



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

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Chania (Greece)



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



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# Who we are?

**CETENMA**

Centro Tecnológico  
de la Energía 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.



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# 1. The issue with urban biowaste



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# 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 waste water sludge (UWWS)**



**Specific municipal biowaste separately collected**



**Rejections / fractions from composting and anaerobic digestion**

**Compulsory separate collection since 01/01/2024!**

# Status of biowaste management

## COMPOSTING



Image Freepik

They are both  
very good but...  
ONLY 2?

Where is the  
menu?

THE SAME SOLUTION DOES  
NOT WORK EVERYWHERE  
NEED TO GET HIGHER  
ADDED-VALUE

THEY ALSO HAVE  
DRAWBACKS

## ANAEROBIC DIGESTION



Image Freepik



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## 2. The answer: urban circular bioeconomy



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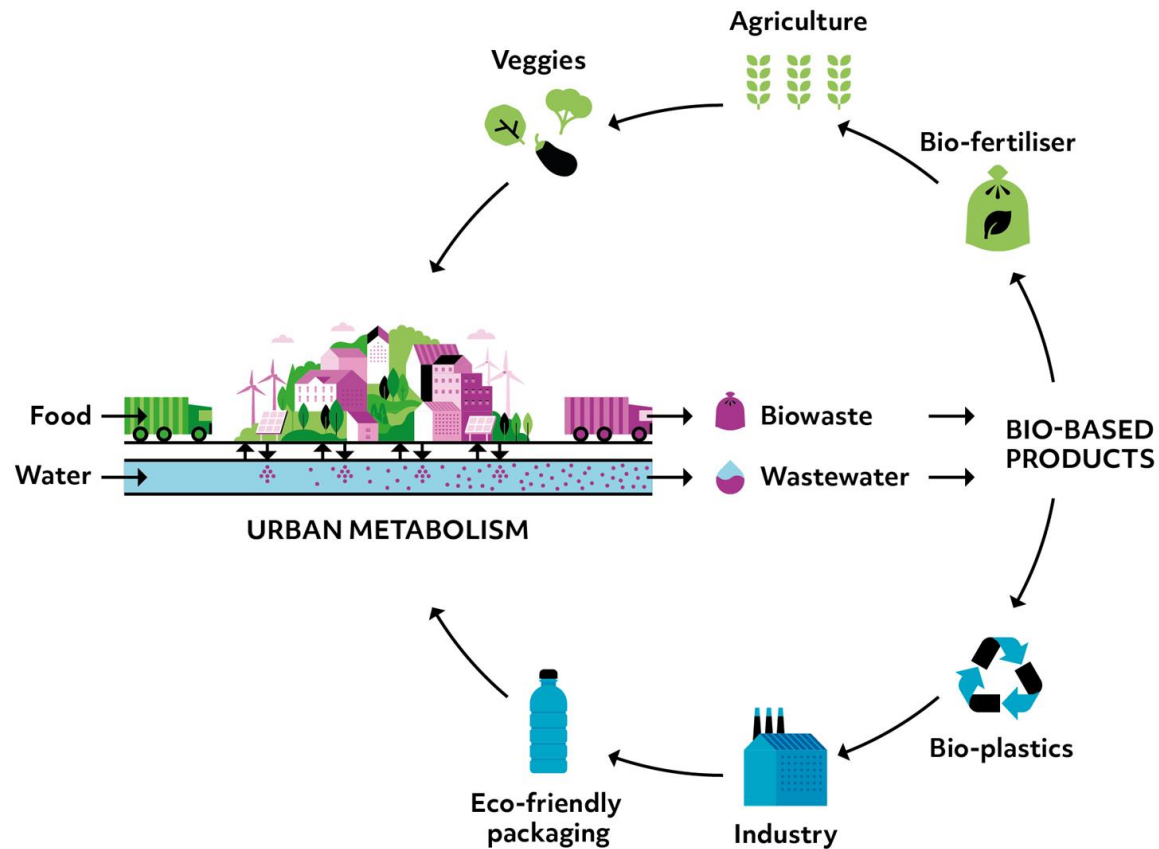
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An initiative  
of the



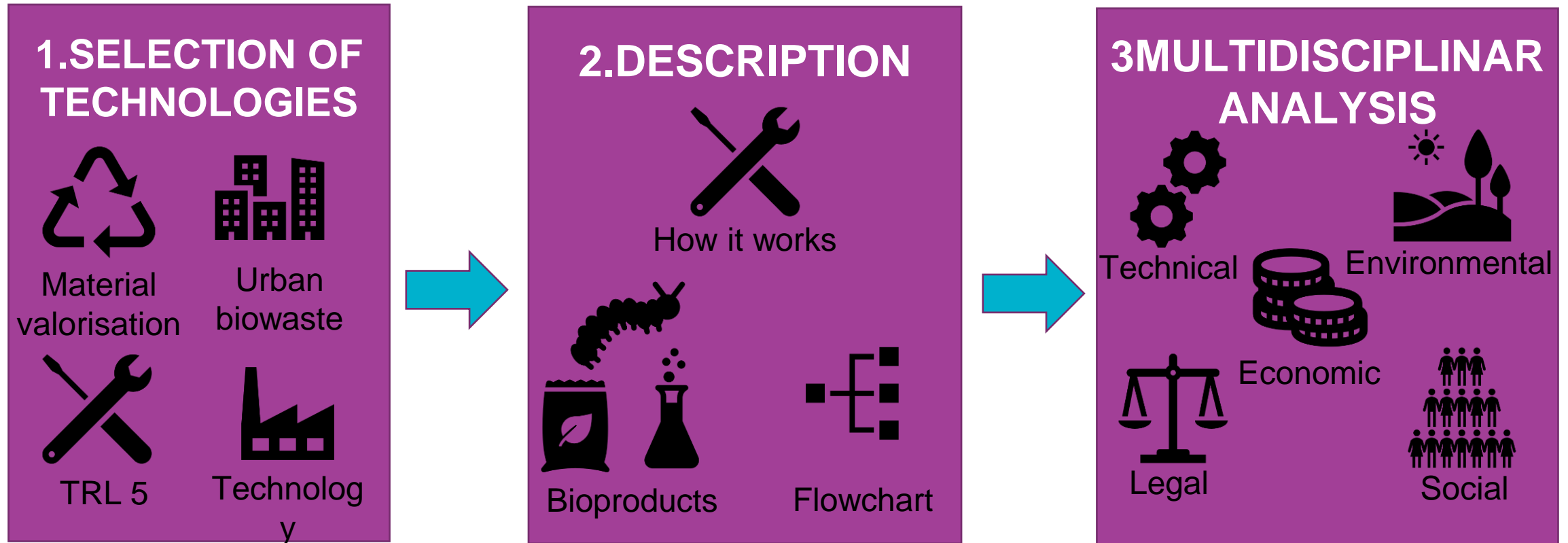
# Urban circular bioeconomy concept

Publications Patents Research projects Start-ups



Many opportunities, but how to find your way?

# HOOP Methodology to make the menu of technologies





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



## D2.2 State-of-the-art of technologies for the production of bioproducts from biowaste and wastewater

Author(s): CETENMA, CETAQUA, Draxis, ITENE, Nafigate, RdA, SAV, SfC



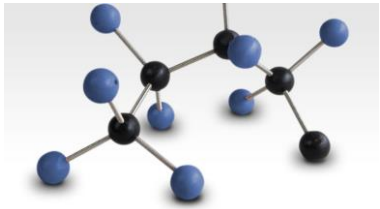
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Feedstock	Technology	Bioproducts
AD biogas	Bioprocess anaerob	g from the High-protein feed and food supplements
OFMSW, AD digestate	Black Soldier	duction Feed, frass, proteins, lipids, chitin
AD dewatering liquid	Nutrients re	digestion Phosphorus and nitrogane-based biofertilizers
Meat/fish by-products	Biochemical	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	Fermentatio	Bioplastic, cosmetics
Spent coffee grounds	Fermentatio	Nutraceutical products and food additives
UWWS	Biochar from	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



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# 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...



# Results



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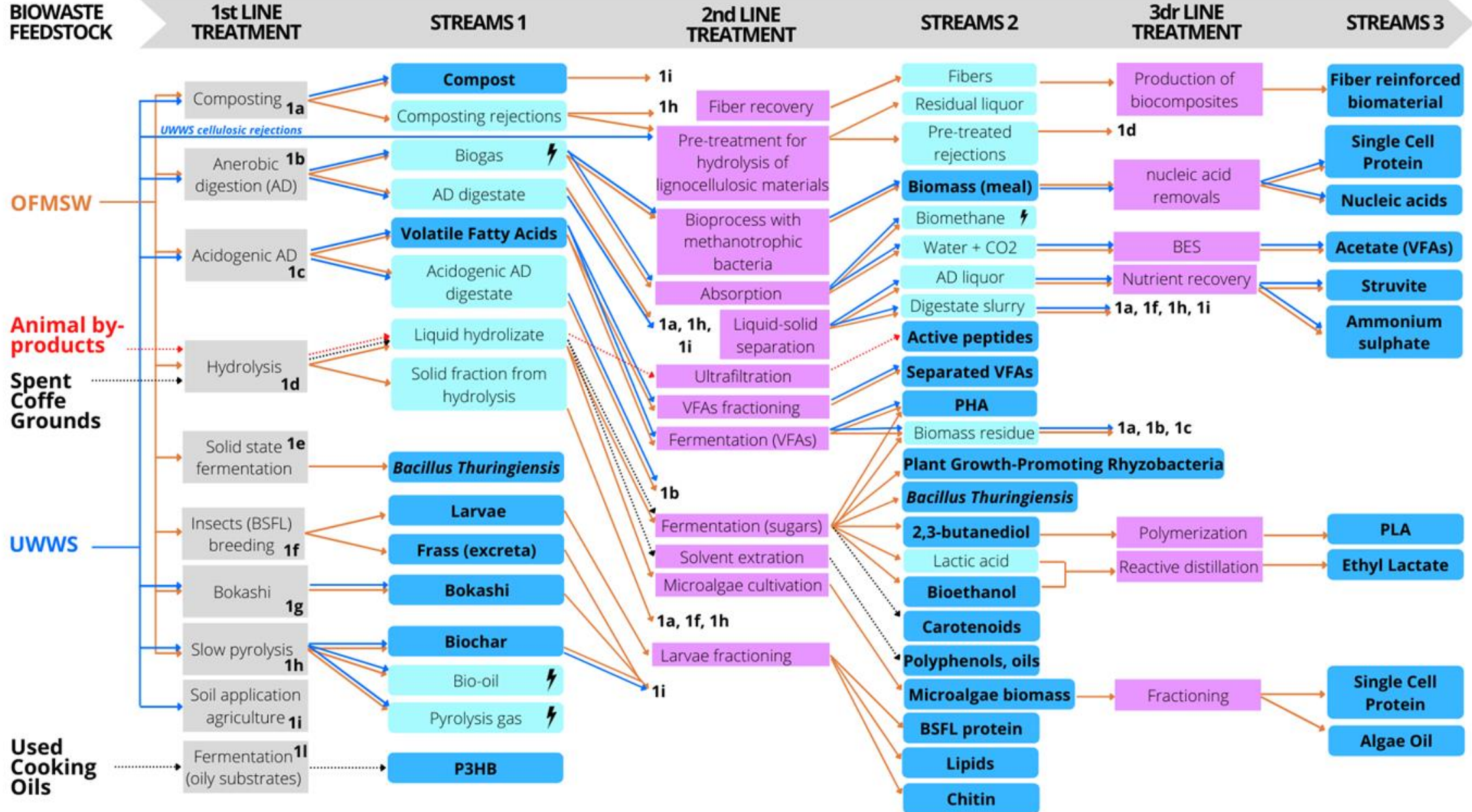
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European  
Commission



# 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**

# 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!

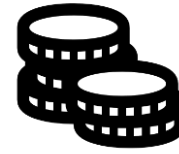
1. **BE AWARE OF REGULATORY!**



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# 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



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# The HOOP Project



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# What is HOOP?



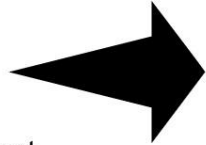
 **23 partners**  
**10 countries**

**€9M**

Budget

€5.8M PDA management

€8M EC Contribution



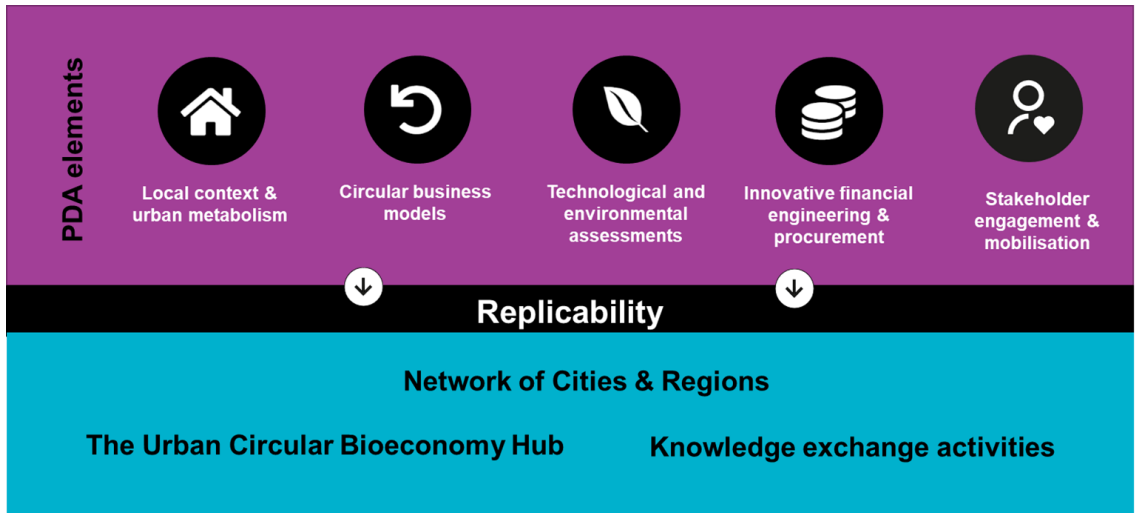
**€51.7M**

Investment  
Induced

Oct  
2020

Jun  
2023

Oct  
2024



## How to unlock investments in urban circular bioeconomy?



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# Learn more: HOOP Urban Circular Bioeconomy Hub

HOOP Urban Circular Bioeconomy Hub  
Boosting the implementation of Circular BioEconomy projects

The HOOP Network of Cities and Regions is a forum to exchange lessons learned and ideas for the implementation of bioeconomy projects.

[Join the Network of Cities and Regions](#)

HOOP Virtual Academy

The Virtual Academy provides resources related to the implementation of Urban Circular Bioeconomy solutions. This includes handbooks, manuals, factsheets and videos on technologies and financial engineering for circular bio-economy projects.

Filter: Implement and develop Collect and valorise Engage stakeholders Evaluate and improve

Search by keyword:  Filter by topic:

**D4.1 Novel Circular Business Models applied in the value chain of bio-waste valorisation**  
Author: DRAXIS ENVIRONMENTAL S.A.

HOOP project\_Novel Circular Business Models applied in the value chain of bio-waste valorisation  
This report focuses on the identification of Circular Business Models for bio-waste valorisation.

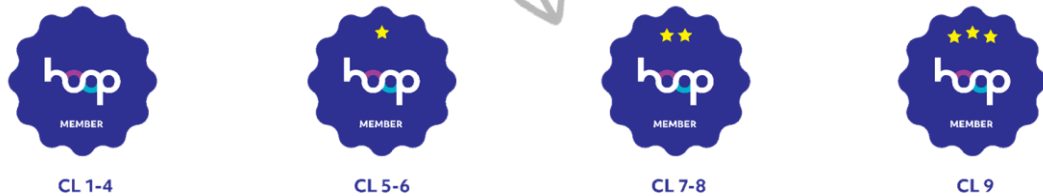
**Investment Package Manual for European Cities and Regions (Volume III)**  
National and Regional investment package on

HOOP project\_Investment Package Manual for European Cities and Regions (Volume III)  
The Volume III of the Investment Package Manual presents a selection and inventory of funding and financing schemes, programmes, instruments and tools for investment projects on circular bioeconomy and bioenergy at National and Regional levels.

**Investment Package Manual for European Cities and Regions (Volume II)**  
European investment package on circular

HOOP project\_Investment Package Manual for European Cities and Regions (Volume II)  
The Volume II of the Investment Package Manual guides the reader through the selection and inventory of funding and financing schemes, programmes, instruments and tools for investment projects on circular bioeconomy and bioenergy at European level.

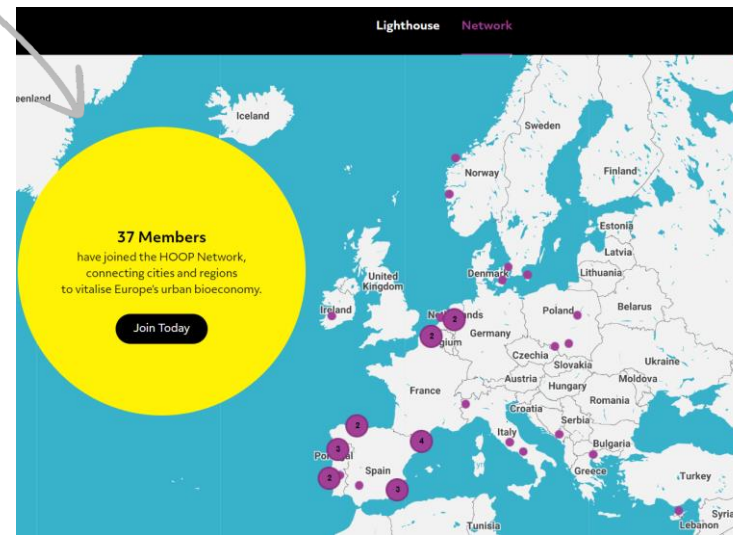
## Virtual Academy



## HOOP Bio-Circularity Label



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## HOOP Network of Cities and Regions



**Thank you very much for  
your attention!**

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