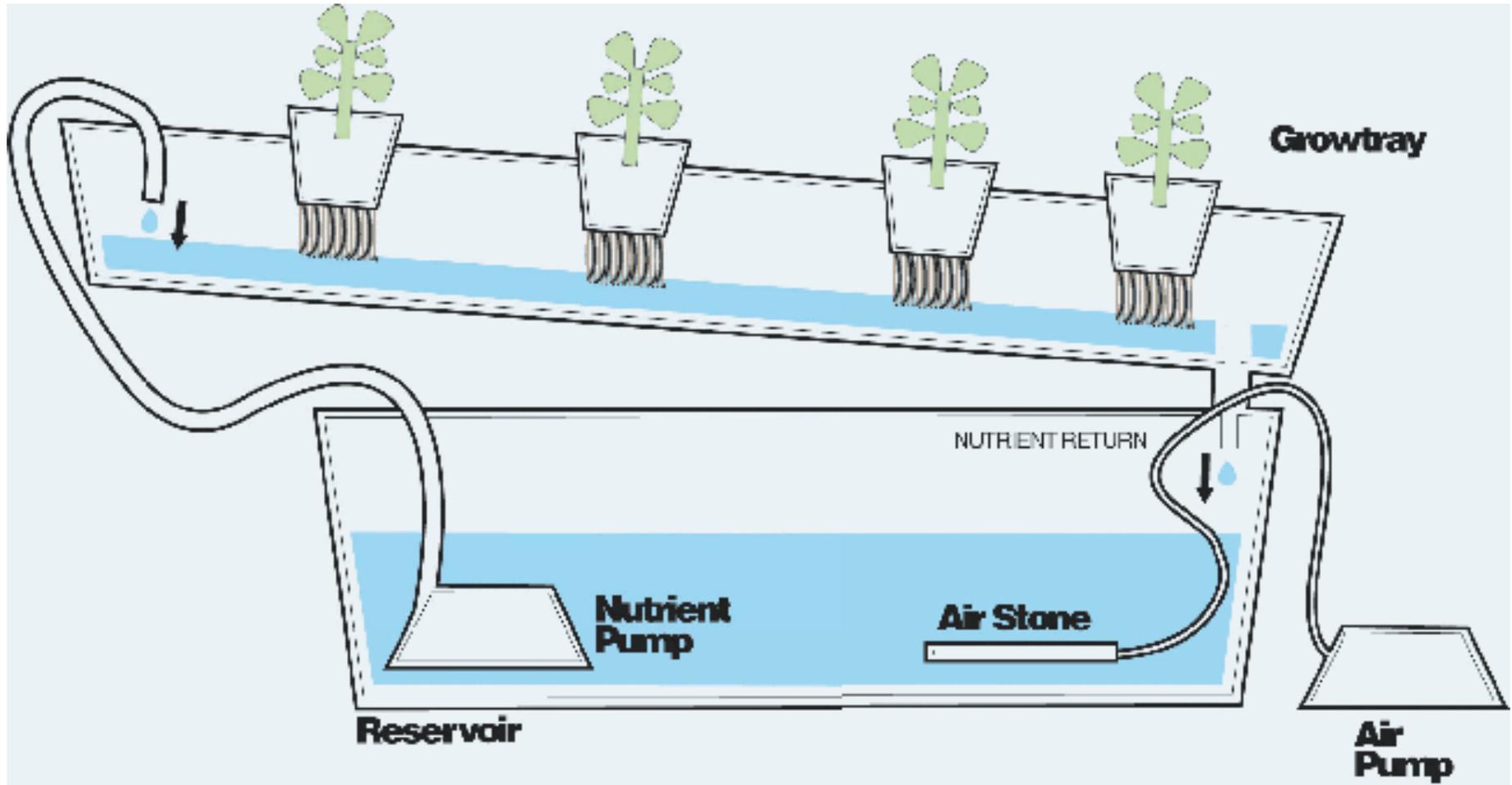
What is Indoor Agriculture?

- Definition: Growing produce/herbs/ornamentals indoors under controlled conditions using artificial light and oftentimes other technologies that allow plants to grow indoors with increased output.
- “Agriculture today is pretty much a two-dimensional operation. We need to figure out how to do it in the third dimension” -- J. Michael Gould, director of Texas A&M’s AgriLife Research and Extension Center.
- Various names for / subsets of indoor farming:
 - Indoor agriculture (we will use this term throughout this report)
 - Urban agriculture
 - Controlled-environment agriculture
 - Vertical farming
 - Building integrated agriculture
 - Hydroponics – use water and a non-soil growing medium to provide plants with nutrients.
 - Many different civilizations have used hydroponic growing techniques throughout history.
 - Aquaponics – plants are grown on small rafts floating in water filled with nutrients that come from waste produced by fish in a separate tank.
 - Aeroponics – roots are hanging in the air where they can be sprayed with water and nutrients.
- Indoor agriculture is more conducive to compact produce.
 - Greens, tomatoes, peppers, cucumbers, herbs and strawberries.
 - Some flowers/ornamental plants are also appropriate for indoor agriculture.

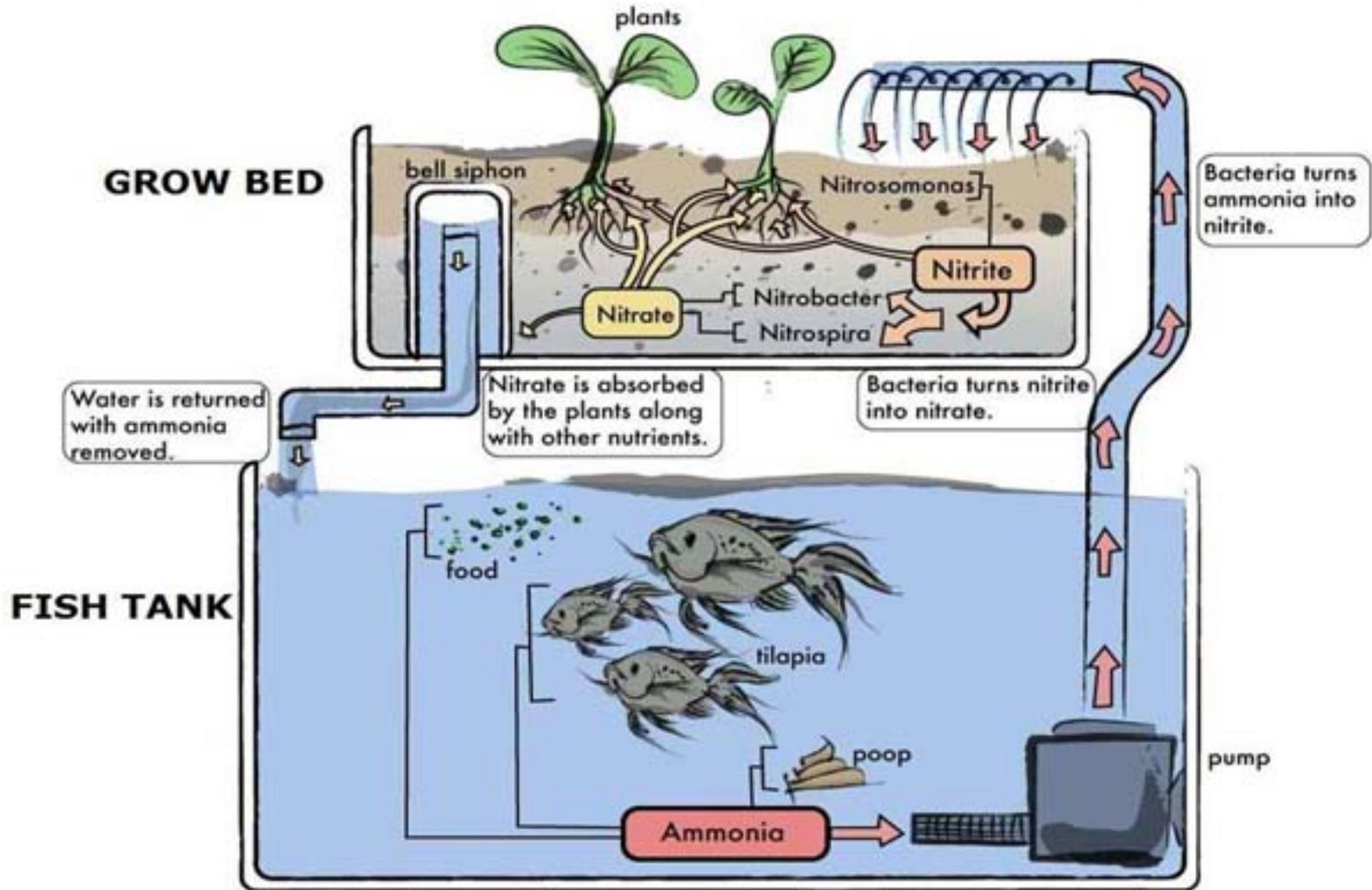


Indoor ag takes traditional farming and turns it sideways. Going from 2 to 3 dimensions allows for much greater crop yield per square foot.

Hydroponics



Aquaponics



Environmental Advantages of Indoor Agriculture

- Uses 90%+ less water than traditional agriculture
- Uses no pesticides or herbicides
- Uses 70%+ less fertilizer
- Eliminates agricultural runoff
- Reduces carbon footprint:
 - No tractors, plows, etc - minimal shipping of product – reduced spoilage – increased freshness
- Much more efficient use of land:
 - Can get 8 – 12 more harvests per year; 1 indoor acre is equivalent to 4 - 20 outdoor acres or more, depending upon the crop, Year-round crop production
- Allows food to be grown and consumed in areas that cannot support crops
- No crop failures due to droughts, floods, pests, etc.
- Can convert abandoned urban properties into food production centers
- Potential for job creation in depressed areas.

Ted Talk / YouTube

<https://www.youtube.com/watch?v=xRdsCu5CcQ8>

Philips GreenPower LED Lighting

https://www.youtube.com/watch?v=Uh_zJ09jUc0

PBS Future of Farming

<https://www.youtube.com/watch?v=ILzWmw53Wwo>

TEDx Talk Indoor Agriculture “MythBusters”

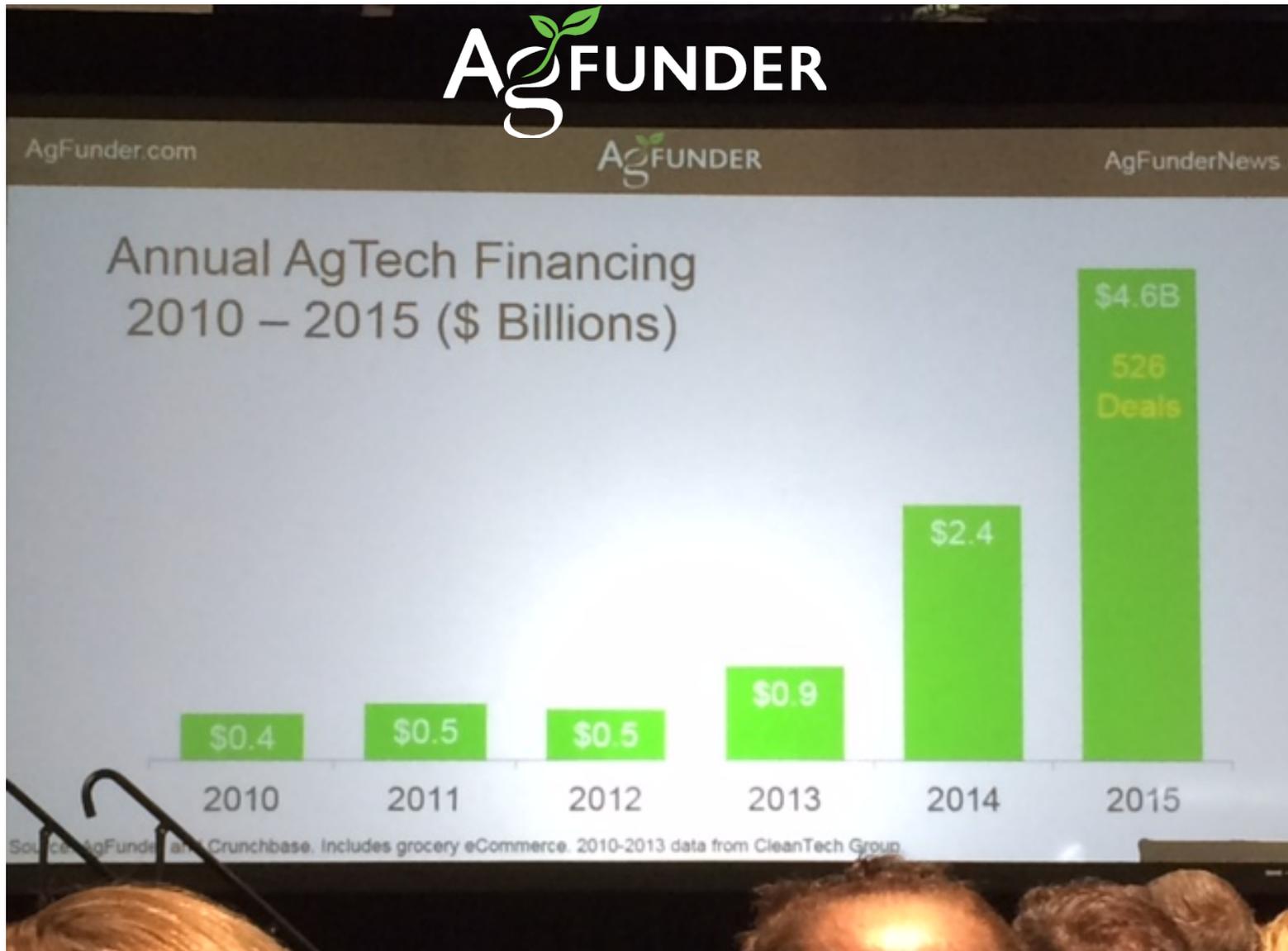
Why Indoor Agriculture for Southern Company?

- Aligns with our objectives for community and economic development, sales growth, branding, corporate relations, education, and promotion of healthy lifestyle.
- Heavily incented, abandoned industrial buildings exist throughout our territory. Many of these could be repurposed into productive indoor farms, recapturing lost jobs and revenue.
- Electrical load similar to data centers – heavy demand and flat load shape – but consumption is more flexible. Indoor ag customers can take advantage of off-peak, curtailable, interruptible, or other incentive rates.
- Demand for locally sourced, sustainably produced food is increasing locally and nationally. Examples:
 - Atlanta Commitment: <http://tinyurl.com/q8utmge>
 - Walmart: <http://tinyurl.com/p7j3jgo>
 - Campus Commitment: <http://tinyurl.com/qeruobd>

Why Georgia for Indoor Agriculture?

- Growing population with strong buying power
- Excellent access to markets / logistics
- Low customized power rates
- Affordable real estate
- Market penetration for local leafy greens in Georgia is near zero

Indoor Ag Con



M. Agnes Jones Elementary School Aquaponics Lab (April, 2016)



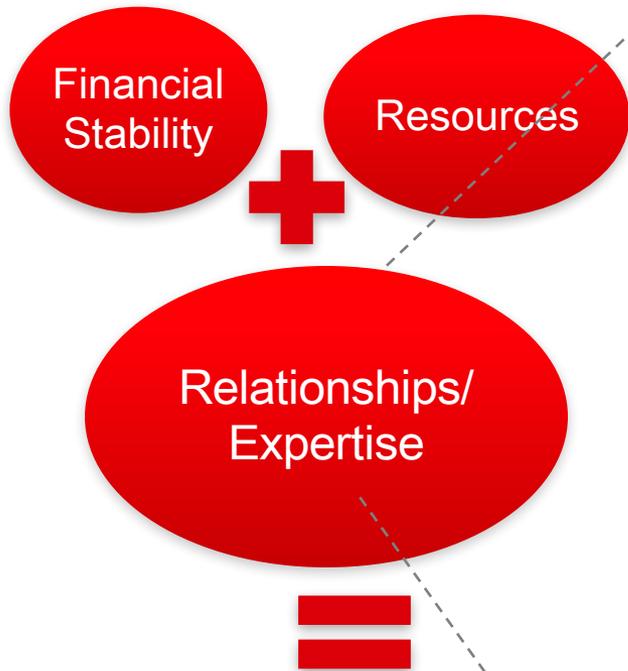
“Zip Grow” Towers (April, 2016)



Confidential & Proprietary

Southern's Value Contribution

Southern can help indoor ag business in a number of ways



Internal Services <ul style="list-style-type: none">• Industry and overall economic forecasting• Demographic/workforce data, research and projections• Award-winning internal R&D team• Energy Innovation Center	Federal and State <ul style="list-style-type: none">• State and local leadership (i.e. city councils, legislators, Chamber of Commerce, state agencies, county commissions)• Educational and research institutions (research at Ga Tech, high school science curriculum)• Incentives for various industries• Environmental agencies and regulations
Industry Expertise <ul style="list-style-type: none">• Agribusiness leadership• Centers of innovation• Community and economic development professionals across the region• National Accounts (major grocers, restaurants, etc.)• Food processing companies, methods, and equipment	Utility Leverage <ul style="list-style-type: none">• Distributed generation, load management, backup power (PowerSecure)• Proactive electricity rate design• Real estate and land use

Strategies to Capture the Indoor Ag Market

1. Identify and contact existing and potential indoor agriculture growers and markets to determine growth options inside the Southern Company retail footprint.
2. Pursue listing of vacant warehouses, buildings, locations, etc. that would meet Indoor Agriculture specifications throughout the Southern Company footprint
3. Identify all applicable state, federal, and local incentives available to support indoor agriculture industry within the Southern Company footprint
4. Provide useful guidance to persons wanting to get into the indoor agriculture business and succeed as a grower
5. Explore new rate options for Indoor Agriculture
6. Approach indoor agriculture from the plant-based biopharmaceuticals
7. Develop a target list of higher education partners, i.e. Auburn University, University of Georgia, Mississippi State that have colleges in both pharmacy and agriculture with the potential to develop a project similar to the *GreenVax Project at Texas A&M* and assess the feasibility.

Indoor Agriculture Opportunities in Atlanta

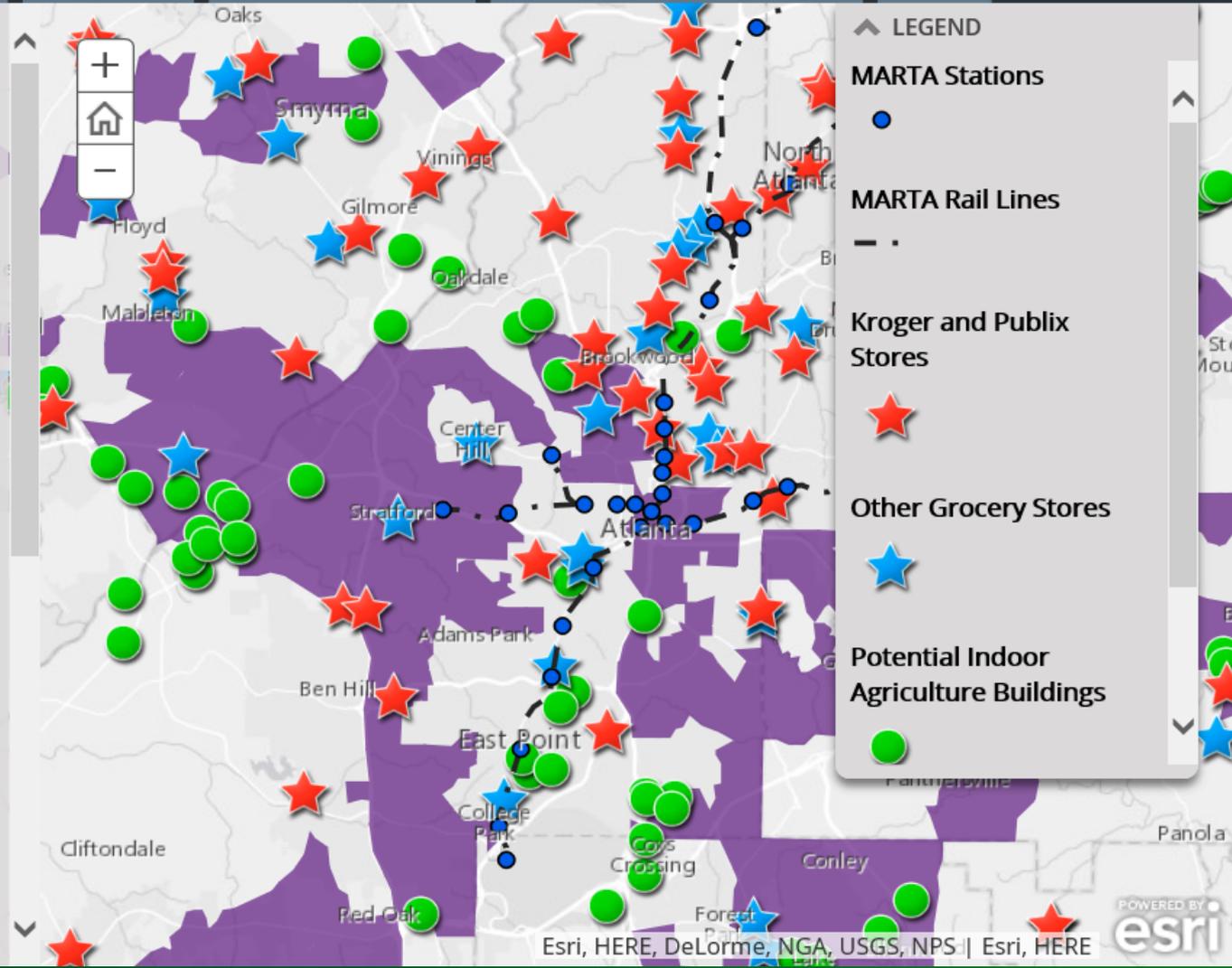
- Food Deserts
- Incentive Zones
- Population
- Population Growth
- Median House Hold Income
- Crime



According to the the US Food and Drug Administration, food deserts are defined as urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food. Instead of supermarkets and grocery stores, these communities may have no food access or are served only by fast food restaurants and convenience stores that offer few healthy, affordable food options. The lack of access contributes to a poor diet and can lead to higher levels of obesity and other diet-related diseases, such as diabetes and heart disease.

Census tracts qualify as food deserts if they meet low-income and low-access thresholds:

1. They qualify as "*low-income*





Indoor Agriculture

GEORGIA: A GREAT ENVIRONMENT FOR INDOOR AGRICULTURE

Why Georgia for Indoor Agriculture?

- Growing population center with strong buying power
- Robust and established agriculture industry
- Excellent accessibility to market and transportation infrastructure
- Abundant and affordable workers
- Skilled technical talent
- Growing entrepreneurial talent with technology forte
- World-class research and development resources
- Venture capital availability
- Business-friendly environment
- Clean, safe, reliable and affordable electricity
- Growing population with appetite for local and organic products
- Expanding wholesale and retail customer base
- Growing food processing industry

Indoor Agriculture Poised for Growth

Georgia is at the heart of the super-charged Southeast. With its economic vitality fueled by robust population growth and pro-business climate, Georgia is an attractive destination for businesses, including pioneers in indoor agriculture

Home to 680 food processing companies and 50,000 farms which together account for \$26 billion in GDP, Georgia has an exceptional agricultural and food production infrastructure. These resources, when applied toward the establishment and nurturing of a new indoor agriculture industry cluster, will benefit indoor agriculture operations that make Georgia home.

Momentum for Indoor Agriculture in Georgia

Georgia's reputation for being the most business-friendly state in the U.S. certainly extends to indoor agriculture. Over the past year, initiatives in Atlanta have reinforced leadership's commitment to fostering indoor agriculture operations in the

area. The City of Atlanta is especially dedicated to enhancing a sustainable food supply for its residents while Georgia consumers are increasingly demanding products that are locally grown.

- Atlanta mayor appoints first ever Urban Agriculture Director, October 2015
- Atlanta establishes an Urban Agriculture Task Force that will study "Controlled Environment Agriculture", March 2016
- The Atlanta Local Food Initiative continues to partner for a sustainable food system in Metro Atlanta
- Georgia Tech participates in FEWS initiatives, Nexus of Food, Energy and Water Systems
- Utilities get creative with cost-cutting rate plans for qualified customers
- Georgia's Center of Innovation for Energy provides research, business planning and market support for indoor agriculture companies





FREIGHT
FARMS









**SQUARE
ROOTS**





QUESTIONS????

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