VALUEWASTE

Unlocking new **value** from urban bio**waste**

Unibio solutions for UFMSW valorisation from Valuewaste

Michael Jensen, May 26, 2021

Horizon 2020
European Union Funding
for Research & Innovation

"This project has received funding from the Europ
Union's Horizon 2020 research and innovat
programme under Grant Agreement No 818312"

THE PROJECT

at a glance

Start Date
1 November 2018

End Date
31 October 2022

48 months

17 partners
5 different **countries**

Project title:

Unlocking new VALUE from urban bioWASTE

Acronym: Valuewaste

Grant Agreement Number: 818312

Call: H2020-SFS-2018-1

Overall budget: 10,863,876.25 euros

EU Contribution: 8,375,472.25 euros

Pilot cities: Murcia (ES) and Kalundborg (DK)

Pilot Plant in Murcia (ES): working since January 2021

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OUR VISION

DECOUPLING

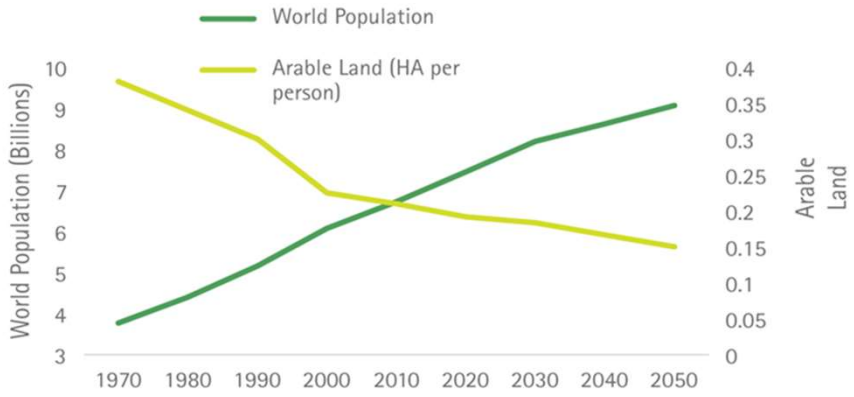
PROTEIN PRODUCTION

FROM

FARMING AND FISHING

The world needs **sustainable** solutions in food production

- **The world needs sustainable solutions to overcome the large-scale food challenges of the 21st century**
  - ~10 billion people by 2050
  - More wealthy people = increased demand for protein
- **Protein production is increasingly challenging**
  - Fish stocks reducing, water becoming a scarce resource and cropland limited

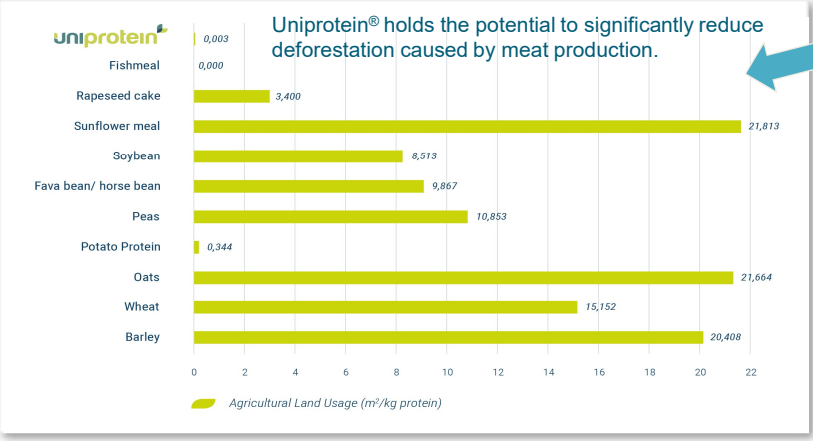


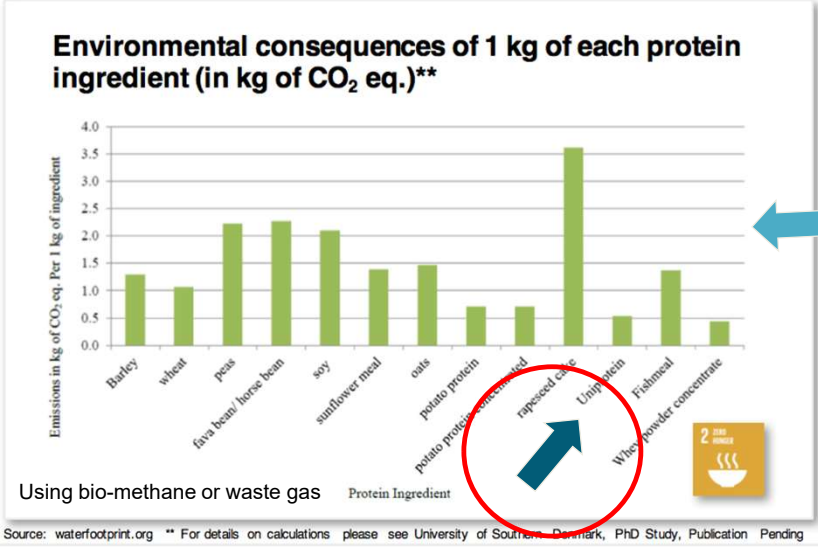
Value propositions

- **Scalable technology that provides protein in large quantities with a small footprint**
- **Sustainable, non-GMO and organic products**
- **No intensive agriculture and unsustainable fishing**
- **Reduced climate impact of meat production**
- **Provides alternative use for carbon monetization e.g. by using methane currently flared**

FOOD SECURITY
Meeting the food security needs of the soon-to-be 10 billion people

Minimizing environmental effect of food production
Sustainability is the key focus





Low land footprint

A 10,000 m² land plot (ex. utilities) is needed for production of 25,000 tonnes per annum of Uniprotein®, while a similar space of land only allows for production of 700-3000 kg soy.
Hence Uniprotein® holds the potential to eliminate/reduce the deforestation caused by current soy production.

Oceanic effect

Currently fishmeal produced from fish farms or wild, commercially caught fish puts unsustainable pressure on ocean ecosystems
Uniprotein® is almost identical to fishmeal in terms of protein content and essential amino acid profile
Uniprotein® therefore holds the potential to eliminate/reduce pressure on ocean ecosystems.

Reduced water usage

Production of Uniprotein® requires 5 litres of water for production of 1 kilo of, while production of soy requires 1500-3000 litres of water for production of 1 kilo including rain water*
Most of the water is recycled to the U-Loop fermentor to reduce its consumption
Reducing water usage in food production will become a political focus point in the future!

CO_2 effect

The CO_2 profile of Uniprotein® varies dependent upon source of methane. If bio-methane or flare gas are utilized then production of Uniprotein® leads to actual GHG reduction or production is neutral.**

Furthermore, Uniprotein® adds many derived positive CO_2 impacts:

- Reduces deforestation as Uniprotein® reduces the need for soy
- Allows for production to take place closer to point of utilization, thereby reducing CO_2 outlet from transportation
- Allows farmers to reduce total feed quantity per animal

Sustainable game-changing technology

Natural Gas/Biogas (Methane)

Oxygen

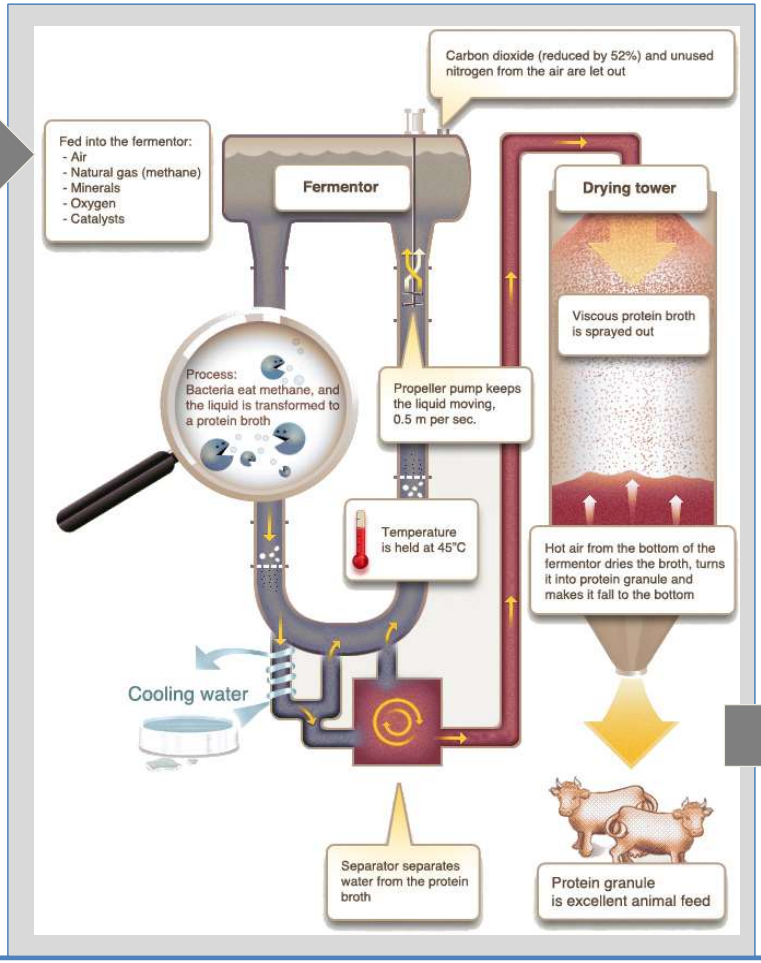
Chemicals

Minerals

Water

- **Use methanotrophic bacteria that "eats" gas and convert it to protein**
- **The U-Loop® speeds up the process significantly while allowing Unibio to perform the process in a controlled and monitored environment**

Unibio's U-Loop® technology drives process efficiency & economics



Technology status

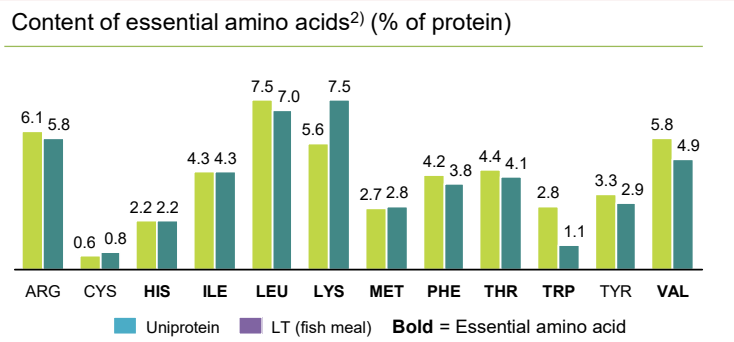
- **Results from pilot and demonstration scale in Denmark**
  - Protein quality on specification
  - Productivity target reached
  - Target fermentation length surpassed
  - Cost of substrate documented
- **Commissioning as we speak - testing of Russian plant with bacterial culture**
  - One module (4x50m^3) plant produces c. 6,350 tonnes/year of Uniprotein®
  - Several tonnes of spray dried product have been produced
- **Benefits of production approach when fully implemented**
  - Highly scalable
  - Attractive returns
- **Ongoing negotiations of industrials plants - 2023**
  - South East Asia, Middle East and North America

PROTELUX PLANT IN RUSSIA (LICENSEE)

High quality product, promising test data, no off-take risk

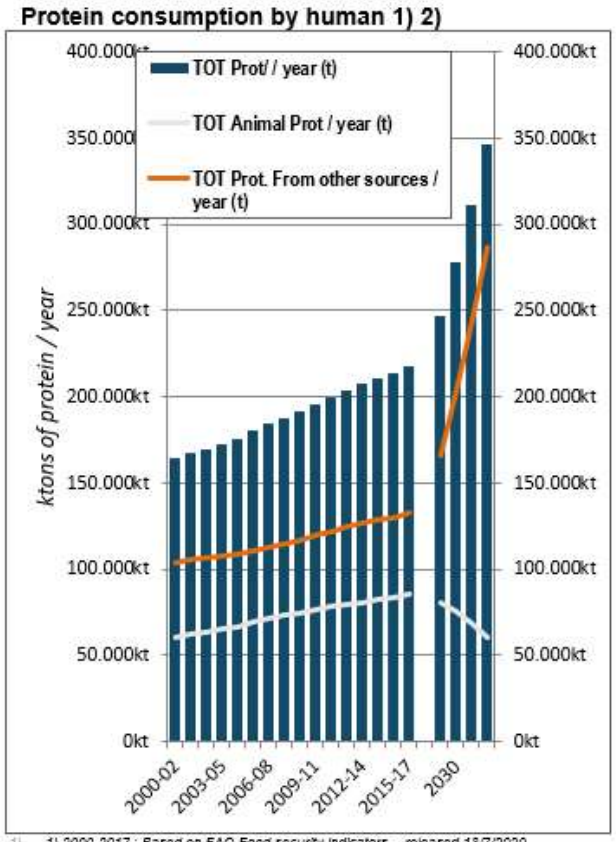
- **Uniprotein® - superior product performance and appealing product characteristics**
  - Protein-rich biomass (≈70% protein)
  - Better amino acid composition than fishmeal
  - Can be used as a direct supplement in animal feed compounds
  - PET–Product with only 2-3% of N.A. - now available
- **Approved in EU for animal and fish feed**
- **Feeding trials show promising results**
  - Updated test on juvenile rainbow trout, carp, tilapia, shrimp, salmon and piglet feed
  - **High feed conversion ratio**
  - **High true protein digestibility**
- **Unibio offering off-take agreements on full or part of the production capacity**
- **Collaboration with Goodvalley on climate neutral pork**
- **FEED-X Partner, shifting protein production from conventional to sustainable methods**
- **NEXT STEP FOOD….**

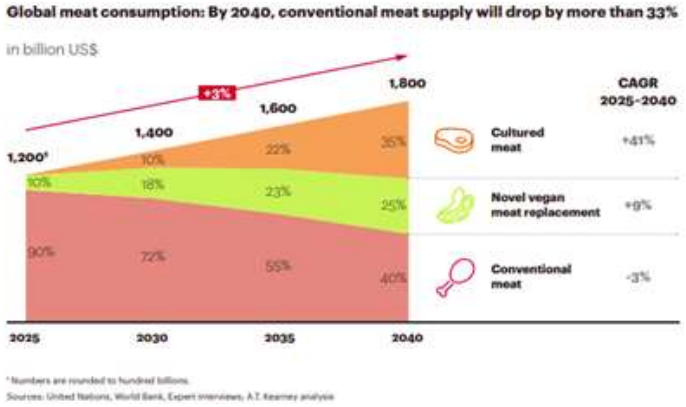
Superior quality and several applications

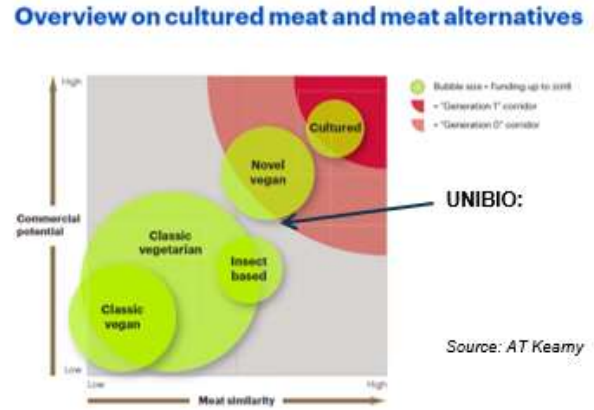


Food strategy

Global megatrends create a need for alternative protein sources: by 2040 worth 1,000bn US$





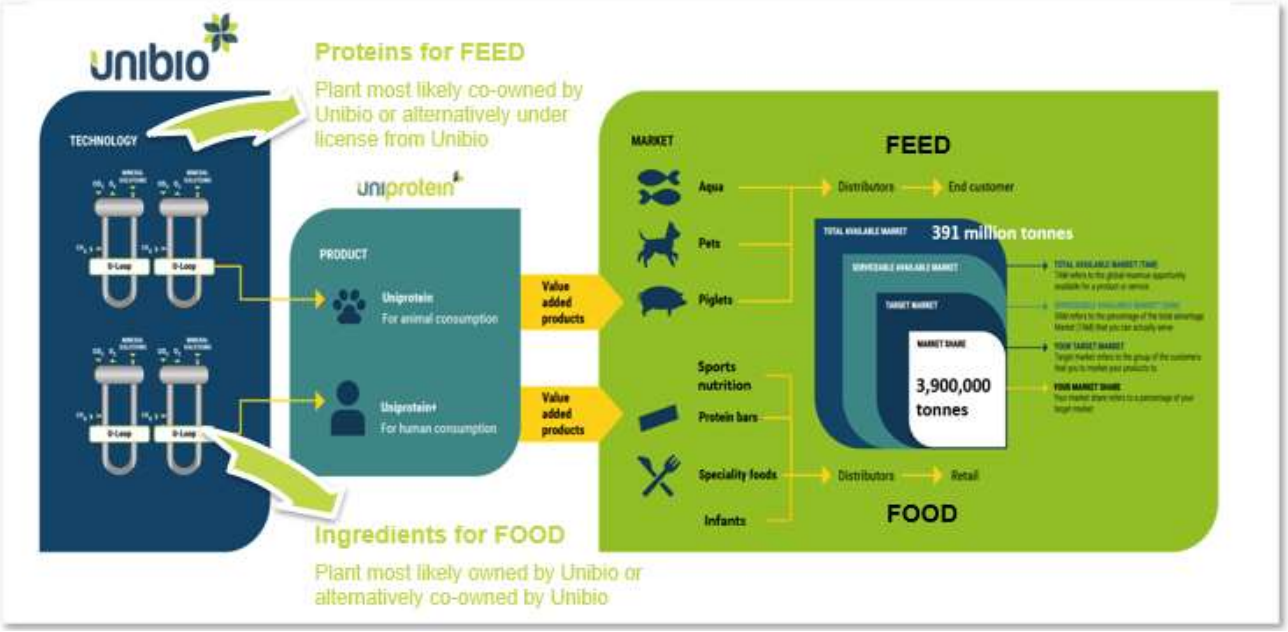


1) 2000-2017 : Based on FAO Food security indicators - released 13/7/2020
2) 2020-2050: Based on AT Kearny projections – How will cultured meat and meat alternatives disrupt the agricultural and food industry?, 2019

Build ”feed and food” plants

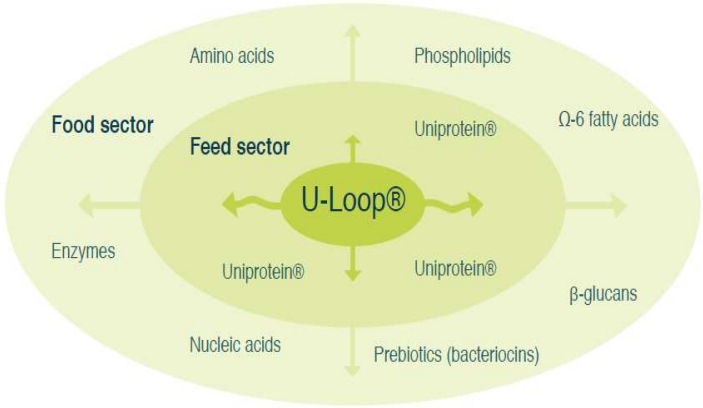
Production plant ownership strategy changes with food ingredients production

- The value-added food ingredient products will be produced by Unibio in joint venture or 100% owned food ingredients production plants. This grants the company a large amount of flexibility to choose where to locate the plant(s) and the entire transfer price when selling the products into the partnerships. Unibio intends to raise the necessary funds to pursue this strategy.
- However, in case it makes logistical and commercial sense, alternatively Unibio may add food ingredient downstream sections to existing plants co-owned by Unibio. It may speed up the commercial roll-out of the food related products and create better margins in case feedstock prices are lower in areas with existing Uniprotein® production plants.



FRACTIONATION ROUTES AS OF TODAY

Product and process development



Various products derived from the biomass

The fractions are isolated and purified by means of various separation processing technologies, membrane filtration principles and various chromatography techniques.

Protein products
- Uniprotein+ (vegan)
- BPC
- BPI

Taste Enhancers
- Nucleic acids
- Hydrolysed cell walls and fatty acids

Vitamins
- Vitamin B12

Bioactive peptides
- Methanobactin

Mineral products
- Bioavailable minerals (high level of zinc essential in vegan food)

Fractionation			
Constituents 1000 tonnes	Volumes Tonnes	Value USD/t	Value - turnover USD
Cell Walls & Fatty Acids	43	2.000	86.527
BPC-BPI	743	7.500	5.572.500
Nucleic acids	41	13.000	527.617
Ash	174	1.000	173.555
In total	1.000		6.360.199

Uniprotein+			
Constituents 1000 tonnes	Volume Tonnes	Value USD/t	Value - turnover USD
Uniprotein+	780	4.500	3.510.000
BPC-BPI	70	7.500	525.000
Nucleic acids	50	13.000	650.000
Ash	100	1.000	100.000
In total	1.000		4.785.000

VALUEWASTE PROJECT PARTNERS

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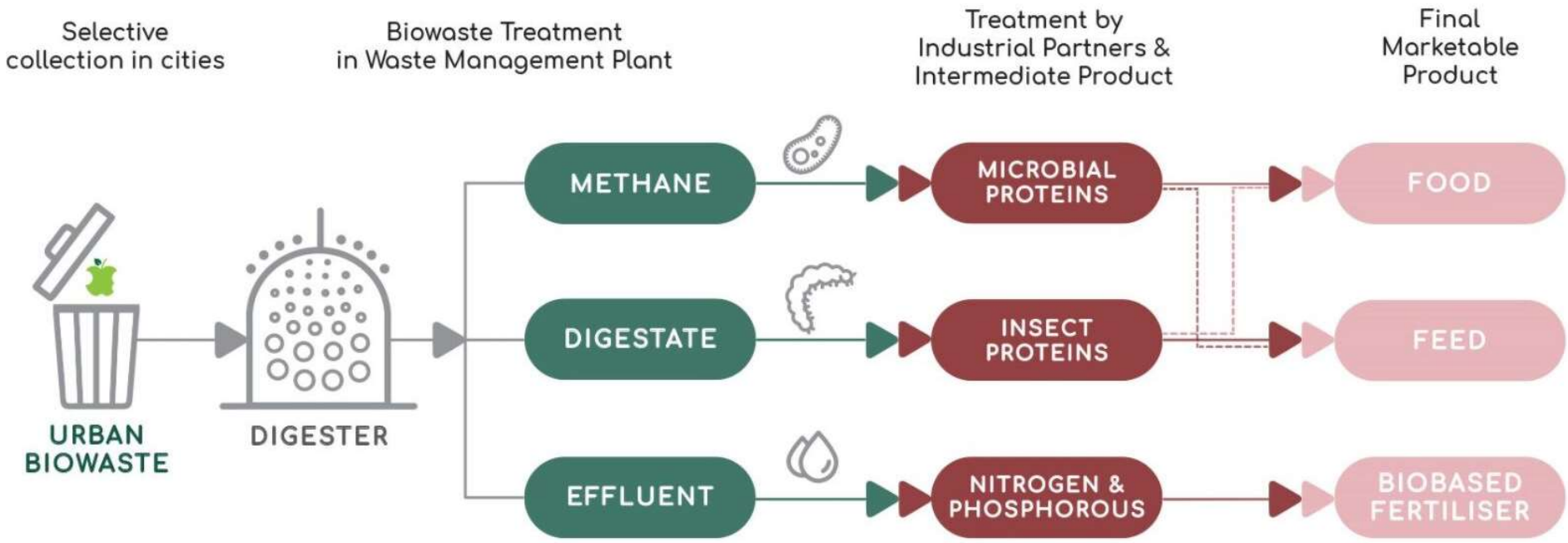
THREE VALORISING LINES

Of urban biowaste



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