Urban biowaste valorization: what's the menu? The H2020 HOOP project's state-of-the-art

Miguel Ángel Suárez, Elisa Gambuzzi (CETENMA)

Evgenia Vogiatzidaki, Eva Skourtanioti (Draxis)

22nd June 2023, 10th International Conference on Sustainable Solid Waste Management

Chania (Greece)

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

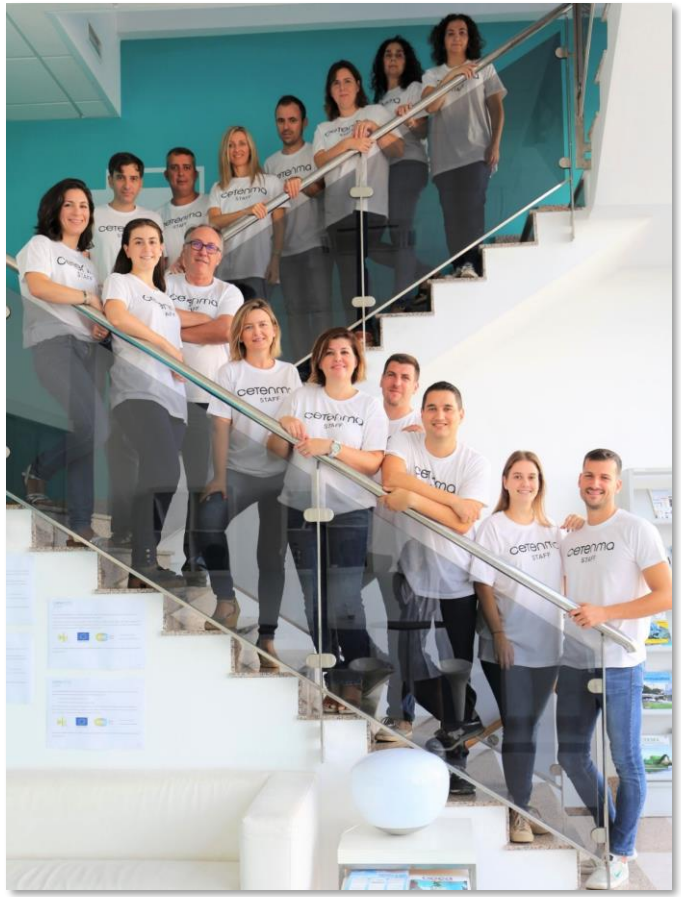
Circular Cities & Regions Initiative

CCRI Project

An initiative of the European Commission

Who we are?

Centro Tecnológico de la Energia y del Medio Ambiente



The **Technology Centre for Energy and the Environment, CETENMA** (Cartagena, Spain), is a private, non-profit Business Association, which was set up to support companies with technological research, development and innovation in all areas related to Energy and the Environment, thereby assisting them in becoming more competitive.

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

1. The issue with urban biowaste

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

The issue with urban biowaste

Organic fraction municipal waste (OFMSW)

selectively collected.

Households, HoReCa, Waste from street markets

Green waste from parks and gardens

Urban wastewater sludge (UWWS)

Specific municipal biowaste separately collected

Rejections / fractions from composting and anaerobic digestion

Compulsory separate collection since 01/01/2024!

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

Status of biowaste management

COMPOSTING

Image Freepik

They are both very good but…

ONLY 22

THE SAME SOLUTION DOES NOT WORK EVERYWHERE

NEED TO GET HIGHER ADDED-VALUE

THEY ALSO HAVE DRAWBACKS

Where is the menu?

ANAEROBIC DIGESTION

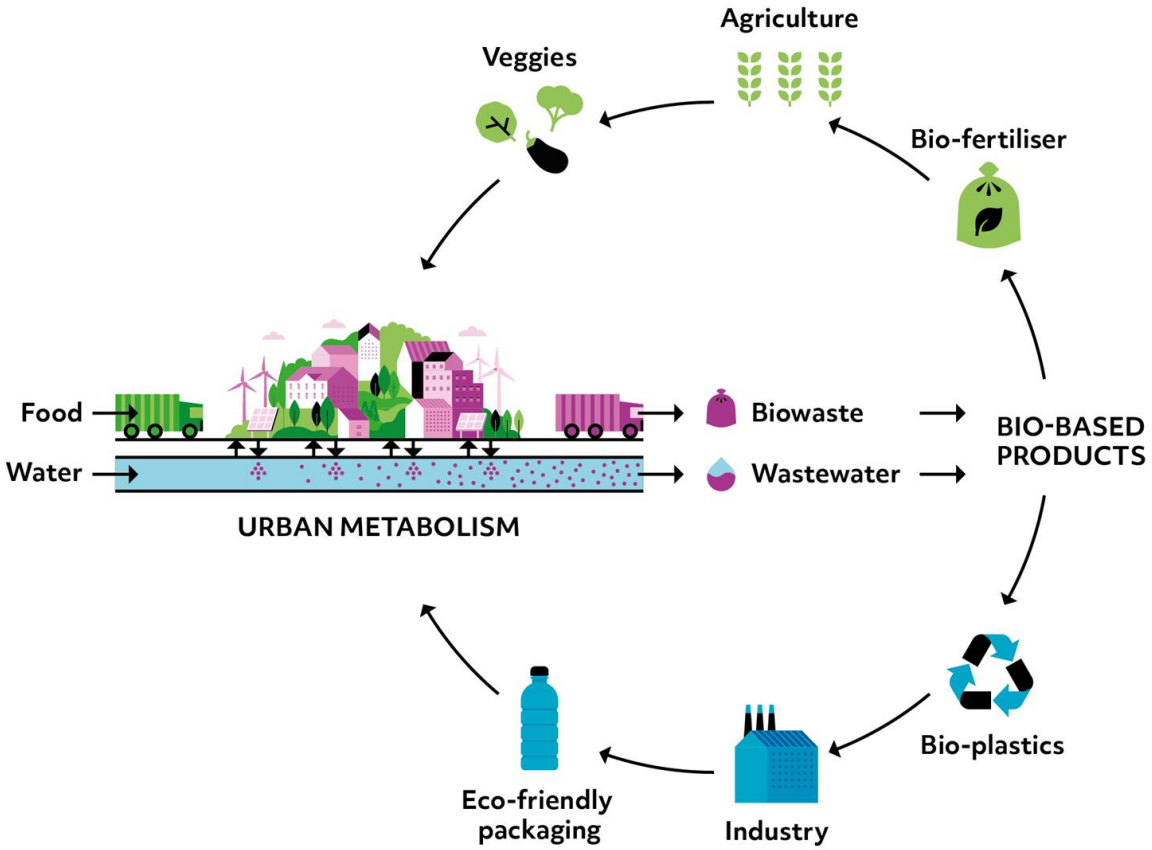
Image Freepik

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

2. The answer: urban circular bioeconomy

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

Urban circular bioeconomy concept

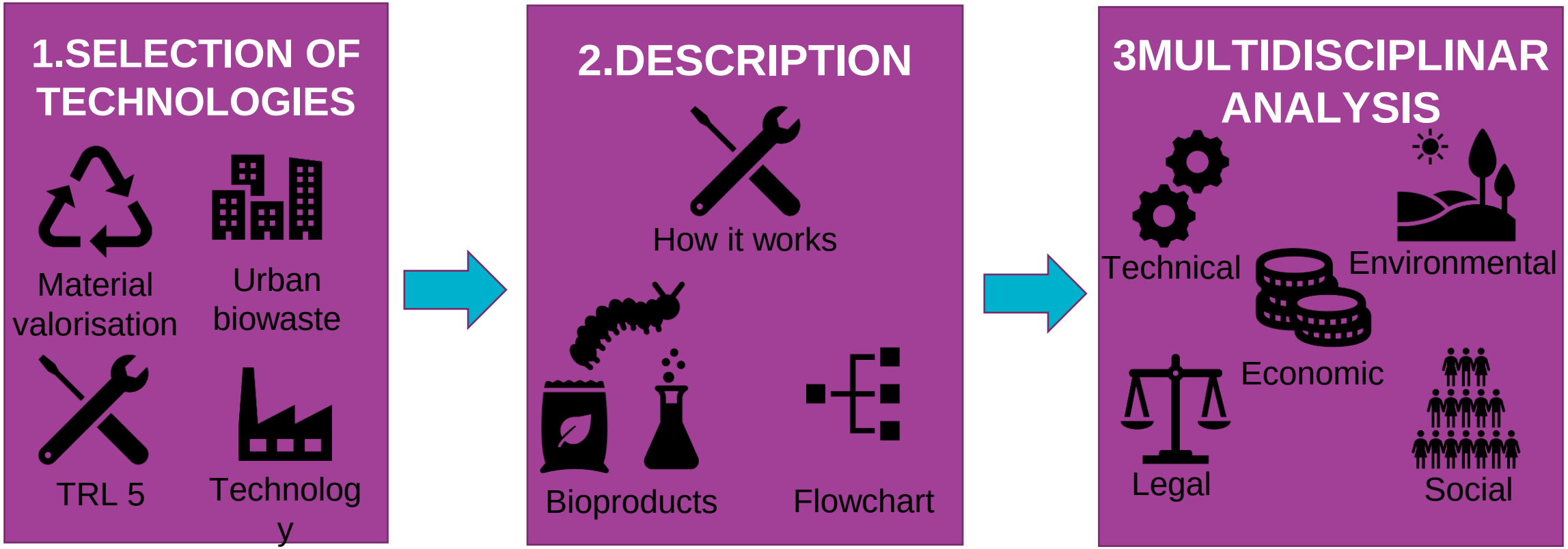


Publications Patents Research projects Start-ups

Many opportunities, but how to find your way?

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

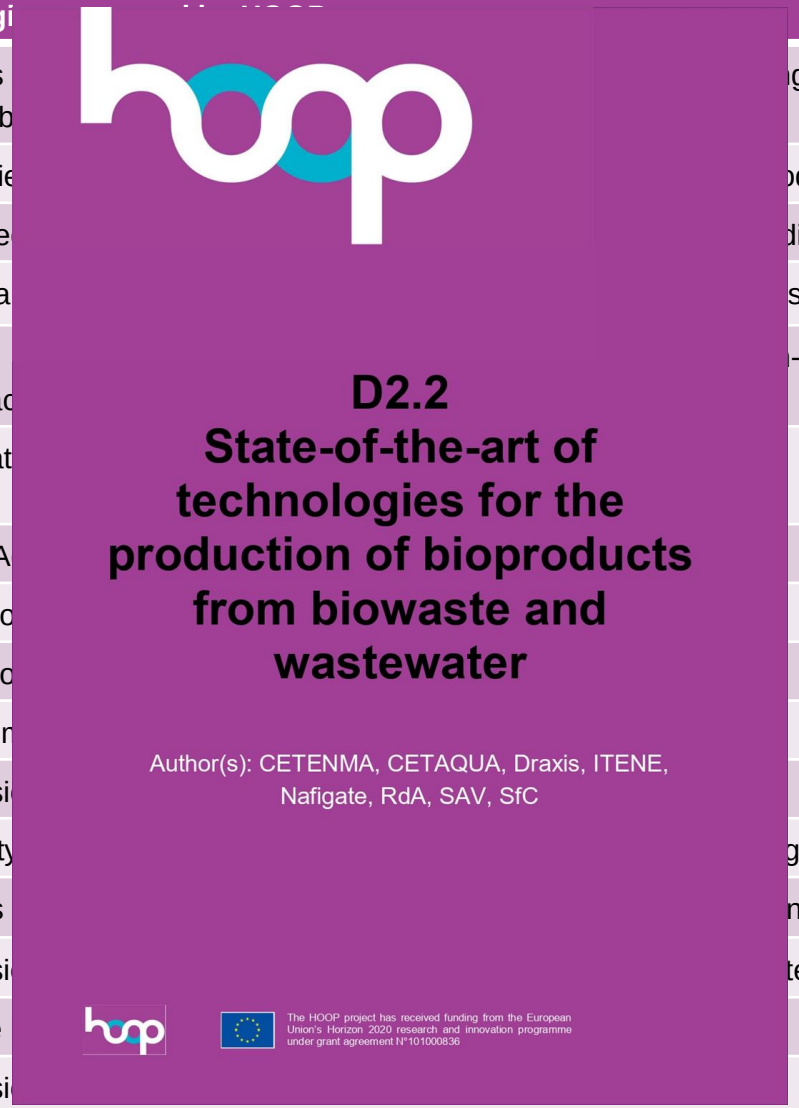
HOOP Methodology to make the menu of technologies



The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

This is the menu: Portfolio of 17 technologies for urban biowaste and wastewater sludge

Feedstock	Technologi		Bioproducts
AD biogas	Bioprocess anaerob	g from the	High-protein feed and food supplements
OFMSW, AD digestate	Black Soldie	oduction	Feed, frass, proteins, lipids, chitin
AD dewatering liquid	Nutrients re	digestion	Phosphorus and nitrogane-based biofertilizers
Meat/fish by-products	Biochemica	s	Collagen hydrolysate and active petides
OFMSW, UWWS	Production rhizobac	-promoting	Biofertilizers, biostimulants
OFMSW, garden waste, cellulosic rejections	Ethyl Lactat		Biosolvent, chemical building blocks
OFMSW (fruits/vegetables)	Polylactic A		Biopolymer
Used cooking oils	Fermentatic		Bioplastic, cosmetics
Spent coffee grounds	Fermentatic		Nutraceutical products and food additives
UWWS	Biochar fron		Biochar (biofertilizer)
UWWS	Bioconversi		Bioplastic
UWWS	Volatile fatty	ge	Chemical building blocks
OFMSW, UWWS, garden waste	Bioprocess	n waste	Chemical additive
AD biogas	Bioconversi	tems	Chemical building blocks
OFMSW	Microalgae		High-protein and omega-3-rich feed
OFMSW, horeca waste	Bioconversi		Biopolymers
OFMSW	Production of biopesticides Bacillus thuringiensis from OFMSW		Biopesticide



The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

Bioproducts by market sector

Chemistry

Volatile fatty acids
Acetate
Ethanol
Biosolvent (ethyl lactate)
2,3-Butanediol

Biopolymers

PHAs
PLA

Cosmetics

Bioplastics
Bioactive
ingredients

Nutrition

Single Cell Protein
Insects (protein, fat, chitin)
Animal feed
Nutraceuticals (carotenoids, active peptides)

Agriculture

Biofertilizers (PGPR)
Biopesticides (Bt)
Phosphorus/nitrogen fertilizers (struvite, ammonium sulphate)
Biochar
Insect frass

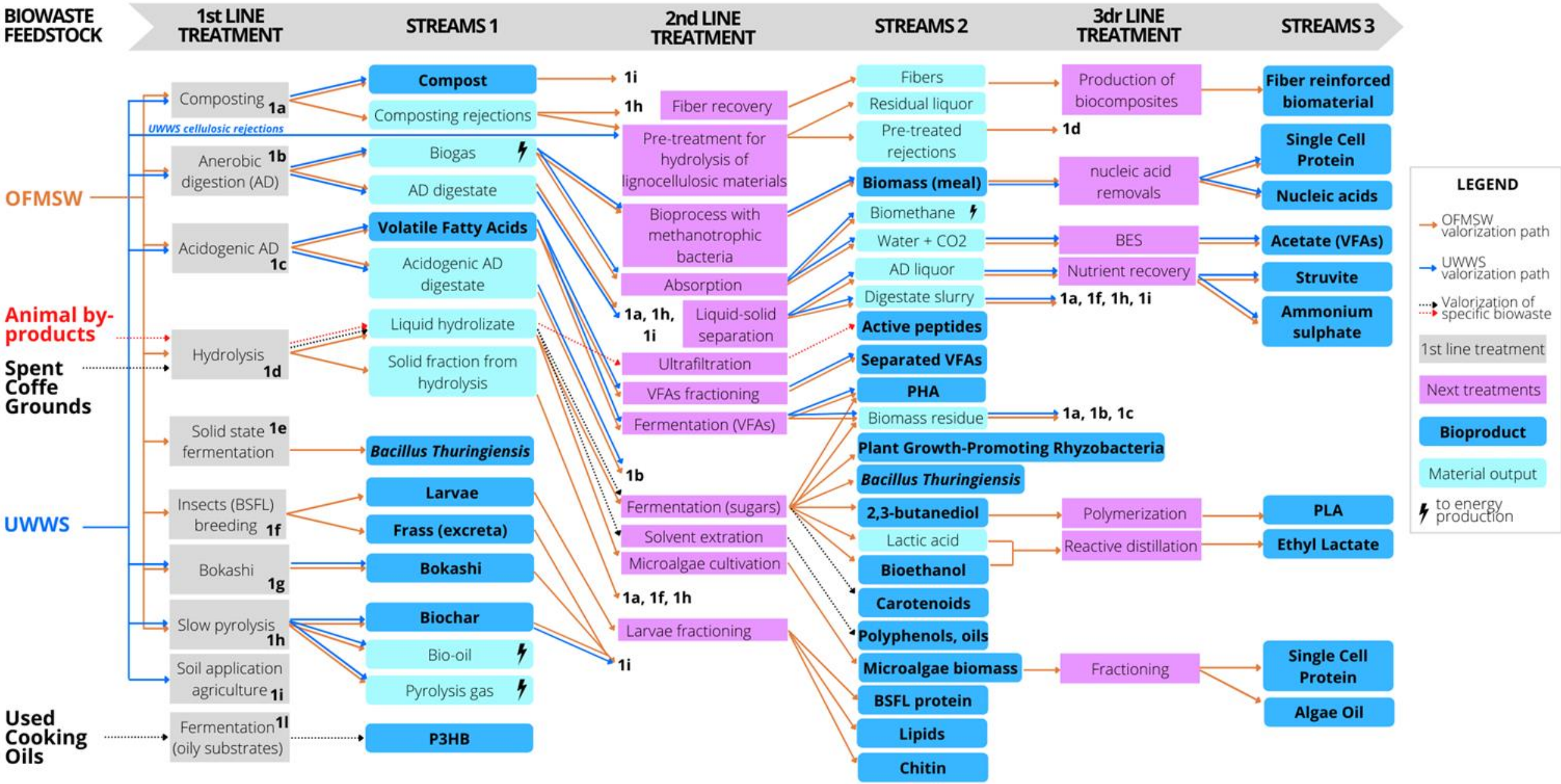
And more coming soon...

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

Results

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

VISUAL SUMMARY OF PROCESSES FOR THE PRODUCTION OF BIOPRODUCTS FROM BIOWASTE AND WASTEWATER



Circular Economy is, first of all, ECONOMY

Building the new economic paradigm is like building a house

Materials

Biowaste valorization technologies

+

Tools

Economic ecosystem for the bioproduct(s)

=

House

Successful Circular Bioeconomy Business

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

Results

1. Waste management solutions are **multistep industrial processes**

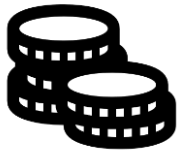
1. Flexibility
    1. Different processes can provide **the same function** (i.e. hydrolysis)
    2. A same technology might be applied to different biowaste

1. Biowaste **quality** is usually critical!

1. **BE AWARE OF REGULATORY!**

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

Results



- Replacement of existing linear products
- Economic value of the bioproducts and TRL are key factors for feasibility
- Higher added-value by downstreaming
- Social aspects: odours, noise, price

- Robustness in insect farming or pyrolysis
- Specific biowaste technologies:
  - Good for agrofood by-products
  - Regulatory advantages

To Learn more contact me

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

The HOOP Project

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

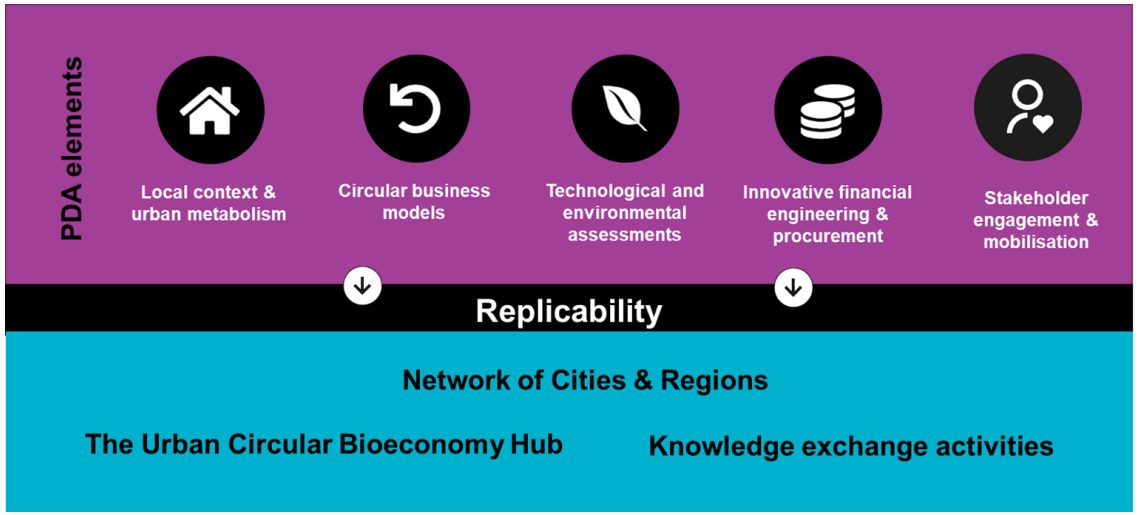
What is HOOP?

VALUEWASTE
WaysTUP!
SCALIBUR

23 partners
10 countries

€9M
Budget
€5.8M PDA management
€8M EC Contribution

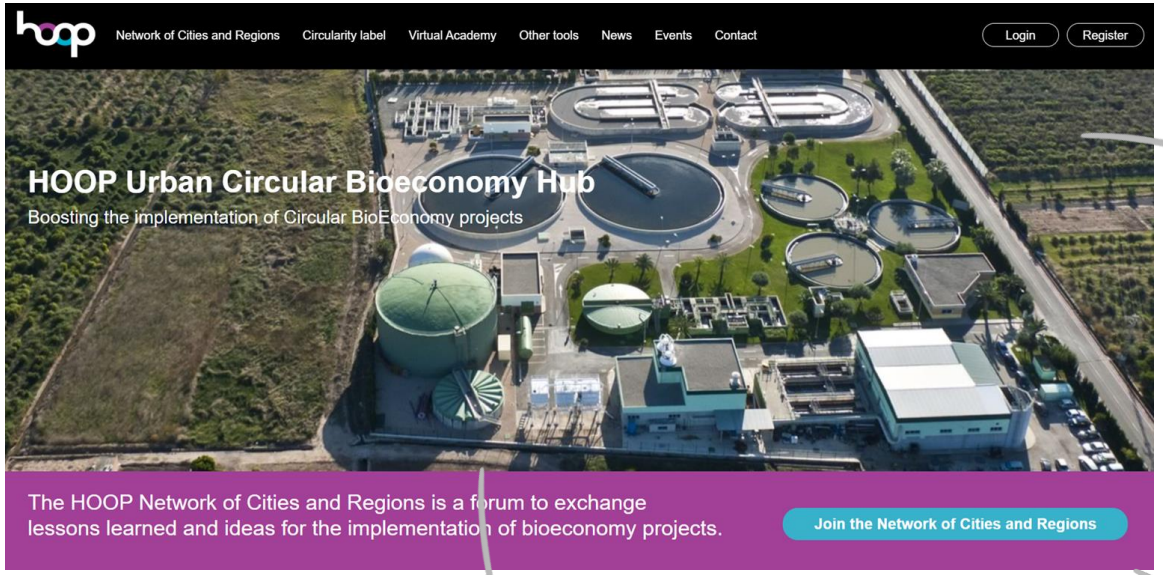
€51.7M
Investment
Induced

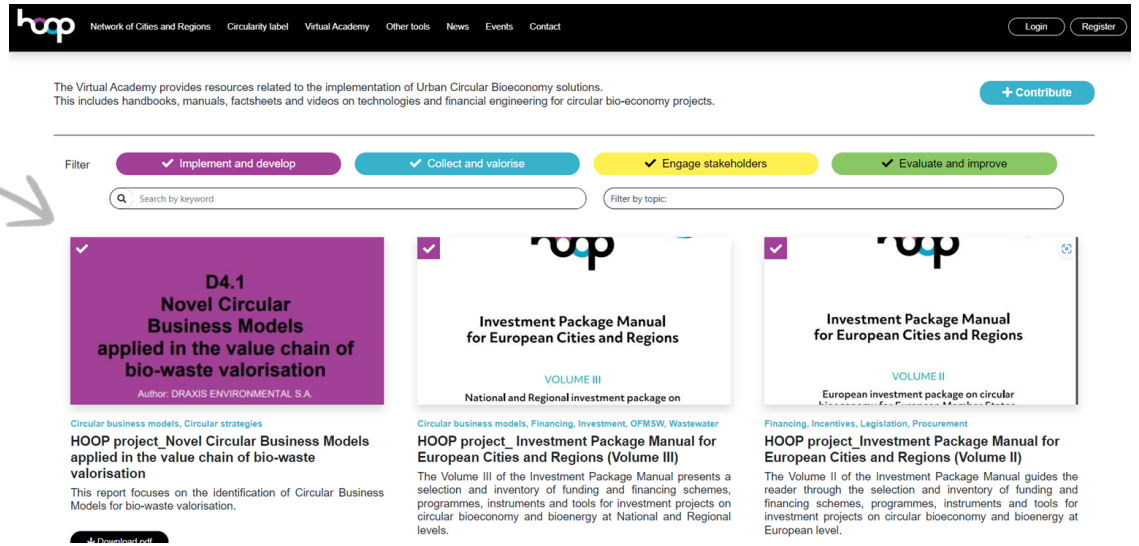


How to unlock investments in urban circular bioeconomy?

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

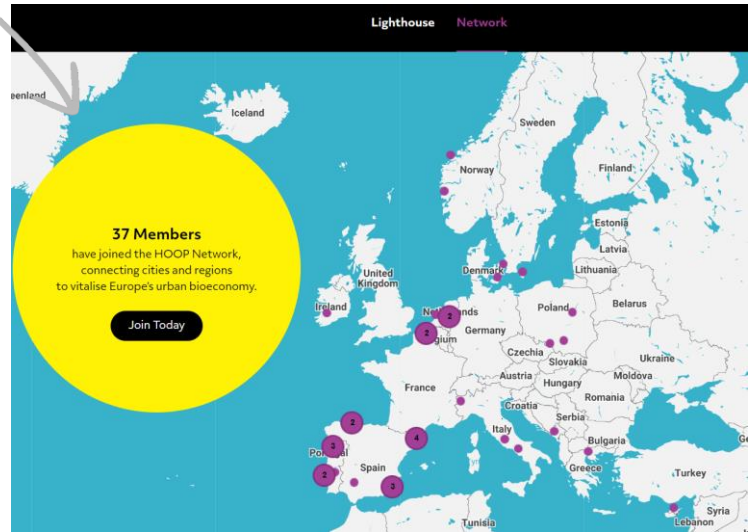
Learn more: HOOP Urban Circular Bioeconomy Hub





Virtual Academy

HOOP Bio-Circularity Label



HOOP Network of Cities and Regions

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836

Thank you very much for your attention!

Miguel Ángel Suárez

miguelangel.suarez@cetenma.es

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836