Food and Agriculture Organization of the United Nations

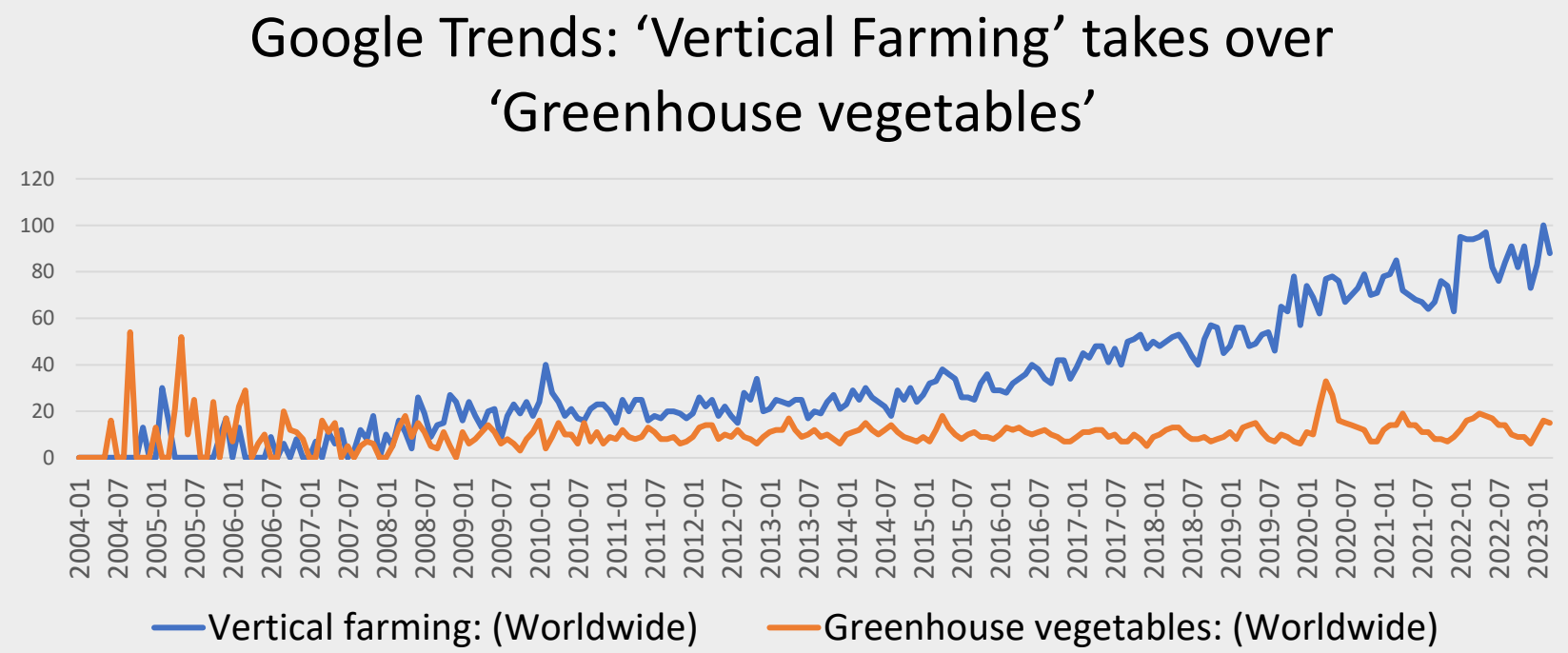
European Bank for Reconstruction and Development

Vertical Farming

Business Models and Success Factors

EAST FRUIT

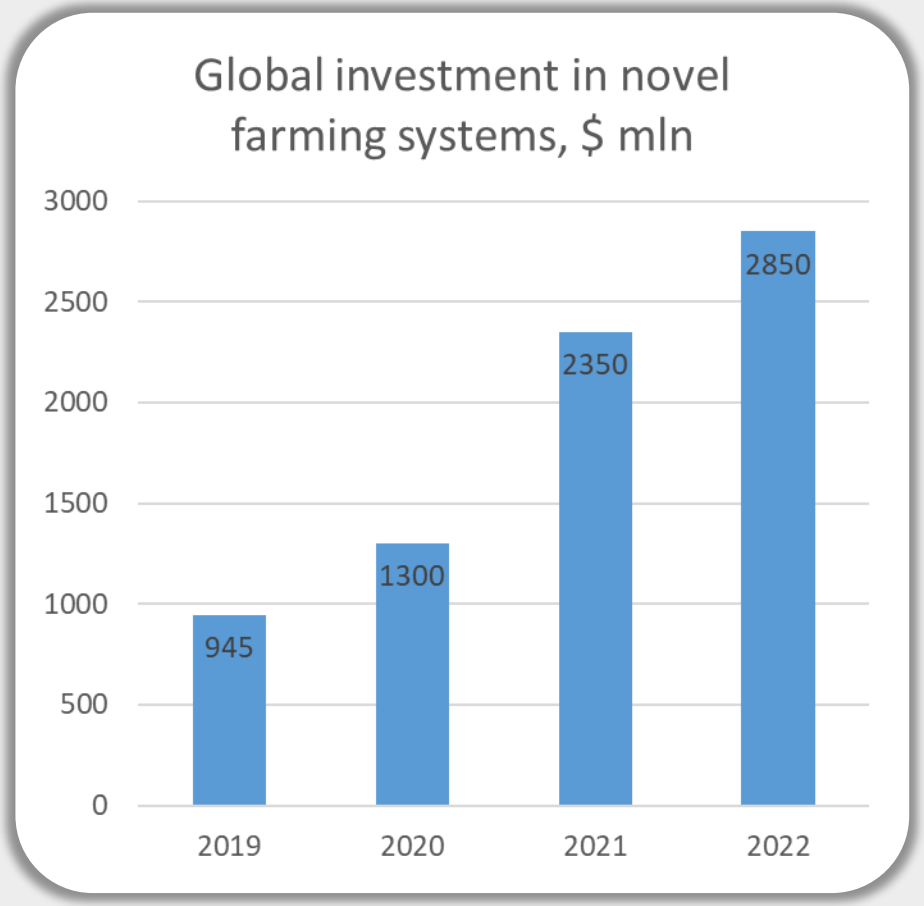
Vertical farming is trending

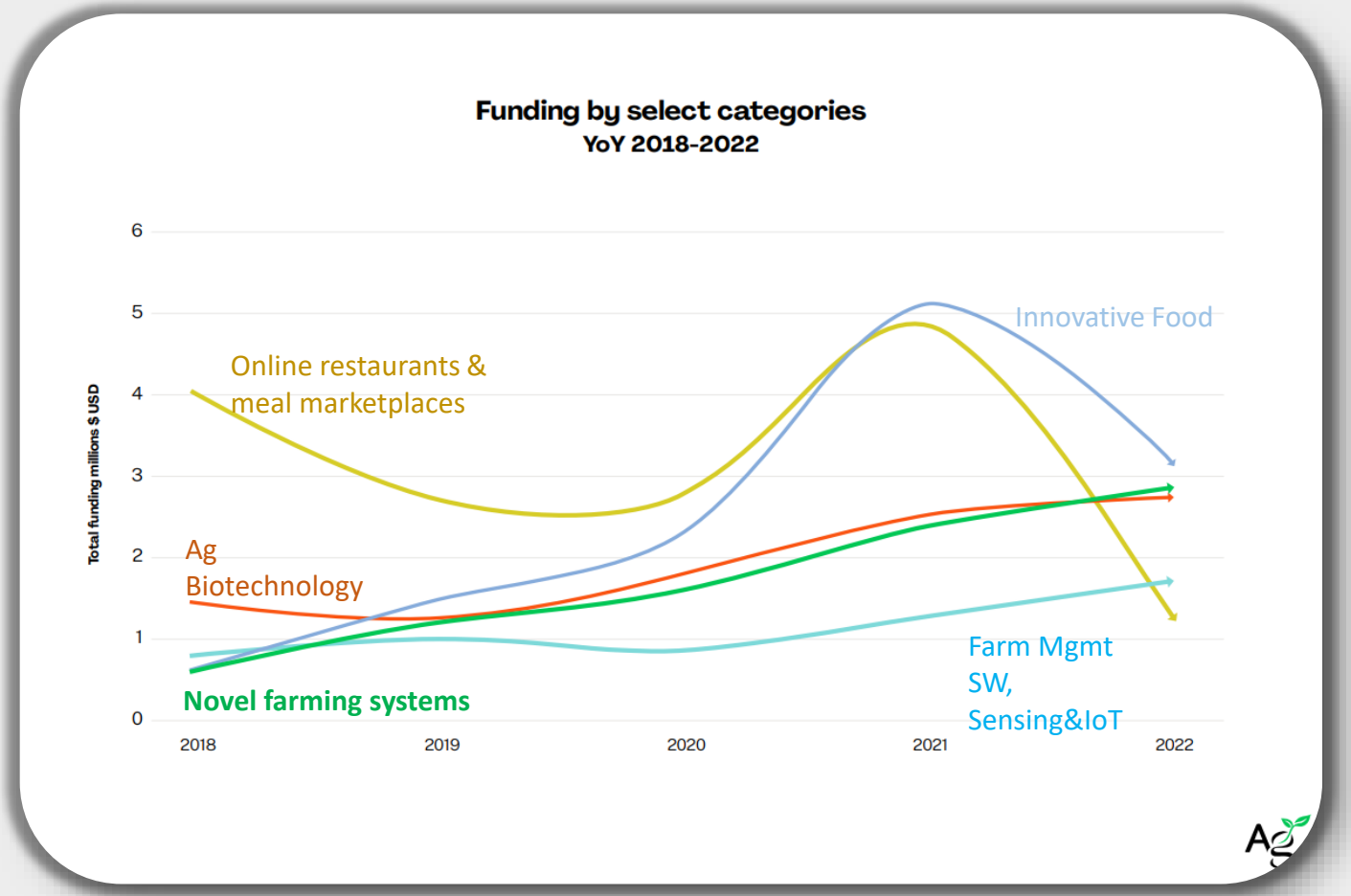


Vertical axis: represent search interest relative to the highest point on the chart for the given region and time.
A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term

Vertical farming attracts investments

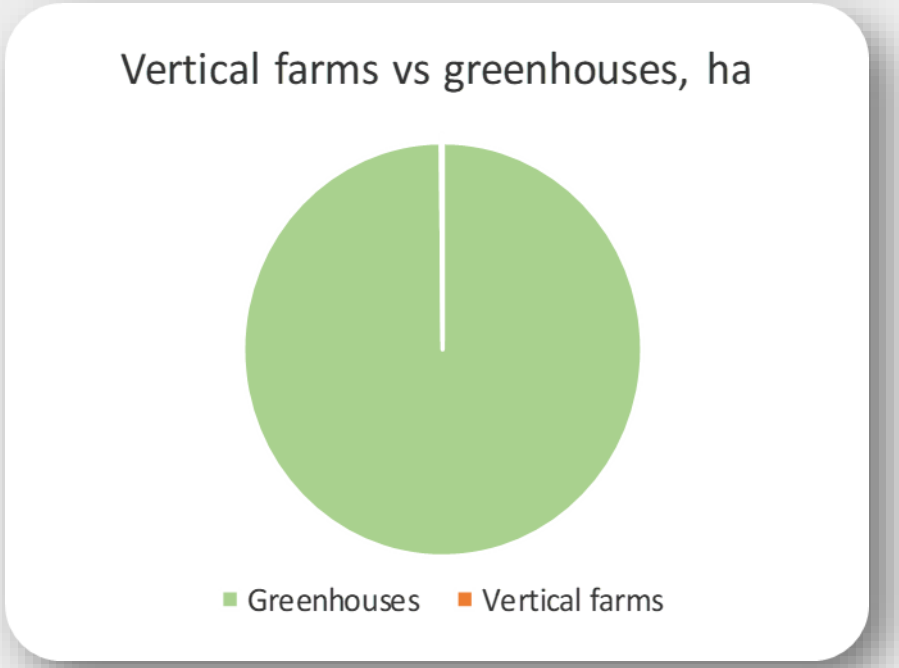
In 2022 novel farming systems have attracted $2.85 billion which is 21% year-over-year increase





How is the vertical farming influencing fresh produce market?

- The global area of vegetables and herbs grown in greenhouses is estimated at about 500 000 ha, of which about 40 000 ha in glasshouses and remaining – under plastic
- While vertical farms occupy a bit more than 70 ha worldwide
- Even considering 4x productivity comparing to conventional greenhouses, the supply from vertical farms is still less than 0.1%
- Vertical farming is still a niche industry



Source: Rabo Research

How ‘novel’ is vertical farming system?

- The technology is old,
- but its success depends on the **business model**, suitable to the context of application

600BC – Hanging Gardens of Babylon

1150AD – Aztec chinampas hydroponic farming

1627 - Hydroponic gardening and farming methods - Sylva Sylvarum by Sir Francis Bacon

1915 - Gilbert Ellis Bailey – Vertical Farming

1929 -William F. Gericke (UC Berkeley) published “Aquaculture: A means of Crop-production”

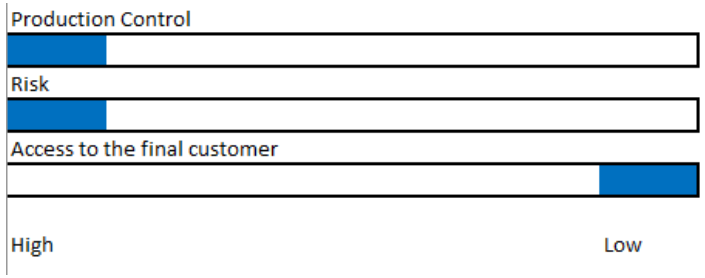
1964 - vertical farm at the Vienna International Horticulture Exhibition

1999- Dr. Dickson Despommier – the Vertical Farm: Feeding the World in the 21st Century

2009 - Sky Green Farms’ Singapore

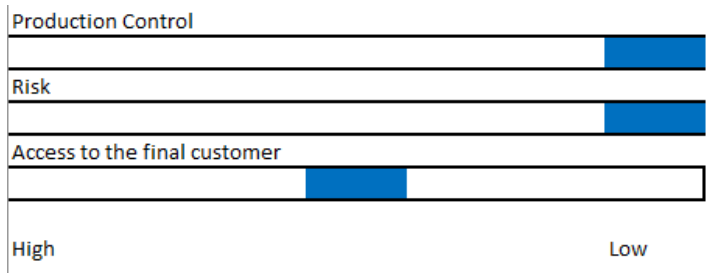
2014 - Astronaut Steve Swanson started the first crop of lettuce on May 8 on the International Space Station

Build-Own-Operate (BOO)



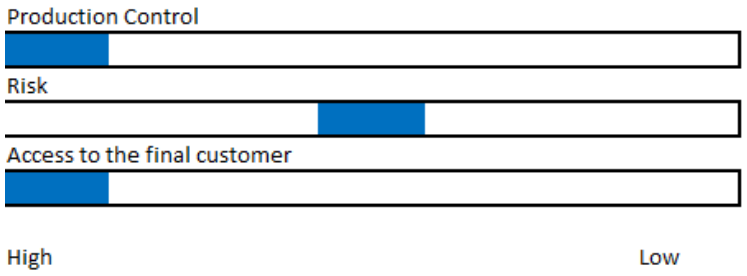
Target market	B2B and B2C Retail, HoReCa
Produce price range	Mass product Greenhouse produce price + premium
Competition	Greenhouse produce
Location	Usually, warehouses, outside the city
Risk	***
Advantages	Control of the whole VC Scalable In-house product dev-t
Disadvantages	CAPEX High risk Needs spec. expertise

Build-Own-Lease (BOL)
Renting out technology

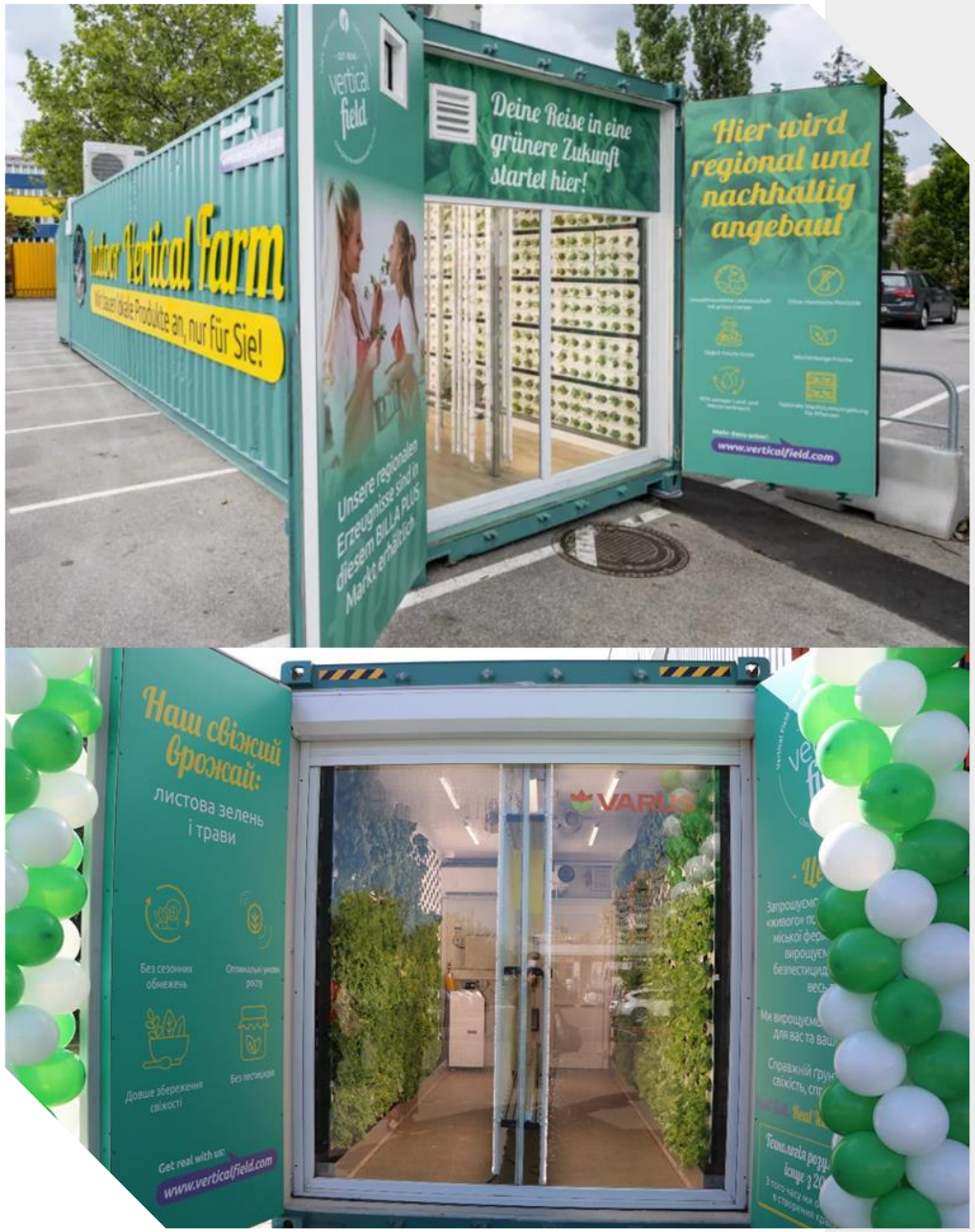


Target market	B2B HoReCa
Produce price range	--
Competition	---
Location	In urban area, hotels & restaurants
Risk	*
Advantages	Scalable and mobile Close to the final consumer Decreased production risks
Disadvantages	Less control over the process

Build-Lease-Operate (BLO)
Service farming



Target market	B2B Retail
Produce price range	Competitive
Competition	Locally grown produce
Location	In retail
Risk	**
Advantages	Scalable Retained control over production Decreased sales risk
Disadvantages	Low margins



Key Success Factors

Market: unique product, daily, fresh, healthy food

Price should be competitive with other market alternatives

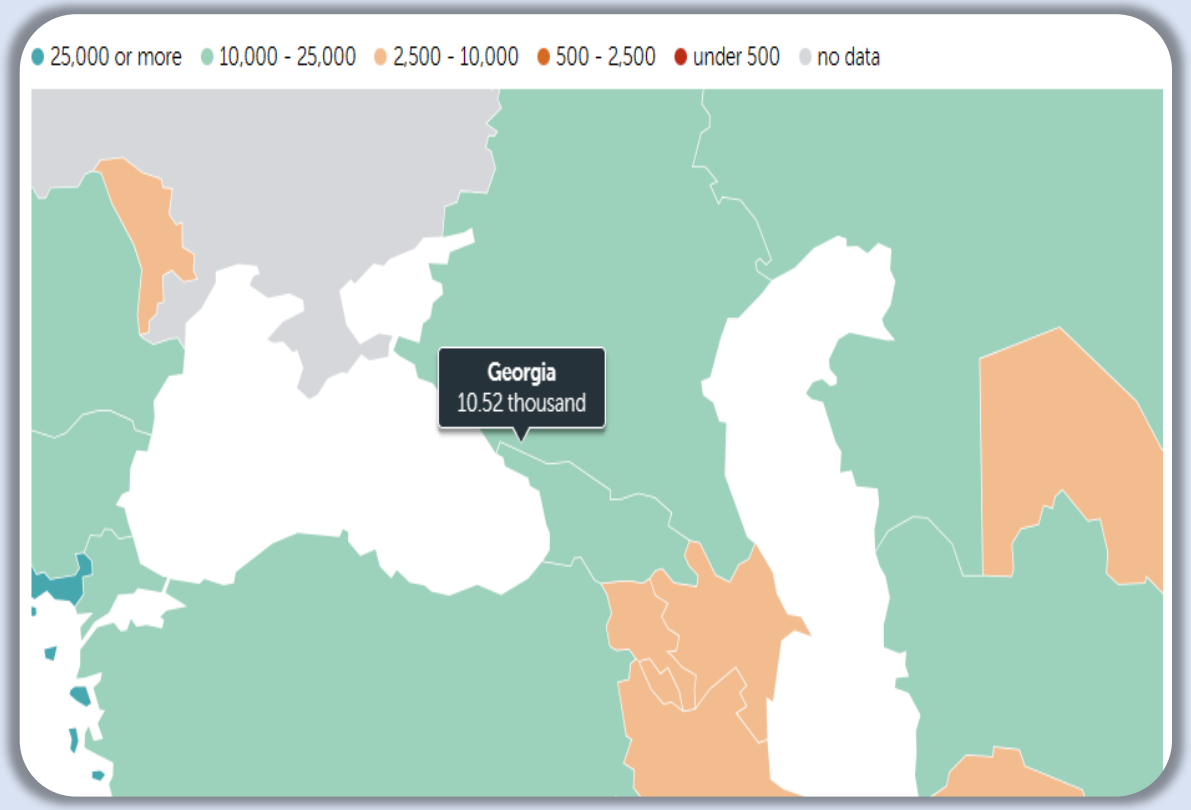
Market access, short logistics

Distribution: Availability of urban infrastructure

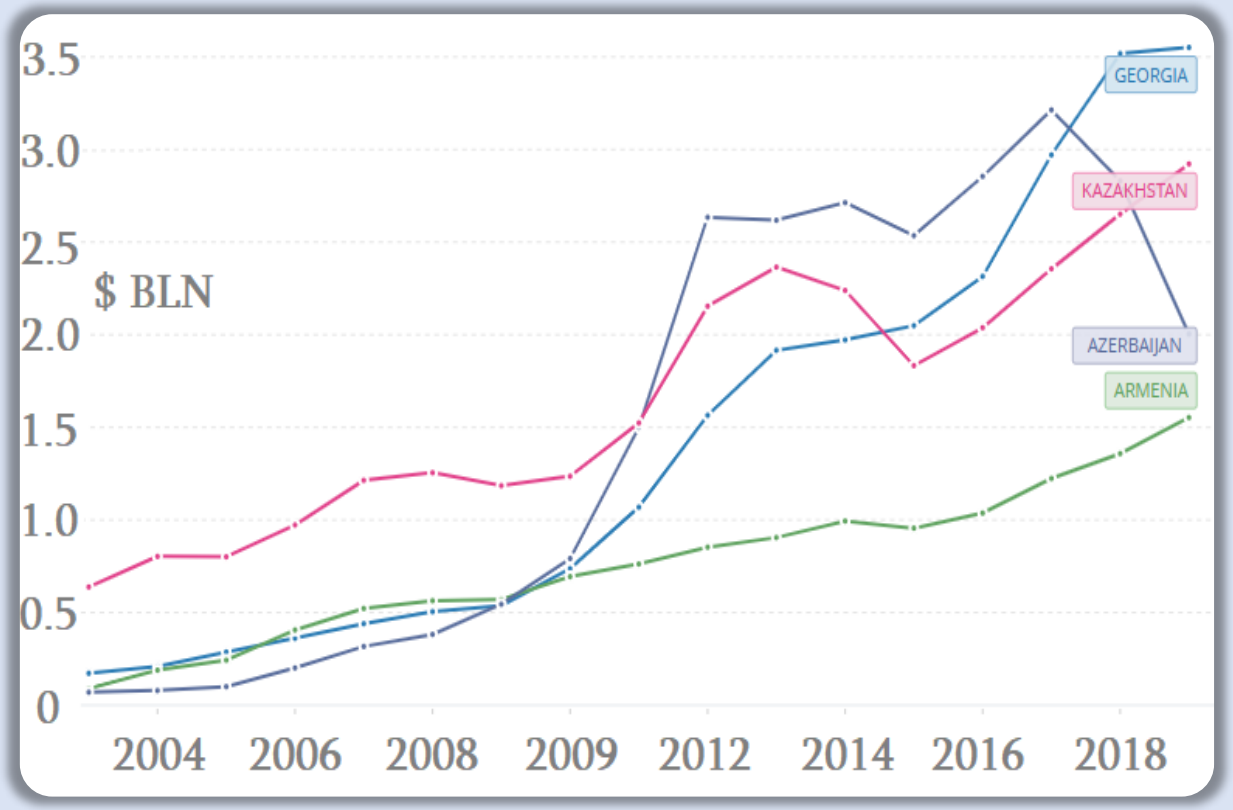
Why Georgia? - General factors

Rising income of local consumers & rising income from tourism

$10k GDP per capita in 2027 (IMF)



$3.55 BLN from inbound tourism (WB)



Why Georgia? - General factors

Buyers' market is growing, while the local supply is stable

Fast development of hotels and restaurants
(2014-2021, GeoStat)

Investments $750 MLN

Turnover $4500 MLN

Record turnover in 2022 $815 MLN

Fast development of retail
(TBC Capital)

FMCG revenue from $3 BLN in 2019 to $6 BLN in 2022

Stalled local supply of Greens
(2014-2022, GeoStat, EastFruit, MoF)

Production

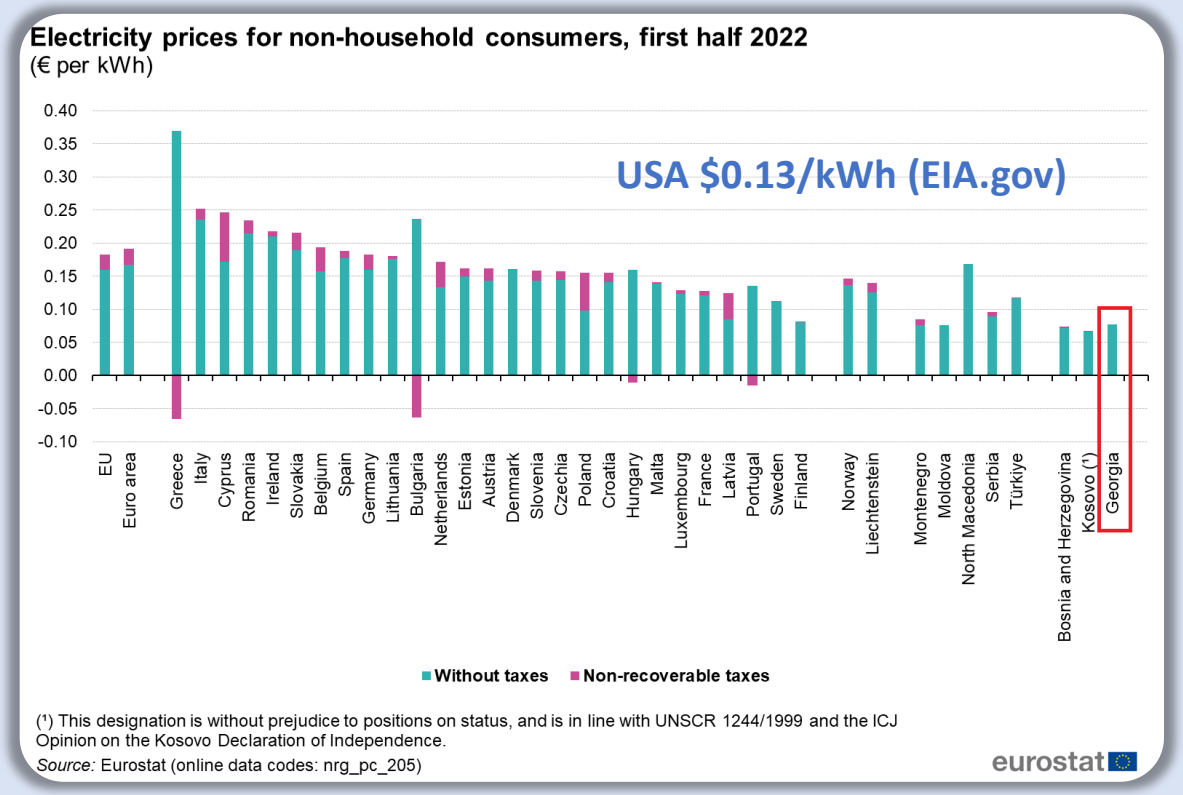
Import

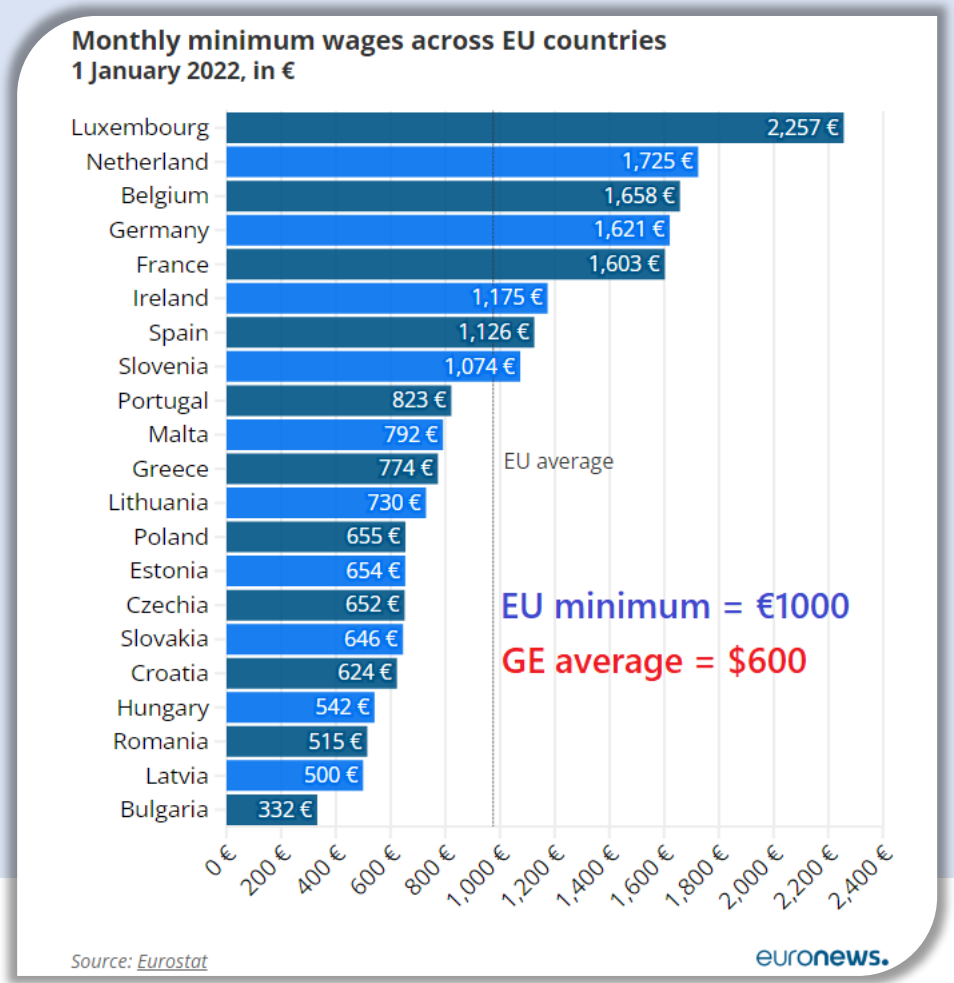
Export

More specific factors - inputs

Main inputs are cheaper in Georgia

Cheaper electricity & labor – Average wage in Georgia in 2022 amounted to $600





More specific factors - outputs

Georgian customers are paying more

Romaine lettuce 1kg

GE ≈17 GEL (Soplidan.ge)
USA ≈13 GEL (Amazon)

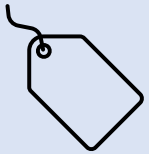
Iceberg lettuce 1kg

GE 9-11 GEL (Soplidan.ge, Goodwill)
USA 7-9 GEL (Amazon)

Factors - results from the local survey

All local farms want to expand or have already expanded

Planned numbers are **close** to actual numbers



Prices for three farms are very close (±2%) to the expected

One farm got 2-10% lower prices than planned

Operational expenses are very close (±2%) for two farms

For other two they are 2-10% higher

For two farms sales volumes are very close (±2%) to the expected

Other two report 2-10% lower than planned

Investing in vertical farm in Georgia

Farming in a building

Results from calculator by iFarm

		Prices 1kg = $15 1pot = $0.8		Prices 1kg = $20 1pot = $1.2	
Farm size, m2	Investment amount, $1000	Monthly EBITDA, $1000	Payback, years	Monthly EBITDA, $1000	Payback, years
150	$ 300	$ 2	10	$ 5	5
250	$ 550	$ 8	5	$ 15	3
350	$ 750	$ 13	4	$ 25	2
450	$ 800	$ 16	4	$ 30	2

- **Room height 3.5m**
- **Building excluded**
- **Investment per m^2 $1,800+**
- **Profit (EBITDA) per m^2 $20-$55**

Investing in vertical farm in Georgia

SPOTS by SPACEFARMS®

Innovative offer from the local SpaceFarms

Monthly	Amount	Unit
Yield	688	Plants
Electricity cost	18	$
Rent & maintenance	800	$
Profit	**576**	**$**

- **Floor size: 2m²**
- **Rent includes seedlings**
- **Estimated annual profit: $6,000-$7,000**

Thank you for attention