

# CluBE and biowaste exploitation initiatives

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Biowaste treatment and exploitation  
SYMBIOSIS Sensitization Event

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# Cluster of Bioenergy & Environment

- Formally established 2014 as a Not-for-profit company
- As a result of continuous cooperation among various operators and enterprises of Western Macedonia Region
- CluBE aims at developing R&D and business activities in the fields of bioenergy and environment
- In particular, addressing the issues of biomass and energy use in order to contribute to local development

# CIUBE: LOCAL NETWORKING



## Public sector

- Regional Authority of Western Macedonia
- Regional Development Fund of W.M.
- Regional Association of Municipalities of W.M.

## Academia

- University of W.M./Dpt of Mechanical Engineers
- Chemical Processes and Energy Resources Institute / Centre for research and Technology Hellas (CPERI / CERTH)
- Technical University of Western Macedonia
- Centre for Technological research of W.M.
- Centre for Environment of W.M.
- Technological University of Thessaly/Dpt of Wood and Furniture

## Business sector (1)

Wood companies:

- Alfa Wood S.A.
- Giotas S.A.
- Ziogas Ltd
- Chliapas S.A.

Cooperatives:

- Forest Cooperative "Pentalofos"
- Agricultural Cooperative "Dimitra"
- Forest cooperative "Smixi"
- Agricultural – Cattle breeding cooperative "Aigopro"
- Fur producing animals breeder's Association

## Business sector(2)

Waste Management company:

- DIADYMA S.A.

District Heating companies:

- DETEPA S.A.
- DEYAK S.A.
- DETIP S.A.

## Business sector(3)

Biomass production and logistics:

- AZ Bioenergeia

Biogas producer :

- Matesion Ltd

Boiler manufacturers:

- Combi Thermodynamiki S.A.
- Camino Design S.A.
- Afentoulides Ltd



## Business sector(4)

Biomass / bioenergy consulting companies:

- Greek Forests Ltd
- Ligeas Energy
- Energon
- Cosc S.A.

Regional Development Agency

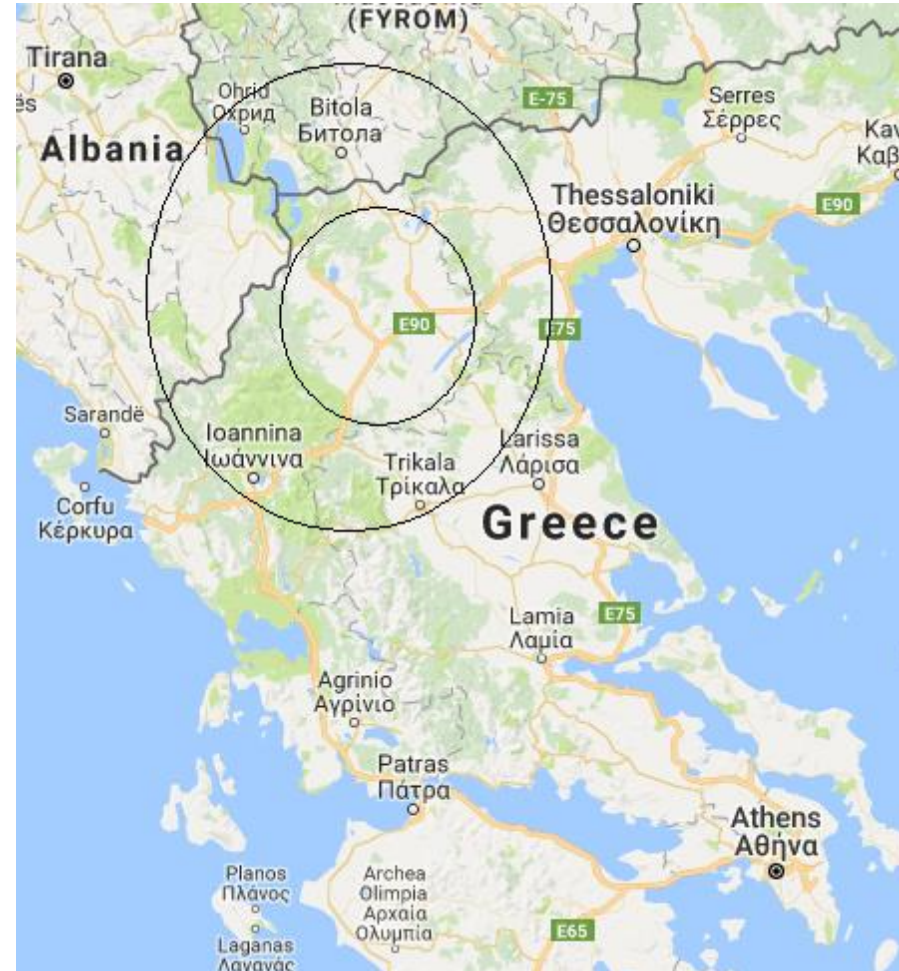
- ANKO S.A.

# MEMBERS' MAPPING



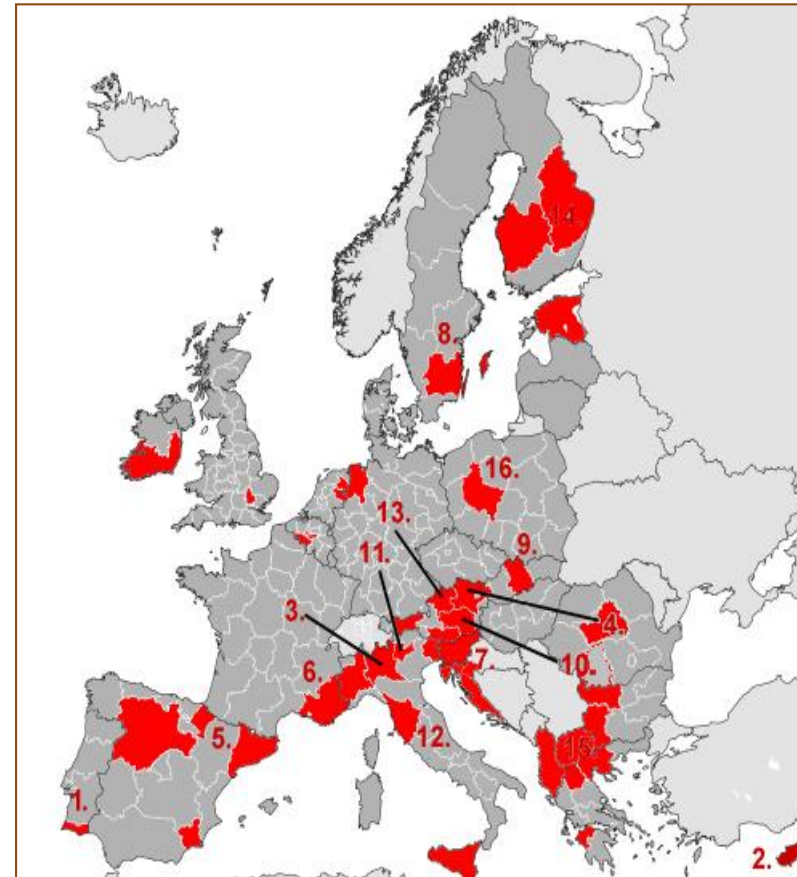
# CluBE area of intervention

- Western Macedonia
- Neighboring regions
- Cross border
- Greece
- Balcan, Med, Europe



# EU NETWORK

European  
network with  
wood/biomass/ bioenergy  
networks  
and clusters



# CluBE: INTERNATIONAL LOBBYING..



## Strategic Objectives CluBE

- Energetic exploitation of biomass for household and industrial use and district heating systems.
- Co-firing with lignite in existing power stations and/or future heating plants.
- Optimization of heating systems.
- Energy savings in the residential and business sector.
- Improvement of energy efficiency for households, public and private buildings.

# Projects - Experience

## SecureChain (H2020):

### Securing future-proof environmentally compatible bioenergy chains (SecureChain)

- Total EC grant: 1,809,586.25 €
- Coordination and Support Action, 04/2015 - 03/2018 (3 years)
- 11 participants in 8 EU member states
- 6 model regions with a large stakeholder group

→ Main target group: SMEs in regional bioenergy supply chains



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646457





# Target group & expected impacts:

SMEs in regional bioenergy supply chains

→ Mobilise more solid biomass

→ Maximise the share of sustainable bioenergy

→ Foster market uptake of most efficient systems



# aGROWchain (Interreg IPA CBC GR-FYROM)

## Agrowaste supply chains for sustainable growth (aGROWchain):

- Total Budget: 669.084,90€
- Duration: 05/2018 - 05/2020 (2 years)
- 5 participants in 2 countries

→ Main target group: Organisation and development of supply chains of agricultural residues

**Interreg - IPA CBC**   
Greece - The former Yugoslav Republic of Macedonia  
a G R O W c h a i n

Co-funded by the European Union and National Funds of Greece and The former Yugoslav Republic of Macedonia, via the Interreg IPA CBC Programme "Greece – The former Yugoslav Republic of Macedonia 2014 – 2020"



# aGROWchain concept

## Problem

Both sides of the border:

Agricultural residues (straw, corn, canes etc)

Minimum or non-management, environmental problems

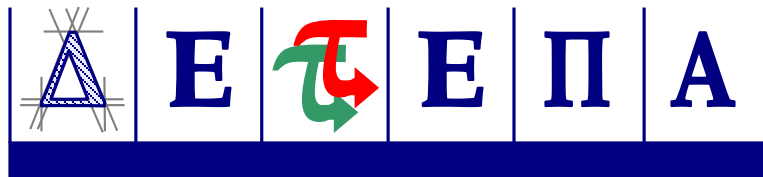
Use of fossil fuel for heating purposes

## Solution

Sustainable management of agricultural residues

Establishment of supply chains

# aGROWchain consortium



## aGROWchain focus

aGROWchain Main target:  
Organisation and development of supply chains of  
agricultural residues (corn, etc)



## BENEFIT (Interreg GR-FYROM Building efficiency):

### Building ENergy Efficiency ImprovemenT: Demonstration for public buildings (BENEFIT):

- Total Budget: 1.170.475,00€
- Duration: 10/2018 - 10/2020 (2 years)
- 5 participants in 2 countries

→ Main target group: Improvement of energy efficiency measures and financing for public buildings

**Interreg - IPA CBC**   
Greece - The former Yugoslav Republic of Macedonia  
B E N E F I T

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## BENEFIT Target

The aim of BENEFIT project is to support public authorities at local and regional level in Greece and FyROM, towards adopting Energy-Efficiency (EE) plans, containing specific energy saving objectives and actions for the renovation of public buildings' stock

It also aims to increase capacities of public authorities personnel in the cross-border area, in planning and implementing energy renovation projects in public buildings.

In this way public authorities will accelerate compliance with the provisions of the recast EPBD (2010/31/EU) and EED (2012/27/EU), which pose demanding requirements for MS for increasing buildings' energy-efficiency, highlighting the exemplary role of public buildings.

# STARDUST (H2020):

## Holistic and Integrated Urban Model for Smart Cities (STARDUST)

- Total EC grant: 21 M€
- Coordination and Support Action, 10/2018 - 09/2023 (5 years)
- 29 PARTNERS FROM 8 EUROPEAN COUNTRIES

→ Main target group: European Cities



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774094





# STARDUST Concept:

## LIGHTHOUSE CITIES

PAMPLONA  
TAMPERE  
TRENTO

## FOLLOWER CITIES

CLUJ-NAPOCA  
DERRY  
KOZANI  
LITOMERICE

## STARDUST PROJECT OBJECTIVES:

- ① To pave the way towards low carbon, high efficient, intelligent and citizen oriented cities, by developing urban solutions and innovative business models, integrating the domains of buildings, mobility and efficient energy through ICT.
- ② To create several “innovation islands” as urban incubators to demonstrate cost-effective and bankable solutions to increase the energy efficiency in the STARDUST cities.
- ③ To create smart ecosystems implementing a new economic paradigm in the European cities, based on eco-innovation, competitiveness, low carbon and circular economy.
- ④ To create and deploy open city information platforms to amplify the impacts and promoting the interoperability software components and data sources.
- ⑤ To organise and foster the transfer of lighthouse cities solutions to the four follower cities.

# RUBIZMO (H2020):

## Replicable business models for modern rural economies (RUBIZMO)

- Total EC grant: 3.928.852,04€
  - Coordination and Support Action, 05/2018 - 04/2021 (3 years)
  - 16 participants
- Main target group: Development of innovative business models in the agricultural value chains



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No773621



# RUBIZMO Concept:

**RUBIZMO** is a new European initiative working to discover the vital ingredients for developing entrepreneurship and successful business models in rural areas.

Special focus will be given to initiatives generating benefits for the economy, environment and society in equal measure



# RUBIZMO Business Tools:

The results of the work carried out within RUBIZMO will facilitate the creation of four complementary tools, specifically, designed for rural entrepreneurs, networks, investors and policy makers



**Virtual Library:**  
Access an extensive library of proven business models and explore interactive material and practical examples to understand how to implement them



**Transformation Support Tool:**  
Understand which business model is the best for you and receive personalized advice to implement your ideas



**Cooperation Toolkit:**  
Learn how to structure and access vital cooperation with an online tool that gives tailor made advice according to business model type



**Training:**  
Explore our training resources and pinpoint favourable conditions to replicate innovative business ideas and models

# SCALIBUR (H2020):

## SCALABLE TECHNOLOGIES FOR BIO-URBAN WASTE RECOVERY (SCALIBUR)

- Total EC grant: 9.999.391,39€
  - Coordination and Support Action, 11/2018 - 10/2022 (4 years)
  - 21 participants
- Main target group: Cities, SMEs and R&D



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817788



# SCALIBUR concept

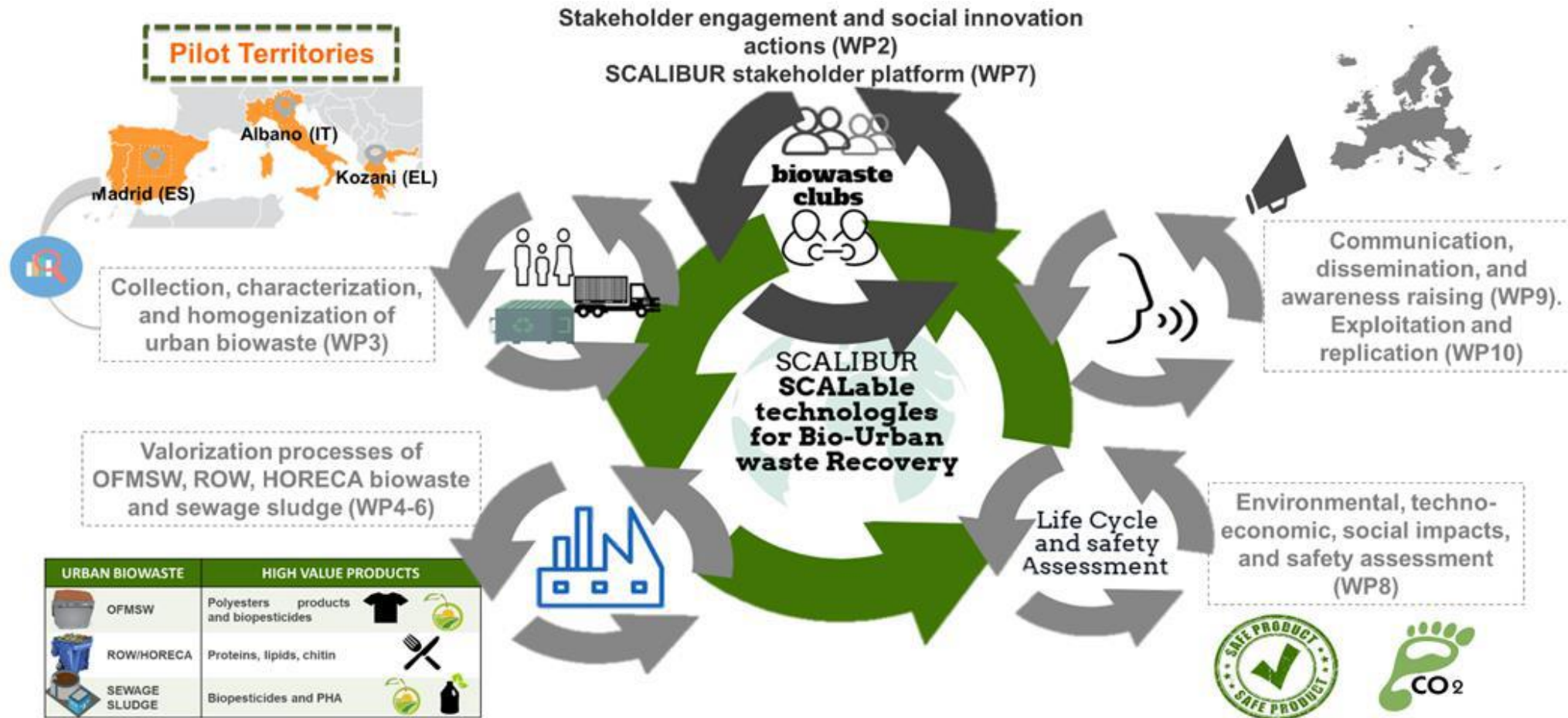
## Problem

- ✓ 100M tones/year of biowaste
- ✓ >75% is landfilled or incinerated
- ✓ ECONOMIC IMPACT – 143 billion euros cost its management
- ✓ ENVIRONMENTAL IMPACT: GHG emission, soil and groundwater contamination



# SCALIBUR concept

## Solution





# SCALIBUR partners



# SCALIBUR Results

## 1 - SOCIAL PERCEPTION

- Improvement of social perception of urban biowaste
- Enhance social participation
- Improving consumer acceptance of bioproducts

## 2- REDUCTION OF LANDFILLING:

- Reduction of amounts of urban biowaste.
- Reduction of environmental impact

## 3- INNOVATIVE:

- New business models on cities by upgrading urban biowaste value
- Alignment with circular economy concept

## 4 - HIGH ADDED-VALUE BIOPRODUCTS:

Biobased plastics (polyester and PHA), biopesticides, safety assessment of proteins, lipid biobased plastics, chitin/chitosan.

# SCALIBUR Products

- Enzymes cocktails for the treatment of OFMSW.
- Pilot plant for insect rearing on biowaste.
- Stakeholder platform.
- Monitoring systems for biowaste treatment plant.
- Methodology for process optimization and scale up of biological processes.
- Biopesticides produced from OFMSW.
- Feed ingredients.
- Sewage sludge pre-treatment to enhance anaerobic digestion of sewage sludge.
- Bioelectrochemical pre-treatment for biogas upgrading and high-value compounds synthesis.
- Technology for obtaining PHA from sewage sludge.

# SCALIBUR Products

- New Solid-State Fermentation (SSF) process.
- Best practices flatsheets for urban biowaste selective collection.
- Nanochitin fibers from BSF.
- Chitosan PLA/PHB formulation.
- LCA databases about biowaste management and their related technologies.
- Sensors for methane and sulphuric acid during waste treatment.
- New biobased and biodegradable polyesters from alternative sources of sugars from OFMSW.
- Optimization of characterization methods.
- SCALIBUR integrated process model.



*Bioenergy & Environment Cluster  
Western Macedonia*

# Thank you!

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