



HOOP State-of-the-art of collection and valorisation possibilities for biowaste streams

Insights from HOOP Lighthouses experiences

07 May HOOP Urban Circular Bioeconomy Webinar Series 2

Dr. Elisa Gambuzzi

cetenma

Centro Tecnológico
de la Energía y del
Medio Ambiente



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

Who we are



cetenma

Centro Tecnológico
de la Energía y del
Medio Ambiente



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

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.






What's HOOP?



8 Lighthouse cities & regions: the HOOP demonstrators







-  25 biowaste valorization routes
- ↕
-  Project Development Assistance (PDA)
- ↕
-  Stakeholder engagement



Replication Strategy



HOOP Network of cities & regions

-  The Urban Circular Economy Hub (UCBH)
-  Circularity Label
-  Knowledge-Exchange activities
-  Virtual Academy

Biowaste collection: different strategies, different results



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

Types of urban biowaste



More types of biowaste



Biowaste collection systems

Compulsory since 01/01/2024

BETTER QUALITY

NON-SEPARATE,
later MBT



SEPARATE, no user identification

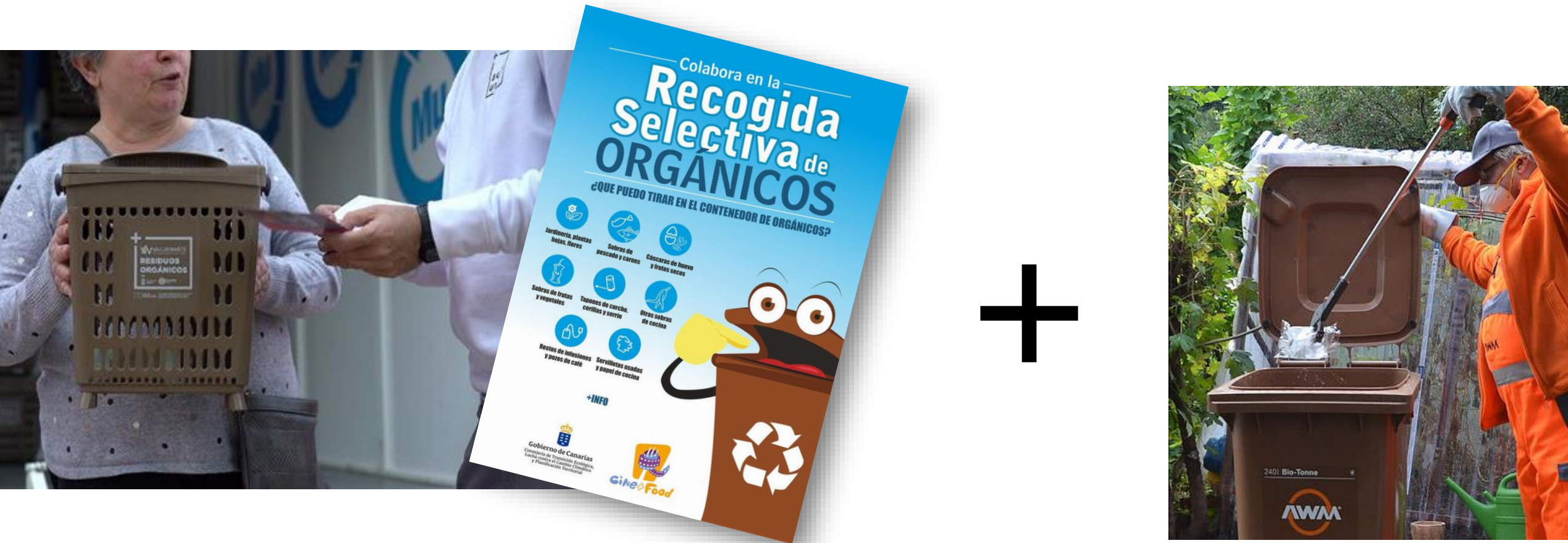


SELECTIVE, with user identification



How to keep and improve the quality

Good practices from Münster, Albano Laziale and Murcia

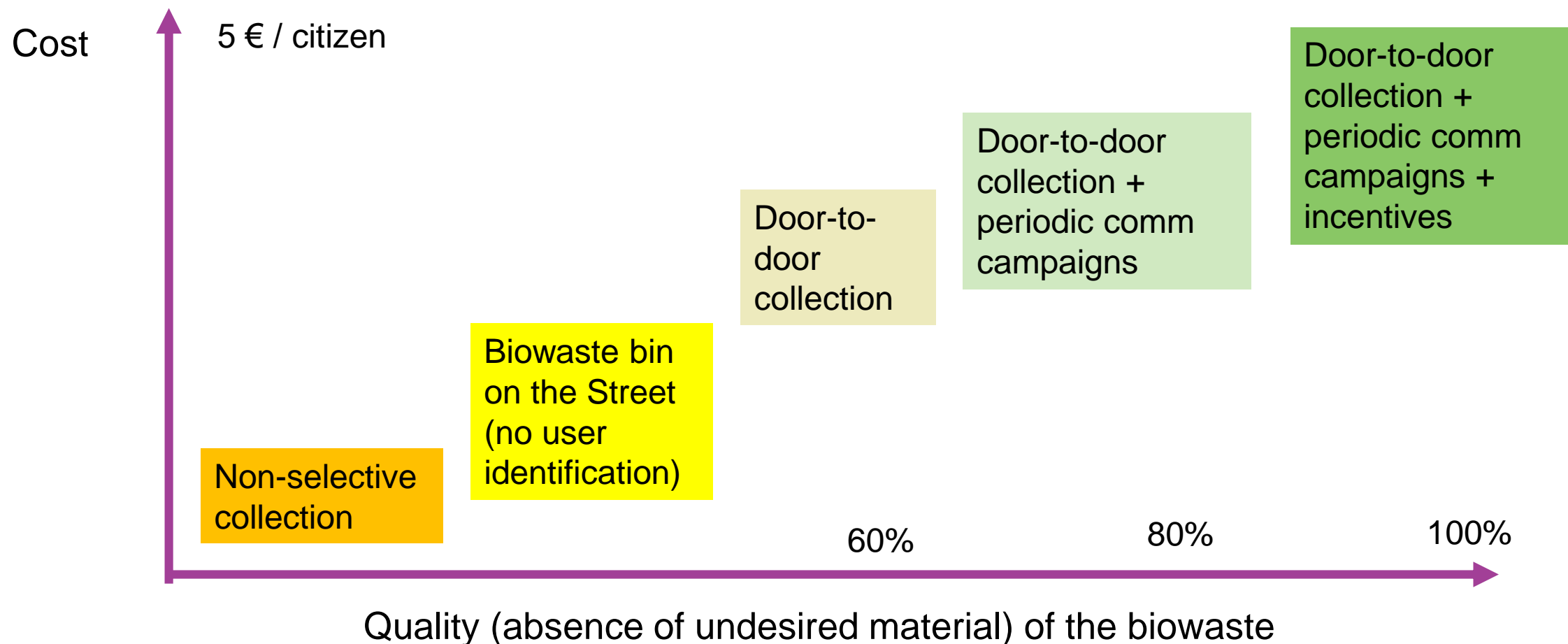


Cost of an effective comm campaign: 5 € / citizen



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

Quality of the biowaste stream vs cost of the collection service



HOOP examples of excellence in biowaste collection



alle wirken mit!

Münster (DE)
98 % biowaste purity



Albano Laziale (IT)
98% biowaste purity



Porto (PO)
94 % biowaste purity



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

Biowaste valorization: examples from the Lighthouses



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



Separate collection door-to-door

Very effective pre-treatment of biowaste stream entering the treatment plant (to remove unwanted material)

Composting system of reference: the compost Nutrimais® has very high quality, meaning great market demand and higher value than others

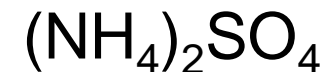


Is there life beyond compost and biogas?

Lignocellulosic waste streams from plants



Digestate effluents and waste water



Is there life beyond compost and biogas?

From used cooking oils to P3HB biopolymer





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

BIOWASTE
FEEDSTOCK

1st LINE
TREATMENT

STREAMS 1

2nd LINE
TREATMENT

STREAMS 2

3dr LINE
TREATMENT

STREAMS 3

OFMSW

Animal by-
products

Spent
Coffee
Grounds

UWWS

Used
Cooking
Oils

Composting 1a

UWWS cellulosic rejections

Anaerobic
digestion (AD) 1b

Acidogenic AD 1c

Mycelium
production

Hydrolysis 1d

Solid state 1e

Insects
breeding 1f

Bokashi 1g

HTC

Slow pyrolysis 1h

Soil application
agriculture 1i

Fermentation 1l
(oily substrates)

Compost

Composting rejections

Biogas ⚡

AD digestate

Volatile Fatty Acids

Acidogenic AD digest.

Mycelium products

Liquid hydrolyzate

Solid fraction from
hydrolysis

Biosurfactants

Bacillus Thuringiensis

Larvae

Frass (excreta)

Bokashi

Hydrochar

Biochar

Bio-oil ⚡

Pyrolysis gas ⚡

P3HB

1i

1h

1b

1c

1d

1e

1f

1g

1h

1i

1j

1k

1l

1m

1n

1o

1p

1q

1r

1s

1t

1u

1v

1w

1x

1y

1z

Fibre recovery

Pre-treatment for
hydrolysis of
lignocellulosic materials

Bioprocess with
methanotrophic
bacteria

Absorption

Liquid-solid
separation

Ultrafiltration

VFAs fractioning

Fermentation (VFAs)

1a, 1b, 1c, 1i

1d

1e

1f

1g

1h

1i

1j

1k

1l

1m

1n

1o

1p

Fibres

Residual liquor

Pre-treated
rejections

Biomass (meal)

Biomethane ⚡

Water + CO2

AD liquor

Digestate slurry

Active peptides

Separated VFAs

PHA

Biomass residue

1a, 1b, 1c, 1i

1d

1e

1f

1g

1h

1i

1j

1k

1l

1m

1n

1o

1p

1q

1r

1s

1t

Blending (polymer,
concrete)

Downstream

nucleic acid
removals

BES

Nutrient recovery

1a, 1f, 1h, 1i

1d

1e

1f

1g

1h

1i

1j

1k

1l

1m

1n

1o

1p

1q

1r

1s

1t

1u

1v

1w

1x

1y

1z

Fibre reinforced biomaterial

Nanocellulose fibres, crystals

Single Cell
Protein

Nucleic acids

Acetate (VFAs)

Struvite

Ammonium
sulphate

1a, 1b, 1c, 1i

1d

1e

1f

1g

1h

1i

1j

1k

1l

1m

1n

1o

1p

1q

1r

1s

1t

1u

1v

1w

1x

1y

1z

LEGEND

OFMSW
valorization path

UWWS
valorization path

Valorization of
specific biowaste

1st line treatment

Next treatments

Bioproduct

Material output

to energy
production

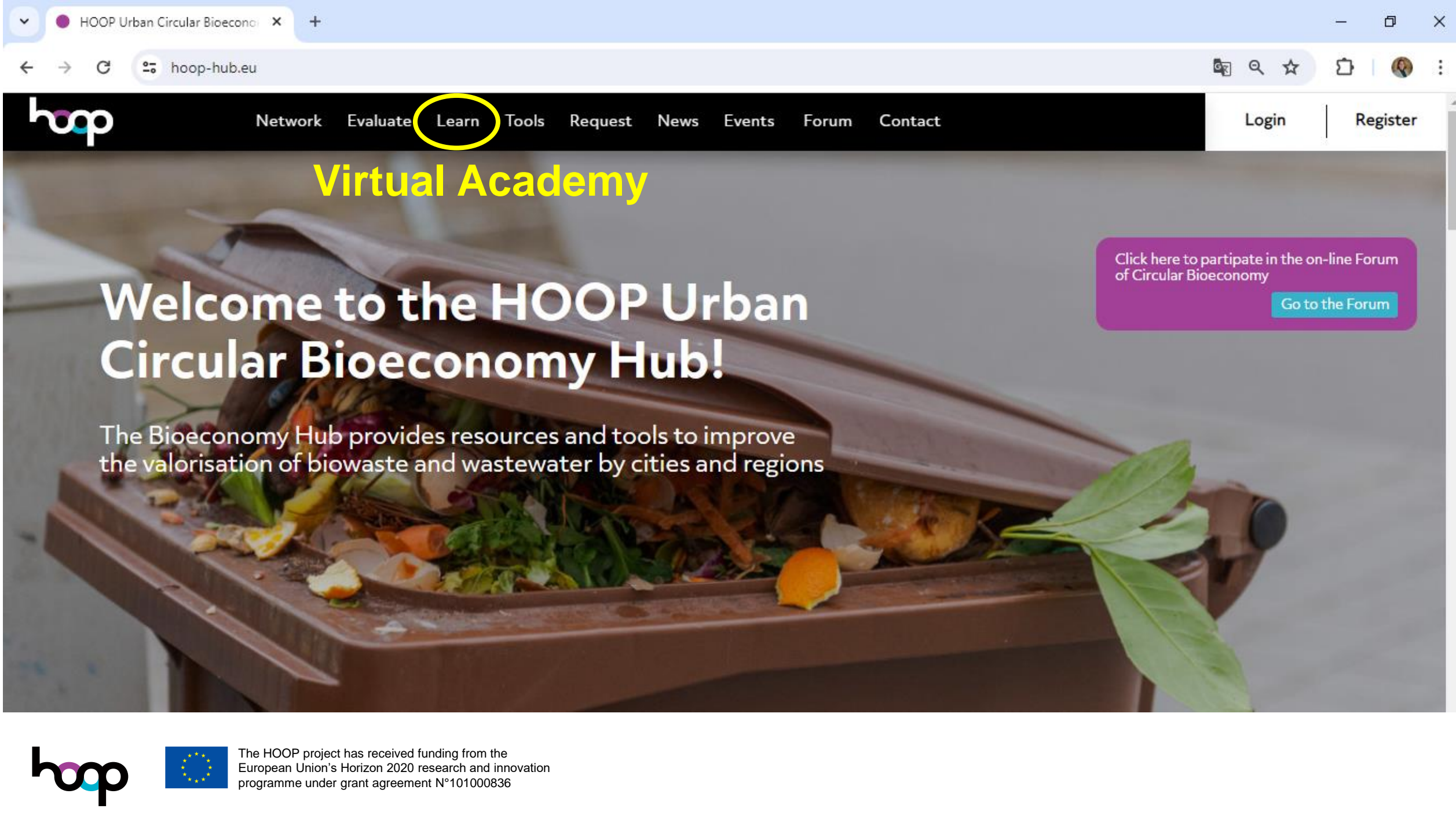
hoop



www.hoop-hub.eu

https://hoop-hub.eu/virtual_academy.html

CL9



Virtual Academy

Welcome to the HOOP Urban Circular Bioeconomy Hub!

The Bioeconomy Hub provides resources and tools to improve the valorisation of biowaste and wastewater by cities and regions

Click here to partipate in the on-line Forum of Circular Bioeconomy

[Go to the Forum](#)



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

Thanks for your attention!

HOOP Hub



Register today!