

New Photobioreactors Technology

Employing a unique hybrid: Bacteria/Microalgae
With Nitrogen Fixation and Carbon Capture capabilities.

- Biomass fermentation
- Alternative Protein
- Molecular farming – In the future
- Plant Cell-Culture – In the future

*Negative CO₂ Emission
and Carbon Capture*

Algaenite Video

Funded by an EIC Accelerator
Horizon 2020

Our vision

"Next generation agriculture": To build **hi-tech protein farms** that will feed the next generations.

To produce high-value protein, cost-effectively and sustainably, through the **cultivation of microorganisms**, utilizing novel technology.

Our mission for the food industry

To supply **low-cost high-quality**, sustainable protein concentrates and functional protein.

Our mission for Bio Fertilizers

To supply sustainable, organic, efficient biofertilizers for Hydroponics and precision agriculture fertigation.



Our Story

Founded in 2021 by Go Green Food Tech with the support of the Europe Innovation Commission (EIC) and a Horizon 2020 grant of €2.5M.

The Algaenite company was formed as a spin-off. We developed patented **photobioreactor** (PBR) technology.

Our Advantages

- Sunlight as the source of energy
- Less contamination
(no available Sugar/Nitrogen)
- Proprietary PBR engineering



Important Events

2021	Horizon Phase 1 + Seal of Excellence	€ 50,000 Grant
2022	Horizon Phase 2	€ 2,450,000 Grant
2023	BLF Commercial Production	
2023	Scale-up of the PBR (Alfa Prototype)	
2024	1 st PO from Florida for the BLF system	
2024	2 nd PO from Connecticut	
2024	Extraction of Phycocyanin	

Company Information

- Private Company
- Year of establishment 2021
- Registered in Israel, USA, Denmark
- Owners: The Hessel Family
- Photobioreactors Technology

The problem: We need Ammonia to make food

Ammonia is the main building stone for fertilizers and protein

We have to "Fix Nitrogen" to make ammonia.

There are two options to Fix Nitrogen:

Organic – Waste Fermentation

Inefficient fertilizer

\$27.48b market by 2030

Pathogens, hormones, antibiotics



Chemistry – The Haber Bosch Process

Polluting chemical fertilizer with emissions

\$40b market

3% – 5% of global fossil fuels



The fertilizer is then used to feed animals that are slaughtered for protein.



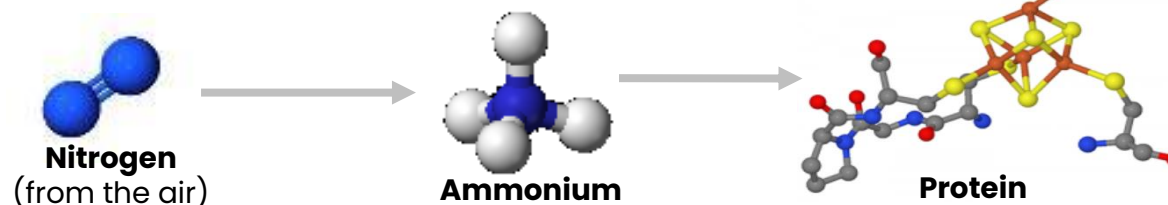
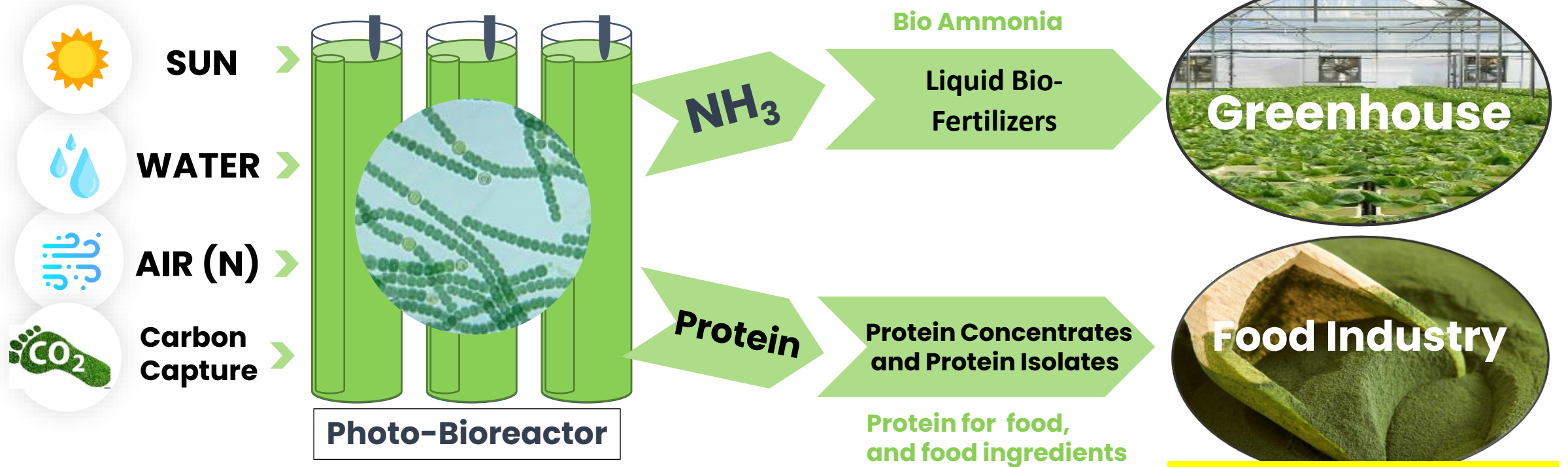
We offer another way: **More Economical and More Sustainable**

Our **microalgae/bacteria** – fix nitrogen and produce bio ammonia in their cells.

It's actually:

A 2μ – solar factory that makes bio ammonia from the air.

All we need is :



The solution is to use **Biology** instead of **Chemistry**

We call it: “3rd Generation Farming”

Automated remote-controlled **photobioreactors (PBRs)**:

- ✓ Cost-effective
- ✓ *Organic certified*
- ✓ *Safe*
- ✓ Top-level engineering
- ✓ *Net Zero CO₂ emission*
- ✓ *Carbon capture*

We don't make green ammonia
We make *bio ammonia*

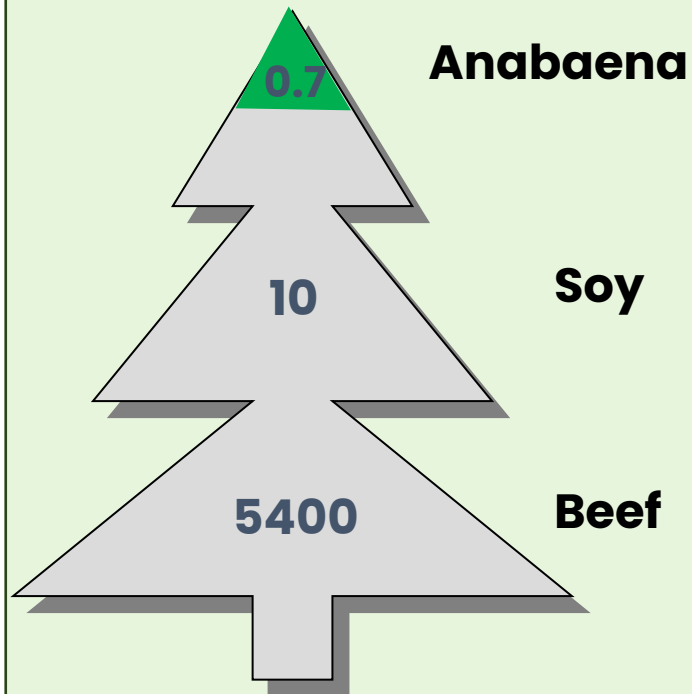


Using Microorganisms to produce protein is the future:

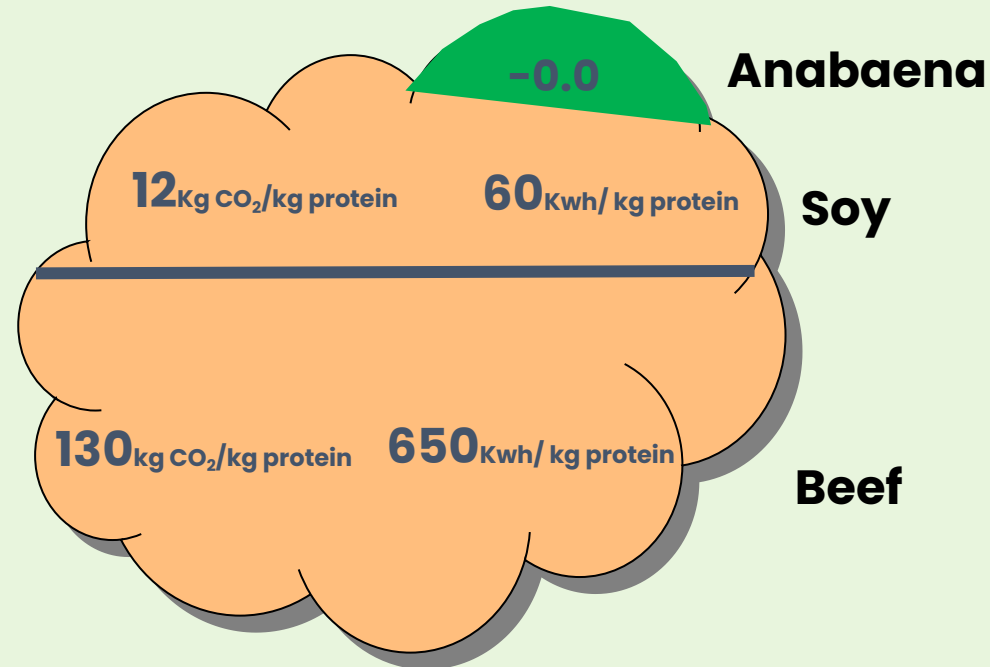
“Highest Quality Protein for the Lowest Production Cost, while Saving the Planet’s Resources”

Our Planet’s Future Depends On Microalgae for Efficient Use of Natural Resources.

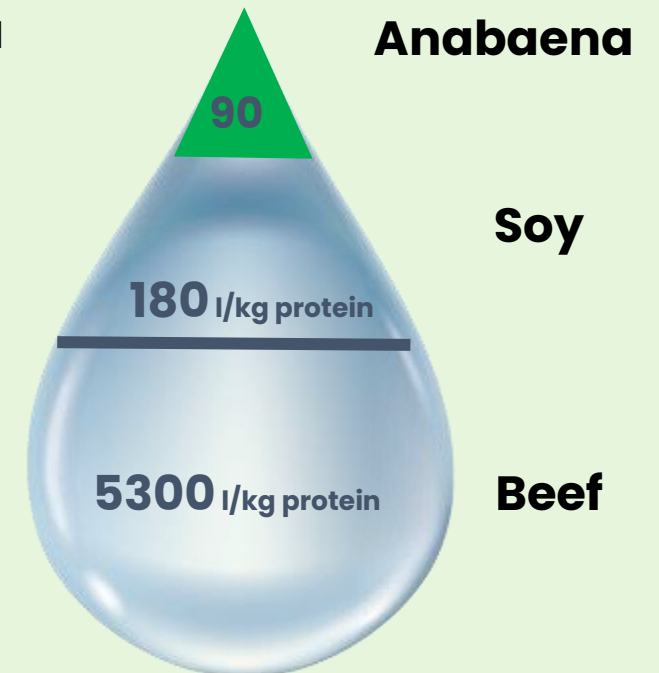
Land Use
(1000m² / Kg Protein)



CO₂ Emissions / Energy



Water Consumption
(Liter of water/kg protein)



Key milestones Achieved:

1. A robust commercial-scale bioreactor PBR system was developed:

Including a novel airlift columns system with a proprietary manifold and hydraulics Systems. Special injection molds were designed for mass production of the PBR.

2. Automation: A control system was developed:

With a user interface and Data Collection Robot (DCR). The proof of concept was converted into a commercial-scale, robust process including full process control and supervision as well as automated operation of all process steps.



3. Microbiology:

The efficacy and reliability of cultures' microbial growth was increased to unprecedented rates that enable commercial -grade performance.

We were able to breed a champion mutant strain of Anabaena, highly resistant to contaminations and cultivation conditions. We named it **Anabaena H**



European Union organic logo



Thank You

www.Algaenite.com

[Algaenite \(youtube.com\)](https://www.youtube.com/Algaenite)

Additional slides follow for your reference

The PBR – Protein production system – Technology for future Protein farms

Next-generation desert farming

A columns system that enables the efficient growth of cell biomass, from which protein is subsequently extracted.

The columns are transparent to allow light to penetrate, for the benefit of the photosynthesis process carried out by the microalgae. At the bottom is the manifold, a system of pipes that hold the columns with a seal, which channels air enriched with carbon dioxide essential for algae growth. The airflow creates gas exchange and allows for the mixing of the biomass generated within the PBR.

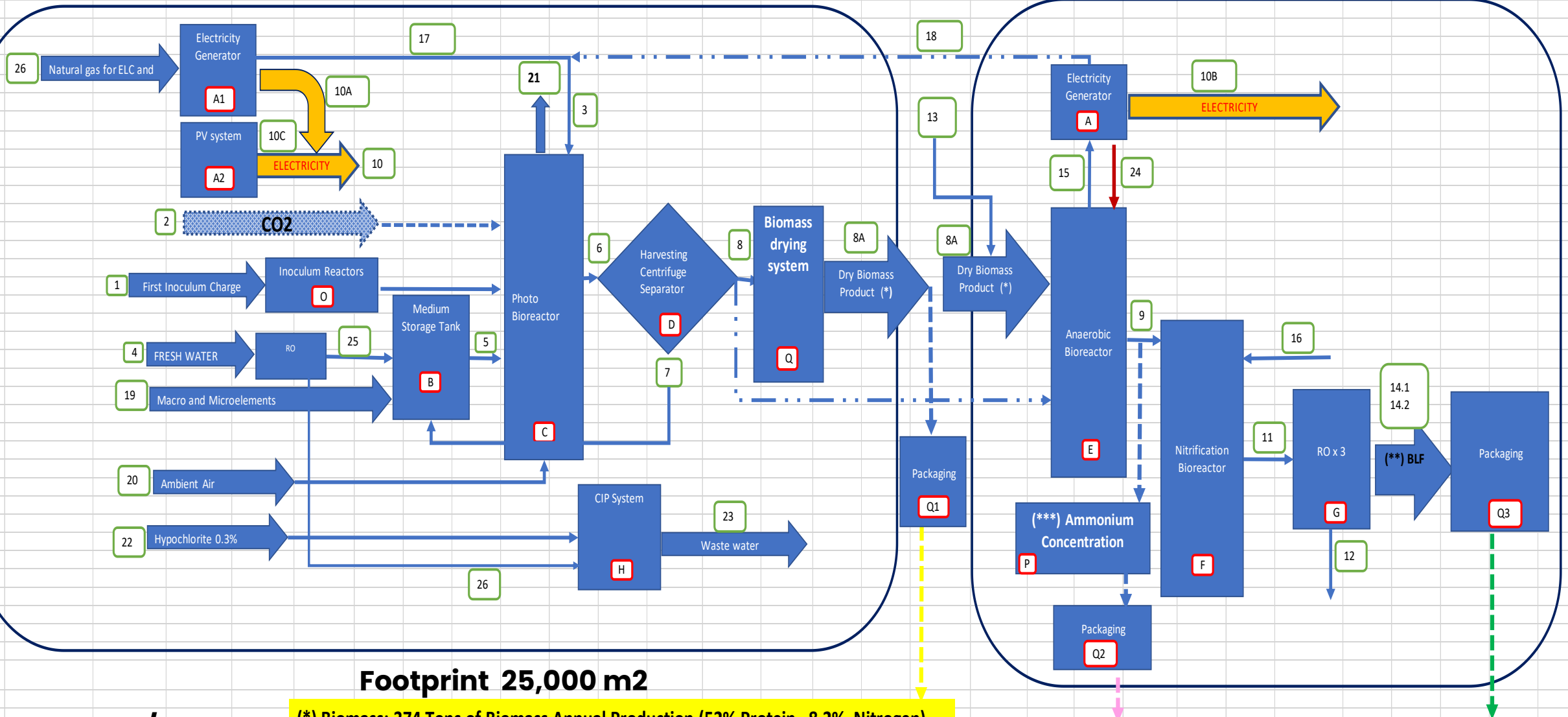
To enable good control of the system (from a distance over the cloud), the PBR has a control and monitoring system that also optimizes the growth process. The development includes an algorithm for growing a culture called NightKeep™.



Our Process

Biomass Photo Bioreactor (BPB) Plant

Bio Liquid Fertilizer (BLF) Plant



**75 Ton/Ha
Of Protein**



(*) Biomass: 374 Tons of Biomass Annual Production (52% Protein 8.2% Nitrogen)

- Feed Stock for Biofertilizers Production
- Plant Based Protein (Bio) - Meat/Fish Analogs
- Food and Feed Additives
- Feed Stock for Bio Cosmetics Industry

(**) Beauty Industry
15% Ammonium Solution
250 ton annual production

(**) BLF - Bio Liquid Fertilizer Composition:

- 3-0-0+6CaO+Me (856 m3/Y)
- 5-0-0+10CaO+Me (545 m3/Y)
- 3/5-0-Hold + Hold + Me (Hold)

Our Process Streams and capacities

Stream No.	UNIT	1	2	3	4	5	6	7	8	8A	9	10	10A	10B	10C	11	12	13	14.1	14.2	15	16	17	18	19	20	21	22	23	24	25	26
Description		First Inoculum Charge supplied by Algaenite	CO2 Makeup Supply	CO2 Gases to Bio Reactor 17+18	Fresh Water	Water to Bio Reactor	Bio Reactor Outlet	Separated Water to Recycle	Wet Biomass	Dry Biomass	Biomass to Nutrifcation	Total ELC	ELC from Gas Generator	ELC from Bio Gss Generator	ELC from PV Panels	BLF Liquid fertilizer to RO	RO Reject	Rewatering 8 - 8A	BLF Bio Liquid 5.5% Fertilizer **	BLF Bio Liquid 2.75% Fertilizer **	Biogas	Ca2CO3	CO2 Generator Flue Gases	CO2 Generator Flue Gases	Macro and Micro-Elements	Ambient Air	O2 Enriched Air	Hypochlorite 0.3%	Waste Disposal	Hot Water (Heat)	RO Product	Natural Gas
Electricity	kWh/y											2,190,000	467,200	438,000	1,285,000																	
	AMP												227	241																		170
	KW												50	53	147																	
	KVA												65	65																		
KW Installed.															704																	
	M3/y				119,685.80	82,859	220,095	209,090										9,855	900													92,066
	M3/h						101	95																								
	M3/h																									12,000	12,000					
CO2	kg/y		0	638,750																			337,625	301,125								
Biomass	Ton/y								1,275	375	1,275																					
Biomass	g/L								0.10	0.33																						
Kg/ biogas/y																					109,500											
BLF	M3/y															10,950			545	1,090												
N (NH4)	%															0.24%	0%		5.5%	2.8%												
Kg/y																						144								0.5		
m3/y																																116,800

Tag No.	UNIT	A	A1	A2	B	C	D	E	F	G	G1	I	J	K	L	M	O	P	Q	Q1	Q2	Q3
Description		Electricity Generator	Electricity Generator	PV Panels	Medium Storage Tank	Photo-Bio- Reactor	Harvesting-Separator-Centrifuge	Anaerobic Bioreactor	Nutritication Bioreactor	RO	UF	CO2 ISO Tank	Chemicals Storage	Air Blowers	Micro-Elements Dissolver	Product Storage	Inoculum Reactors	Ammonium Concentration	Bio Mass Dryer	Dry Bio Mass Packing	BLF Packing	Dry Bio Mass Packing
No. of Units		1	1	1	2	20	6	2	2	3		2	1	1	1	1	3					
Kw		50	53	53		50	108	8						200	3					12	12	12
MOC					PVC/ PP	PMMA		PVC/ PP									PMMA					
Volume	m3				1,300	125		150	75	12				200	3							
Capacity	kWh/d	1000-2000																				
	kg/d [CO2]	1000-2500																				
	m3/d						400-1000															
Footprint	m2	5	5	3500	50	27,000	200	200	70	20	50	50	500	15	5	600	20	100	100	50	100	20
Columns						160,000																



1 KG of CH4 produces :

KG of CO2 : 2.75CO2

Energy : 50MJ

Energy : 13.9Kwh Electric

Energy : 4Kwh

29,160

The Team:



Lior Hessel 
CEO Growponics

Entrepreneur with vast know-how and experience in Ag-Tech. Founder and CEO of Growponics



Liat Hessel 
CRO

Food scientist with over 15 years of experience in alternative portion R&D. Adv, Food Law Consultant.



Dr. Hani Shkolnikov Lozober 
R&D Project Manager

Ph.D. on Cyanobacteria protein at the Faculty of Biotechnology and Food Engineering, Technion, under [Prof. Avi Shpigelman](#)



Dr Yuri Belilovsky 
CTO

35 years engineering experience
Energy and thermodynamics expert



Anders Thomsen 
CEO Algaenite ApS Denmark

Business Consultant
CEO at NordicFlexHouse ApS



Tal Amsalem
VP Business Development

An experienced food industry executive. Vast knowledge in Food-Tech marketing and operations



Kobi Cohen 
CFO

25 years experience in global innovation financial management



Ohad Hessel 
COO

25 years of engineering experience.
Marketing and project management



Dr Stefan Leu 
Project Manager

Experienced Biochemist, Environmental Scientist and Sustainability Expert



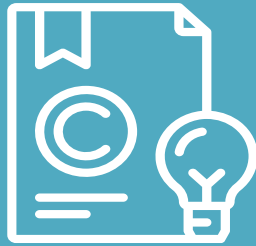
Assaf Shemesh 
Biotechnology Engineer M.Sc.

Software Developer, AI, and data analysis expert

THE TEAM COMBINES

Global business development, microbiology, food science, control, automation, sensor technology and artificial intelligence (AI) software.
Ag-Tech R&D and business development for more than 24 years.

Our IP – Two Patent Applications where files, in 2018 and in 2024



Provisional patent
62/724,457
August 2018



PCT
IB2019/057284
Aug 2019

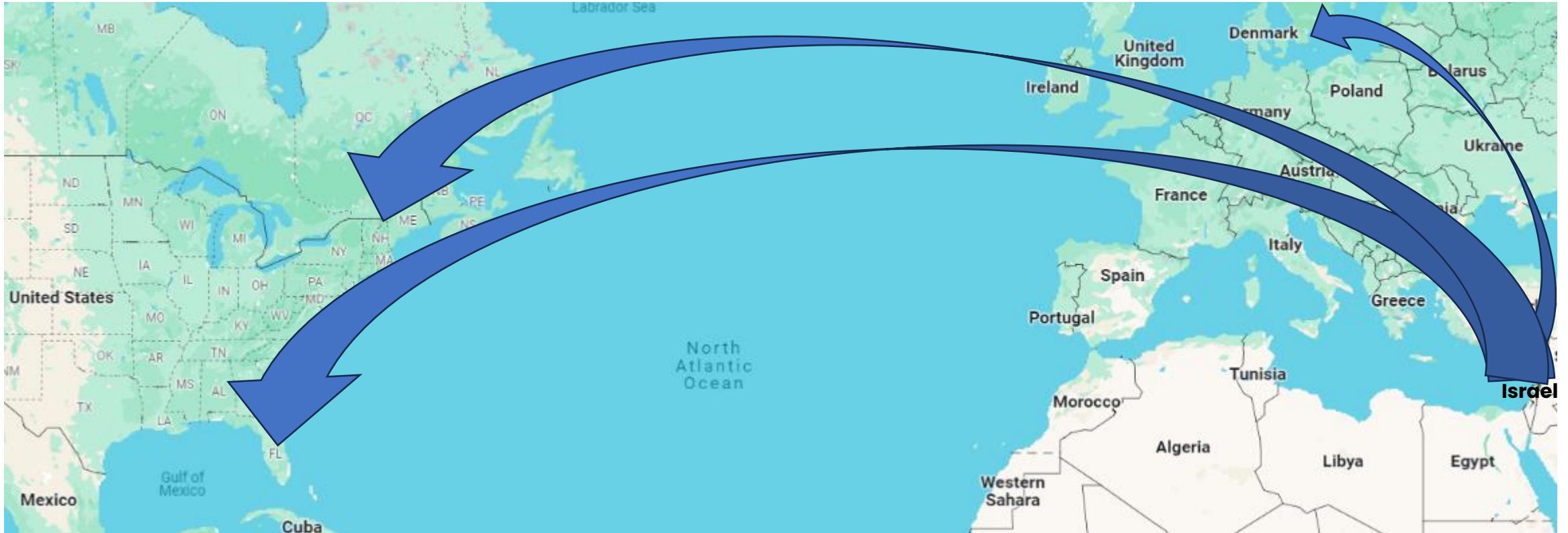


Applications
in **Europe**
and in the **US**



Covering process engineering, algorithms, and machine learning
Over \$35,000 invested in IP protection (Leading Israeli IP Law Firm)

Beta Sites in Connecticut Florida and Denmark



Algaenite Europe



Anders Thomsen

CEO Algaenite ApS Denmark

1. Establishment of Algaenite ApS in Denmark, with Anders Thomsen as CEO.
2. Establish Algaenite demonstration site (beta sites) at Legro A/S, DTI/Nordic Greens is in Denmark (**LOI**), and TECNOVA Technology Center is in Spain. (**LOI**)
3. Documentation and Validation from the beta sites.
4. Certification of Algaenite products in Denmark and Europe. (**Novel Food**)
5. Business plan, financial projections, marketing & sales strategy for the European market.
6. Hiring and scaling up the Algaenite ApS company in Denmark for sale, marketing & technical support.
7. *Alternative protein 2 year R&D (from TRL6 to TRL8).* **Product A** – Protein powder AnabaenaH Consecrates. **Product B** – Phycocyanin – Functional, high-value protein.

Algaenite USA



[Eb Gaines](#)

VP Marketing and Business Development

1. Establishment of Algaenite Inc. in Delaware
2. Establish an Algaenite demonstration site (beta sites) at H2O-Farm
3. Documentation and Validation from the beta site.
4. Certification of Algaenite products in the US. (**GRAS**)

The Global Algae Protein Market

52% of the AnabaenaH is protein

Protein Concentrates and Protein Isolates

A close-up photograph of a green, powdery substance, likely algae protein concentrate, being poured from a white ceramic bowl. The powder is vibrant green and has a fine, granular texture. The background is blurred, showing more of the same powder on a surface.

Global **ALGAE**
PROTEIN Market

Opportunities and Forecast,
2021-2028

Global Algae protein Market is expected to
reach **\$709.0 Million** by 2028.

Growing at a **CAGR of 8.9%** (2021-2028)

<https://www.alliedmarketresearch.com/algae-protein-market-A12704>

The Global Phycocyanin Market:

50% of our AnabaenaH protein is Phycocyanin

A diagram showing three white chevron shapes pointing to the right, containing market data. The background is a dark image of a white bowl filled with blue powder, with some powder spilling out.

In 2022
757.4 M\$

CAGR 7%
2023-2033

Expected to
reach
1,488 M\$
by 2033

<https://www.futuremarketinsights.com/reports/phycocyanin-market>

Spirulina / AnabaenaH Products

Products that we experimented with their development



Aioli



Tahini Spread



Butter



Tahini



Super Drink



Risotto



Yogurt



Candy and Coconut



Cheese selection

More products that we experimented with,



Blew Marshmallow
with Phycocyanin



Blueberry Ice Cream
with Phycocyanin

Cosmetics



Face Mask
(As Antioxidant)



Face Cream
(As Antioxidant)



Cerumen
(As Antioxidant)

Our Liquid Bio-Fertilizers' Results:



Comparing productions at our facilities in Bialik, Israel

OUR ORGANIC FERTILIZER-



Lettuce grown with our fertilizer



CHEMICAL FERTILIZERS

Lettuce grown with chemical fertilizers



We Get the Same Quality with *Maximum Yield*
35% Higher yield than competing organic fertilizers

Competing Nitrogen Bio Fixation Technologies



Bacteria Species	<i>Anabaena</i>	<i>Klebsiella Variicola</i>	<i>Gluconacetobacter Diazotrophicus</i>
Energy source	 Sun	 Sugar	 Sugar
Application	On site fertigation or hydroponics	In furrow.	In furrow or foliar
Applicable in fertigation	 Yes	 Yes	 Yes
Applicable in hydroponics	 Yes	 NO	 Only foliar application
Crops	 All	 Maize, wheat, sorghum	 rice, wheat, maize, soybean and others
% of N supply	 100%	 20-30%	 Up to 50% w/o yield increase
Organic input certified	 Not yet	 No	 Not yet
Enables organic certification of the farm	 Yes	 No	 Requires additional organic fertilizers
Time to market	 Six months	 Commercial	 Commercial
Funding raised	€2.5M from the EU	€430M series D	N/A. From angels and Virya LLC



Competing Organic Fertilizers:



Available Nitrogen	5.5%	0.4%	0.16%
Nitrogen source	Air	Plant residue	Organic wastes

And we have:

- ✓ **30% Additional yield**
- ✓ **Competitive cost**
- ✓ **Suitable for fertigation: Fully dissolved in water**
- ✓ **Free of pathogens, hormones, antibiotics**

Environmental Benefits

Produces Renewable Energy

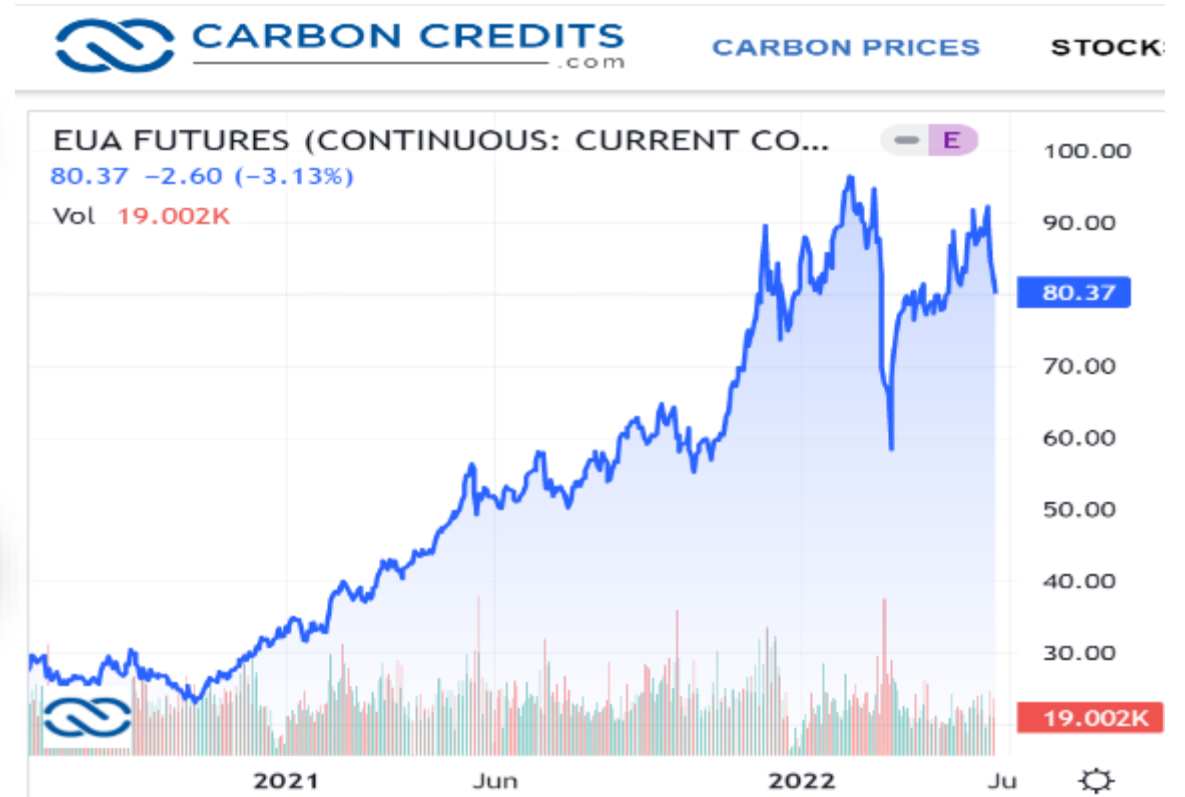
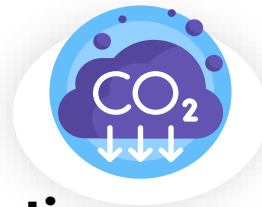
Methane is a by-product of the reactor and is used for generating 1/3 of the electricity needed to run the factory



Negative CO2 Emission

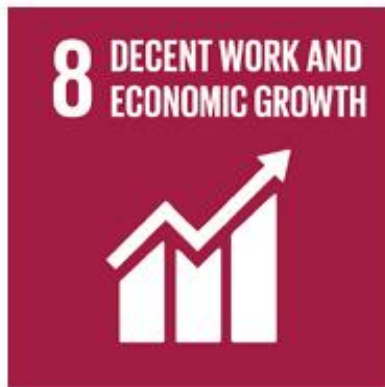
**Carbon Dioxide Removal (CDR)
337 Tons per year per 3ha production unit**

Current price – €80.37 per Ton



1.5 tons of CO₂ absorbed per 1 ton of Biomass

Addressing 6 of the 17 United Nations Sustainable Development Goals:

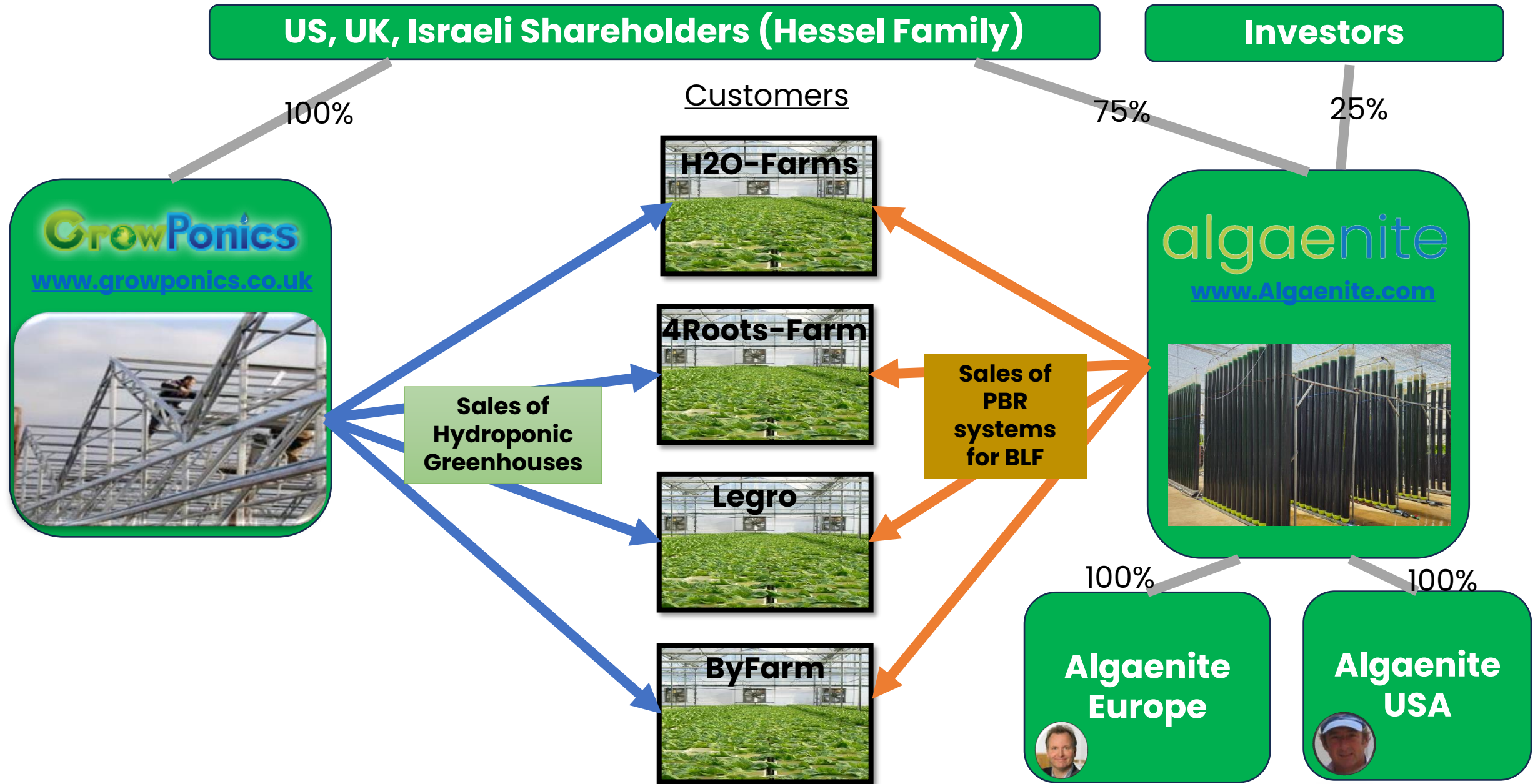


Collaborations

- ❑ SANI Membranes Denmark
- ❑ Connecticut Innovations
- ❑ The Danish Technology Institute
- ❑ Gruda Labs



Corporate structure



About the owners :

algaenite is a subsidiary of **GrowPonics**

Growponics is a global Expert in Hydroponic Technologies

A private Israeli / UK / American Corporation



Growponics designs, builds and operates automated **hydroponic greenhouse** factories using a unique and patented technology



Locations: **Israel** (GoGreen Ltd. IL), **UK** (Growponics Ltd. UK), **Turkey** (Growponics Sera Ltd.), and the **US** (H2O Farms Inc.)
With activities in **Europe, The USA, South East Asia, and the Middle East**



Founded in 2011 by an English-Israeli entrepreneurial joint venture with a **30-year track record** in marketing and operation of CEA30-year30-year

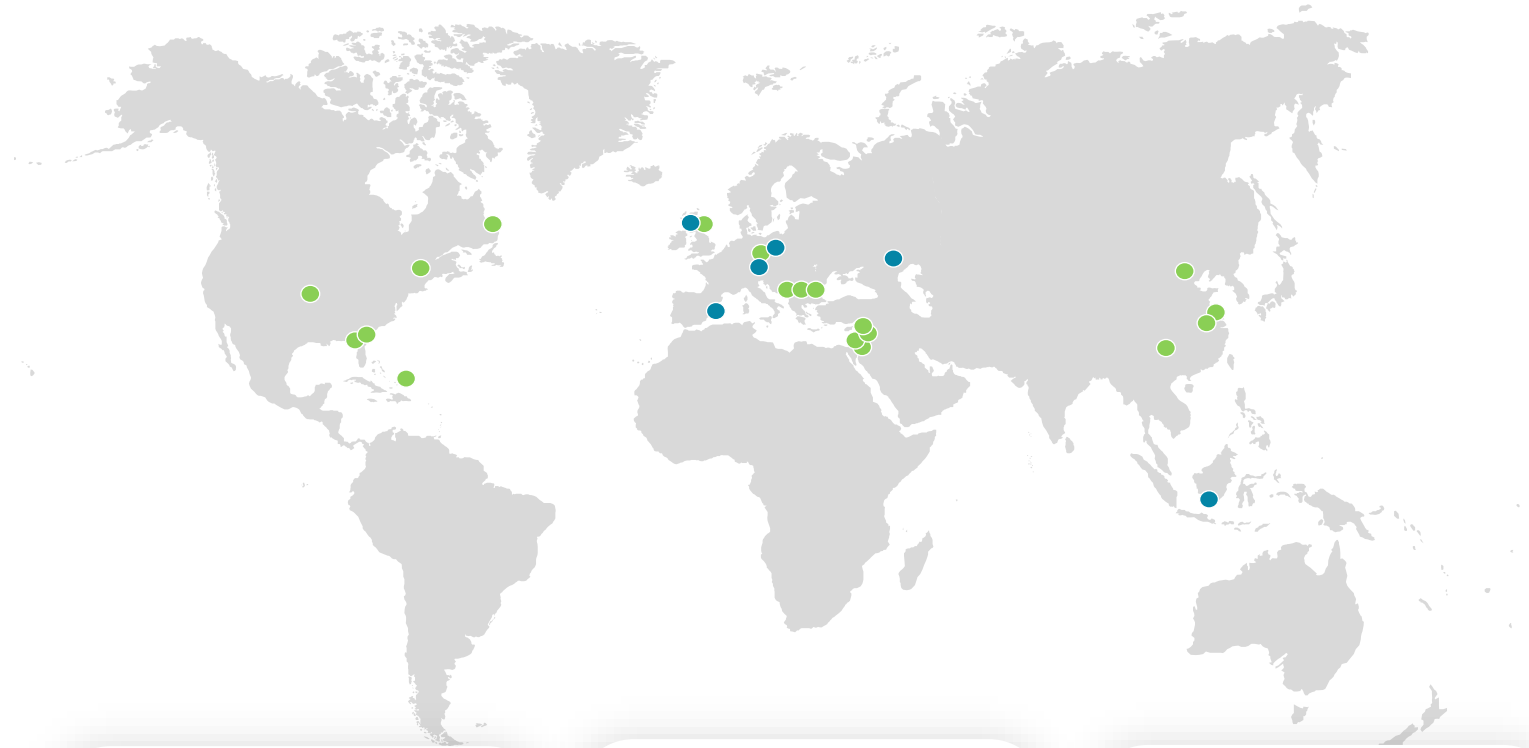


Produces: green leafy **vegetables, herbs** and **vine** plants



algaenite is registered in Israel and the USA and is a **spinoff of GoGreen Food Tech and Growponics**

Growponics: Experts in Hydroponics and greenhouse technology



Over 30 Hydroponic projects



Over €40,000,000 investments



Over €12,000,000 in R&D

