SCALIBUR

LEADING A REVOLUTION
IN BIOWASTE RECYCLING

CENER solution for OFMSW valorisation

Technologies for urban biowaste and wastewater valorisation

May 26th 2021 – Inés del Campo

CENER | NATIONAL RENEWABLE ENERGY CENTRE
ADItech

BIO2C
Biorefinery and Bioenergy Centre

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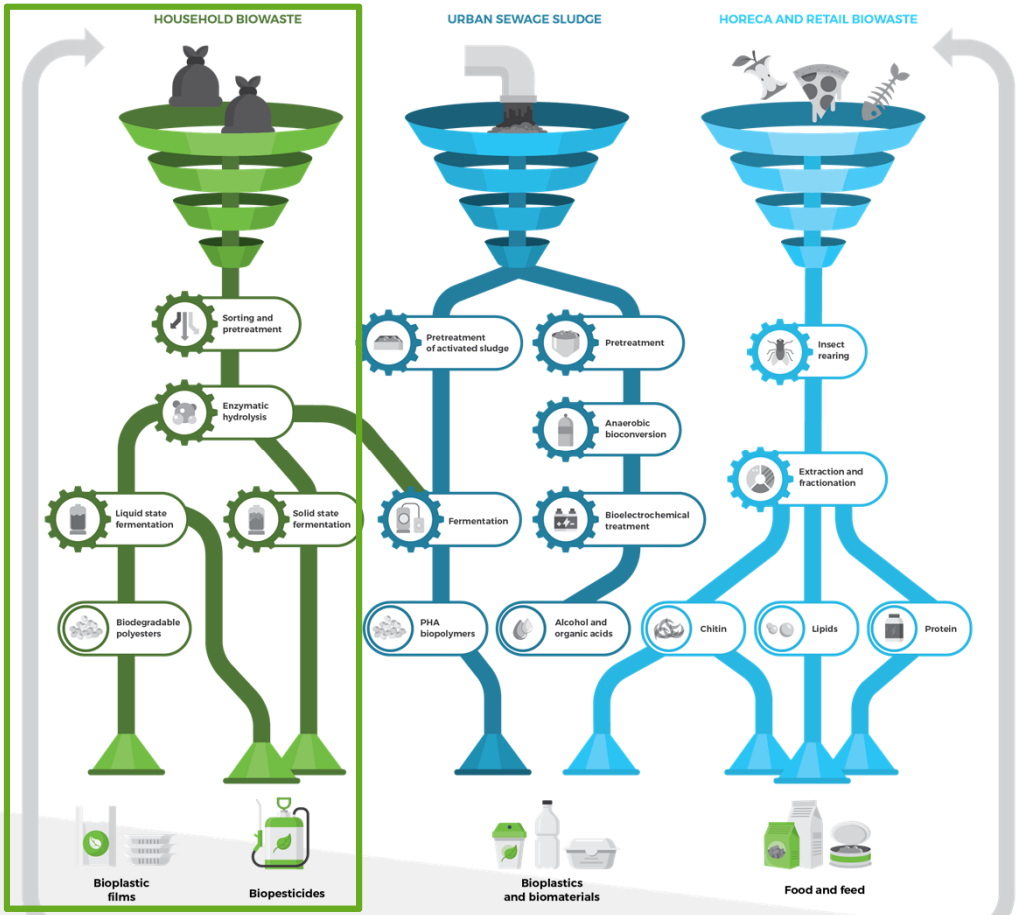
Contents

- SCALIBUR value chains
- The hidden potential of the OFMSW
- CENER solution for OFMSW valorisation
- Upscaling sugar production at the BIO2C
- Expected results and products
- Opportunities and barriers
- *The Circular Urban Biorefinery Concept*
- *The BIO2C plant*

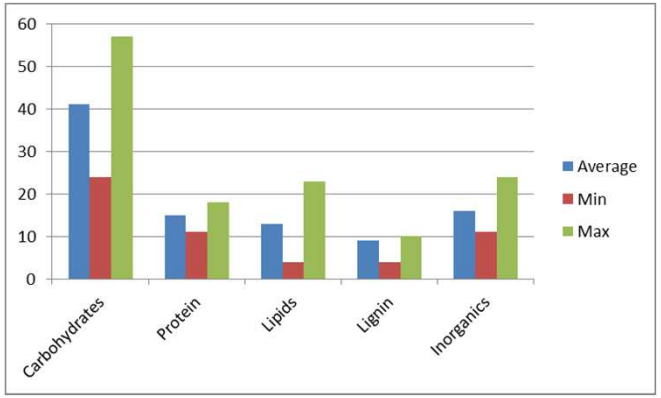
SCALIBUR Value Chains

- **Scalable technologies** for the conversion of biowaste sources:
  - **OFMSW**
  - USS
  - HORECA
- A handfull of biobased products:
  - **Sugars**
  - **Biopesticides**
  - Bioplastics & biomaterials
  - Food & feed
  - Chemicals
  - Fuel
  - Biosolids



The hidden potential of the OFMSW

- Each European throws away approx **200 kg/y of biowaste**
- Stable generation and distributed in the territory. Existing and developed waste logistics
- **Separate collection** of the OFMSW will be **mandatory in all Member States by January 1st, 2024 (European Directive (EU) 2018/851, c).**
- By 2035 the amount of municipal **waste landfilled must be reduced to 10% or less** of the total amount of municipal waste generated
- **CENER aims to develop solutions for unlocking the value of the OFMWS.**



Overview of main components in the OFMSW. % wt, db.
Source: CENER

CENER solution for OFMSW valorisation

In SCALIBUR CENER will:

- Demonstrate the **production of fermentable sugars** from the OFMSW in an operational environment **(TRL 6/7)**
- Validate and demonstrate the production of **bacterial biopesticides** from the sugars obtained **(TRL 6/7)**
- Perform a **technoeconomic and environmental sustainability assessment** of the value chain

CENER solution for OFMSW valorisation

Innovation

Application

Optimization and validation at pilot scale (TRL 4/5)

- Pretreatment validation and optimization
- Enzymatic hydrolysis with high solids load
- Enzyme cocktail optimization
- Validation of hydrolysis at pilot scale (100-200L)

Upstream & Downstream processes definition

- Separation and purification of fractions
- Hydrolyzate downstream and updgrading
- Recovery of bioproducts according to specifications

Upscaling and validation at demo scale (TRL 6/7)

- Validation of hydrolysis at demo scale (up to 3 m3) for production of hydrolyzate rich in sugars
- Production cost-competitive concentrated sugars (400-500 g / l)

TEE sustainability assessment

- Industrial and economic feasibility assessment
- Comprehensive environmental sustainability assessment

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Upscaling sugar production at BIO2C

- *2 tons of biowaste processed per run*
- *One demo run completed, 2 more to be completed by Q4 2021.*

Expected results and products

- Demonstration of high-solids load enzymatic hydrolysis in 3m3 reactors
- Production of approx 500 kg of concentrated sugars
- Application of technologies to reduce the presence of inhibitors (ie: organic acids) and improve the viscosity and pumpability of the hydrolyzate and concentrate.
- Development of ad-hoc separation, purification and concentration processes to obtain a concentrated sugar syrup for subsequent fermentation into biobased products such as biopesticides

Opportunities and barriers

Opportunities	Barriers
• The OFMSW is a high available, low cost and circular feedstock for biobased products • Production of cost-competive sugars as building blocks for biobased industries • Waste reduction, contribution to the Circular Economy and stimulation of sustainable growth, contributing to Europe's green recovery.	• The quality of the OFMSW (% organic matter) is highly dependent on the collection systems and practises in the cities. • The more inerts and inhibitors in the feedstock the more complex and expensive will be the conversion process. • Public perception of products derived from biowaste

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The Circular Urban Biorefinery Concept

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Ciemat

Nafarroako Gobernua | Gobierno de Navarra

The Circular Urban Biorefinery Concept

BIOREFINERY CONCEPT

URBAN BIOWASTE VALORISATION

OFMSW

CIRCULAR URBAN BIOREFINERY

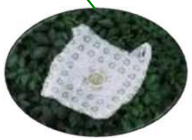
- ✓ Integral
- ✓ Flexible
- ✓ Cascade use
- ✓ Zero residues

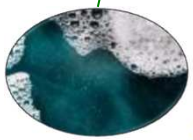
SUGARS – PROTEINS- LIPIDS BUILDING BLOCKS,

BIO-BASED PRODUCTS

Biofuels

Bioplastics





Biosurfactants

Biopesticides

The Circular Urban Biorefinery Concept

Innovative strategy for the valorisation of urban biowaste

Validation and upscaling of developments for industrial applications

CIRCULAR URBAN BIOREFINERY CONCEPT

Sustainable processes for the production of cost-competitive sugars and other biobased products

Reduce and valorize organic waste by creating new business models that contribute to a Circular Bioeconomy

Lab TRL 2-3 Pilot TRL 4-5 Demo TRL 6-7

The BIO2C plant - Closing the gap between lab and market for advanced biofuels & biobased products

- Support market uptake of biobased industries by development, integration, scale-up and demonstration of sustainable processes for the manufacture of biobased products and advanced biofuels.
- Modular test facilities and a highly qualified staff for scaling up whole value chain based on biorefinery concepts and cascading valorisation as an intermediate step between laboratory and industrial implementation.

More info: www.bio2c.es

BIOCHEMICAL UNIT
Thermochemical Pretreatment
Enzymatic Hydrolysis
Fermentation
Downstream

PRETREATMENT UNIT
Chiping
Drying
Torrefaction
Pelletization

GASIFICATION
Gasification Island
Thermal Oxidizer
Flue Gases Treatment

Thank you!!

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