AgriSense

VERTICAL FARMING MANAGEMENT SYSTEM

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Team 10

TODAY'S AGENDA

1. Problem with Current Agricultural Solutions
2. What vertical farming is and how it works
3. Advantages of a vertical farming system
4. Product
5. System implementation
6. Mockups
7. Market size
8. Competitors
9. Financials
10. Future plans beyond this project

INTRODUCTION

IoT-Enabled Vertical Farming for Greece

An innovative IoT-driven vertical farming solution tailored for Greece, focusing on efficient, sustainable crop production. Designed for urban and hospitality markets, this system enhances resource efficiency and enables year-round fresh produce. Positioned to meet rising demand for eco-friendly farming solutions and support local food systems.

PROBLEM WITH CURRENT AGRICULTURAL SOLUTIONS

Water shortage

About 750 million people suffer from access to fresh water worldwide. Agriculture accounts for 70% of global yearly water use, which is the largest contributor to water scarcity. Agricultural farmers use more water than any other group combined, and this heavy usage of water contributes to a lot of environmental and social problems.

Deforestation

All arable land on earth has been already used for agriculture, and expanding farming operations is not possible without cutting down the forests to create more space for plants to grow horizontally. This contributes to worse air quality that we breathe in.

Biodiversity loss

Limiting forest areas also destroys biodiversity. Scientists say that we are undergoing a sixth mass extinction of species in the history of the Earth. According to the WWF foundation, the population of terrestrial species has declined by over 38% since 1970.

PROBLEM WITH CURRENT AGRICULTURAL SOLUTIONS

Price stability and regular access to your favorite fruits and vegetables

The environment is constantly changing, and crops are subject to abnormal weather patterns, which means they can be easily destroyed. When crops are destroyed, the price of the remaining plants goes up. This can cause a problem for restaurants and other companies that rely on the stability of prices for financial planning.

Food Transparency

Food that is bought currently is often produced thousands of miles away and then shipped to grocery stores and restaurants. Having the food grown so far away makes it difficult to know how it is produced and processed. The long food chain system is also very prone to contamination with food-borne illnesses.

Access to fresh, healthy food

The population in 2050 is estimated to grow to up to 60% larger than it was in the year 2000. For agricultural farming to sustain the population, it will have to increase its production rate by 70% while rapidly losing land and resources.

HOW VERTICAL FARMING WORKS

Efficient Land Use

Vertical farming involves growing crops on vertical surfaces, maximizing land use by using stacked layers within spaces like skyscrapers, warehouses, or greenhouses.

Controlled Environments

Crops are grown in controlled indoor settings using techniques such as hydroponics and aeroponics, with LED lights replacing sunlight, which reduces pesticide use and water consumption.

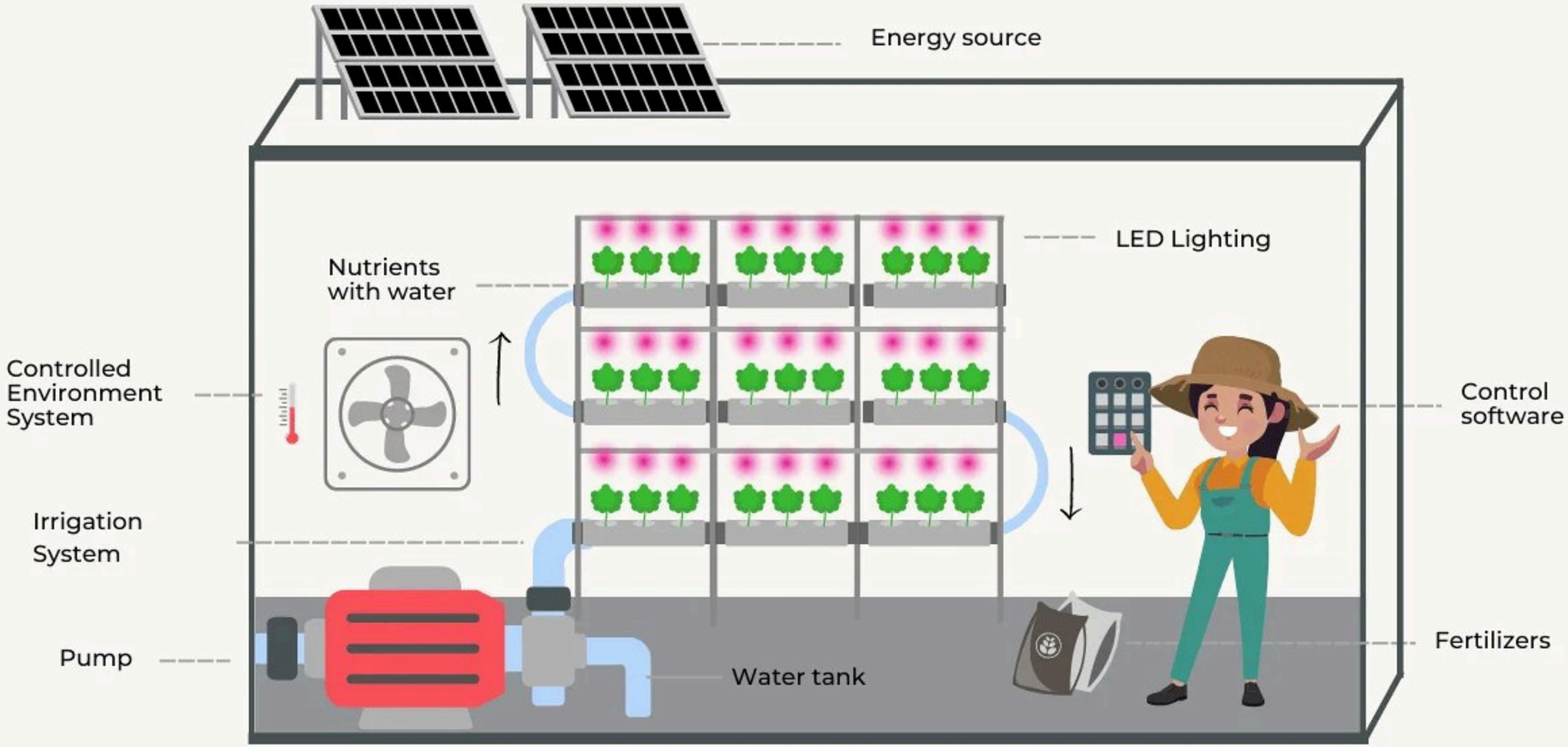
Global impact

The Netherlands, leads in indoor farming, producing 80% of indoor-grown produce worldwide and becoming the second-largest agricultural exporter by value, after the U.S.

Hydropolis

VERTICAL FARM

explained



ADVANTAGES OF A VERTICAL FARMING SYSTEM

SPACE AND RESOURCE EFFICIENCY

Vertical farms use 98% less water and 99% less land than traditional farms, with crop yields up to 240 times higher through year-round harvesting. Sunlight is utilized instead of LEDs, reducing reliance on fossil fuels.

PEST CONTROL AND FRESHNESS ALL YEAR

Controlled airflow eliminates pests without pesticides. Minimal weather dependence ensures fresh greens are available year-round, meeting demand in premium markets, restaurants and grocery stores.

FARMING IN URBAN AREAS

Vertical farming is possible even in densely populated urban areas with limited available space. Product delivery logistics are less complicated, and corresponding expenses are lower.

REDUCED EMISSIONS AND FOOD SAFETY

Vertical farms lower carbon footprints by reducing food miles. Monitored, lab-like conditions minimize contamination risks, enhancing food safety and ensuring fresher, healthier food for consumers.

KEY COMPETITIVE ADVANTAGES

AI Driven Tailor-made Solutions

Our vertical farming systems use advanced AI technology to create custom farming solutions. By analyzing data on crop type, growth patterns, climate, and yield goals, our AI algorithms optimize light, nutrient delivery, and environmental conditions specifically for each crop.

Sustainable-Reusable Energy Usage

We incorporate renewable energy sources like solar and wind power, along with energy storage solutions. Our closed-loop water systems recycle and reuse water, minimizing resource use and carbon footprint, making our farms environmentally friendly and cost-effective.

State Of Art Automations-Robotics

With cutting-edge robotics and automated systems, our farms run efficiently around the clock with minimal human intervention. From planting and watering to harvesting and packaging, automation enables faster turnaround and precision.

Wide Crop Variety

We cultivate a broad range of crops, from leafy greens to fruits, vegetables, and herbs. This diverse product offering appeals to various markets, catering to both local and larger-scale demands while ensuring year-round availability of fresh, nutritious produce.

SYSTEM IMPLEMENTATION

SENSOR NETWORK

Deployed sensors (temperature, humidity, pH, etc.) gather real-time data, connected via microcontrollers (e.g., Arduino, ESP32) to a central processing unit.

DATA TRANSMISSION & EDGE COMPUTING

Data sent through MQTT/HTTP to cloud (AWS/Azure IoT) for centralized analysis; edge computing allows faster local decisions.

AUTOMATION & CONTROL

Based on sensor data, LEDs, pumps, nutrient mixers, and fans adjust automatically for optimal growth conditions.

DATA ANALYSIS AND MONITORING

Machine learning in the cloud predicts growth patterns and detects issues; remote interface allows monitoring, alerts, and manual adjustments.


9:32
Sunny, 24°C
Patras, Greece
Your Devices
Air Flow
Lettuce Room 1
Water Flow
Strawberries Room 1
23°C
Mode: Auto
Authentication
Peaches Room 3
UV Lamp
Entrance
Dashboard
Analysis
Rooms
Settings
9:32
24.3°C
59%
Air Flow
Lettuce Room 1 - Off
23°
Turn On
Mode
Fan
Swing
192.513 kWh
Timer
Schedule
Graph
More
9:32
Back
Lettuce Room 1
4 Devices
UV Lamp
Tomato Room 4
Cooling
Tomato Room 4


9:32
Back
Strawberries Room 1
4 Devices
Water Flow
Tomato Room 4
Air Flow
Tomato Room 4


AgriSense
Dashboard
Devices & Sensors
Logs
Settings
Lettuce Room 3
26 Jul, 2024 1:30 PM
Water Tank 01
65.00
0
100
Location
Current Outside Temp
Last value:
26°C
10 min ago
Humidity
Last value:
62%
10 min ago
Temperature & Humidity
Temperature
Humidity
60
40
20
0
12:00
12:15
12:30
12:45
13:00
13:15
13:30
13:45
14:00
Water Level
6
Controls
Water Level
6
Air Flow
36
Cooling
42
Max Humidity
75
Max Temp.
92
UV Lamp Lvl.
0
Drip Lvl.
1
Drip Irrigation System
ON
UV Lamp 01
OFF


Agrisense
Dashboard
Devices & Sensors
Logs
Settings
26 Jul, 2024
Tomato Room 4
Water Tank 02
65.00
0
100
Tomato Room 4
Current Tomato Room-4 Temp
Last value:
29°C
10 min ago
Humidity in Tomato Room 4
Last value:
44%
10 min ago
UV Lamp
Tomato Room 4
Cooling
Tomato Room 4
Water Flow
Tomato Room 4
Air Flow
Tomato Room 4
Drip System
Tomato Room 4
Water Level
6
Controls
Water Level
Air Flow
Cooling
Max Humidity
Max Temp.
UV Lamp Lvl.
Drip Lvl.
6
36
42
75
92
0
1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Redifine Agriculture with Vertical Farming
Empower your yields with cutting-edge IoT solutions for a smarter, more sustainable future in agriculture. Harness data and automation to optimize every aspect of your growth cycle.
Try for free
See how it works
Revolutionize Farming with IoT-Driven Precision.

SIZE OF MARKET

1. Global Agriculture Market
   - The global agriculture market was valued at approximately $11 trillion in 2021 and is expected to reach $13-14 trillion by 2030.
   - This growth is driven by increased demand for food, especially in emerging economies, along with innovations in sustainable and efficient farming methods.

2. AgriTech and Automation in Agriculture
   - The agricultural technology (AgTech) market, which includes automation, robotics, and AI-driven solutions, was estimated at $22 billion in 2022 and is forecasted to grow to $45-50 billion by 2030.
   - Automation and AI are becoming increasingly vital as farms seek to reduce labor costs and enhance productivity, aligning with the demand for precision agriculture.

3. Vertical Farming Market
   - The vertical farming market was valued around $5 billion in 2022 and is projected to grow at a CAGR of 25-30%, reaching $20-25 billion by 2030.
   - This market segment's growth is fueled by urbanization, the need for sustainable farming, and the ability to grow crops in limited space with lower water usage and no pesticides.

BASIC COMPETITORS

AEROFARMS

Advantages

- **Water efficient**
- **Data-driven approach**

Disadvantages

- **High setup costs**
- **Heavy energy dependency**

PLENTY

Advantages

- High crop yield
- Scalable modular design

Disadvantages

- Limited variety
- High energy costs

BOWERY

Advantages

- Eco-firendly
- Advanced automations

Disadvantages

- Limited regional reach
- Dependency on high-end markets

INFARM

Advantages

- Decentralized model
- Strong retail partnerships

Disadvantages

- Limited production volume
- High costs for partners

SYSTEM COSTS

AVERAGE SENSOR PRICING

- Light/PAR Sensors: $75 to $600. For high accuracy in a commercial setting, a reliable mid-range choice would be around $250.
- Temperature and Humidity Sensors: $25 to $150 each. Integrated options that combine temperature, humidity, and CO_2 often range from $150 to $300.
- CO_2 Sensors: $100 to $500, depending on durability and precision needed.
- pH Sensors: $50 to $200, based on durability and application. A hydroponic-compatible pH sensor is typically around $100.
- Nutrient (EC) Sensors: $30 to $200, with commercial-grade sensors averaging about $150 for reliable nutrient tracking in solution.

SYSTEM INTEGRATION COSTS

- Networking and Data Storage: For cloud integration, we will need networked controllers and storage solutions, which could add $50 to $200 per module in upfront costs or ongoing fees if using third-party platforms.
- Maintenance and Calibration: Sensors may need periodic calibration, especially CO_2 and pH sensors. Factor in an estimated 5-10% annual cost of the initial sensor investment for maintenance.

TOTAL COST

- Sensors per Module: $850 (or $500–$700 if optimized)
- Controller and Networking: $500 per 10-module setup
- Installation and Calibration: $1,000 for initial setup and calibration for 10 modules.

- Total for 10 Modules:
- Optimized Setup: Approximately $6,000 to $8,000
- Full Setup (without optimization): Approximately $9,000 to $10,000

SMALL BUSINESS PLAN

Target Customer: Hobby farmers, small urban farms, educational farms, or small-scale startups producing a few dozen heads of lettuce per cycle.

Module Size: 60 cm x 60 cm trays, single or double tiers.

Capacity: Around 10–15 lettuce plants per module.

Sensors:

- Light (PAR): Basic light sensor.
- Temperature & Humidity: Simple combined sensor.
- CO_2: Basic monitoring.
- Nutrient & pH: Affordable pH and EC sensors for nutrient solution monitoring.

Automation: Minimal, with manual controls or basic automated water and light systems.

Data Access: Mobile app or Bluetooth access for real-time monitoring, ideal for entry-level users.

Cost Estimate: $500–$800 per module, totaling $2,500 to $4,000 for a setup with 5 modules.

Example Price Point: $7,000 for a basic setup, including installation support and limited remote monitoring

MID BUSINESS PLAN

Target Customer: Community farms and small commercial operations that aim to produce a supply for local markets.

Module Size: 60 cm x 60 cm trays, single or double tiers.

Capacity: Each module holds 15–20 lettuce plants, for a total of 150–200 heads per growth cycle in a 10-module setup.

Sensors:

- Light (PAR): Mid-range PAR sensor.
- Temperature & Humidity: High-accuracy combined sensor.
- CO_2: Commercial-grade CO_2 monitoring.
- Nutrient & pH: Reliable pH and EC sensors for hydroponic control.

Automation: Basic automation of lighting and watering schedules.

Data Access: Web-based platform with data logging and alerts for easy monitoring and troubleshooting.

Cost Estimate: $800–$1,000 per module, totaling $8,000 to $10,000 for a 10-module setup.

Example Price Point: $16,500 for a standard system, including a 1-year maintenance plan and remote monitoring setup

HIGH END BUSINESS PLAN

Target Customer: Large commercial farms, research farms, or enterprise-level operations that need highly optimized.

Module Size: 60 cm x 120 cm trays, multi-tiered (up to 4 tiers).

Capacity: High-density system holding 25–30 plants per module, with 250–300 heads per growth cycle in a 10-module setup.

Sensors:

- Light (PAR): High-precision full-spectrum PAR sensor.
- Temperature & Humidity: Industrial-grade sensor for stable conditions.
- CO_2: High-accuracy CO_2 sensor with frequent calibration.
- Nutrient & pH: Premium sensors with data logging and automated calibration for optimal nutrient management.

Automation: Full automation, including HVAC integration, precision-controlled lighting and nutrient delivery, and automated water recycling.

Data Access: Full IoT integration with cloud-based analytics, AI-powered insights for crop yield optimization, and customized alerts for maintenance and troubleshooting.

Cost Estimate: $1,500–$2,000 per module, totaling $15,000 to $20,000 for a 10-module setup.

Example Price Point: $28,000, including installation, 24/7 remote monitoring, and advanced analytics with a 2-year support and maintenance plan.

REVENUE PROJECTIONS

Business Plan	Year 1 Units	Year 1 Revenue	Year 2 Units	Year 2 Revenue	Year 3 Units	Year 3 Revenue
Small Plan	10	$70,000	20	$140,000	30	$210,000
Mid Plan	5	$82,500	10	$165,000	15	$247,500
High-End Plan	3	$84,000	6	$168,000	10	$280,000
Total Revenue		$236,500		$473,000		$737,500

FINANCIAL PROJECTIONS

SUMMARY OF COSTS

Business Plan	Year 1 COGS (60/55/50%)	Year 1 OpEx (20%)	Year 1 Total Costs	Year 2 COGS (60/55/50%)	Year 2 OpEx (20%)	Year 2 Total Costs	Year 3 COGS (60/55/50%)	Year 3 OpEx (20%)	Year 3 Total Costs
Small Plan	$42,000	$14,000	$56,000	$84,000	$28,000	$112,000	$126,000	$42,000	$168,000
Mid Plan	$45,375	$16,500	$61,875	$91,125	$33,000	$124,125	$123,750	$49,500	$173,250
High-End Plan	$42,000	$16,800	$58,800	$84,000	$33,600	$117,600	$140,000	$56,000	$196,000

COST STRUCTURE

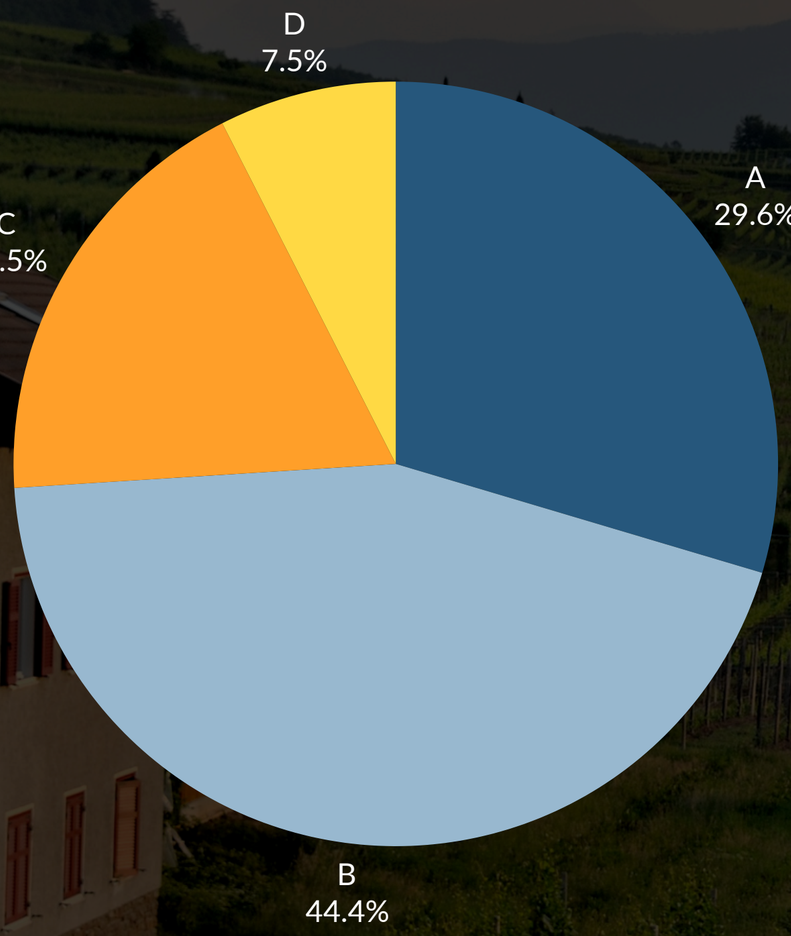
- Cost of Goods Sold (COGS)
  - Small Plan: Estimated COGS at 60% of revenue.
  - Mid Plan: Estimated COGS at 55% of revenue.
  - High-End Plan: Estimated COGS at 50% of revenue.
- Operating Expenses
  - Marketing, salaries, administrative costs, etc.
  - Estimated at 20% of revenue for all plans.

FINANCIAL PROJECTIONS

SUMMARY OF PROFIT PROJECTIONS

Business Plan	Year 1 Revenue	Year 1 Total Costs	Year 1 Profit	Year 2 Revenue	Year 2 Total Costs	Year 2 Profit	Year 3 Revenue	Year 3 Total Costs	Year 3 Profit
Small Plan	$70,000	$56,000	$14,000	$140,000	$112,000	$28,000	$210,000	$168,000	$42,000
Mid Plan	$82,500	$61,875	$20,625	$165,000	$124,125	$40,875	$247,500	$173,250	$74,250
High-End Plan	$84,000	$58,800	$25,200	$168,000	$117,600	$50,400	$280,000	$196,000	$84,000

BUDGET REQUIREMENTS



1. R&D and Customization: €150,000 - €250,000 to tailor the system for Greek crops and test with local farms.

2. Manufacturing and Assembly: €200,000 - €400,000 for modular, cost-effective units suited to Greek farm sizes.

3. Marketing and Partnerships: €100,000 - €150,000 for campaigns targeting urban centers and collaborations with cooperatives and luxury clients.

4. Local Support: €50,000+ annually for Greek-speaking support and maintenance.

Total Budget: €500,000 - €800,000

A. 29.6% R&D and Customization

B. 44.4% Manufacturing and Assembly

C. 18.5% Marketing and Partnerships

D. 7.5% Local Support

ACCOMPLISHMENTS DATE

2025

We have successfully developed a fully functional prototype tailored for the Greek market. It’s now ready for sale, integrating all our advanced features—AI-driven customization, automation, and sustainable energy solutions.

2026

By 2026, we aim to have the entire vertical farming system fully completed and commercially available. This will include all refinements in AI algorithms, automation, and energy efficiency to support scalable, high-yield operations.

2027

EU Market Entry: By 2027, we aim to expand our vertical farming solutions beyond Greece to key markets across the European Union. This will involve strategic partnerships with local agricultural cooperatives, urban farming initiatives, and distribution networks tailored to each region’s needs.

2028

In 2028, we plan to bring our advanced vertical farming technology to the United States. Our market strategy will focus on regions with strong urban agriculture demand and sustainability initiatives. 2028 will also mark the opening of our first fully operational vertical farm in Patras.

THANK YOU

for your time and attention

Presented by Team 10