SCALIBUR

LEADING A REVOLUTION IN BIOWASTE RECYCLING

Deliverable 2.4

Multi-level stakeholder engagement analysis, including gender, and impact analysis

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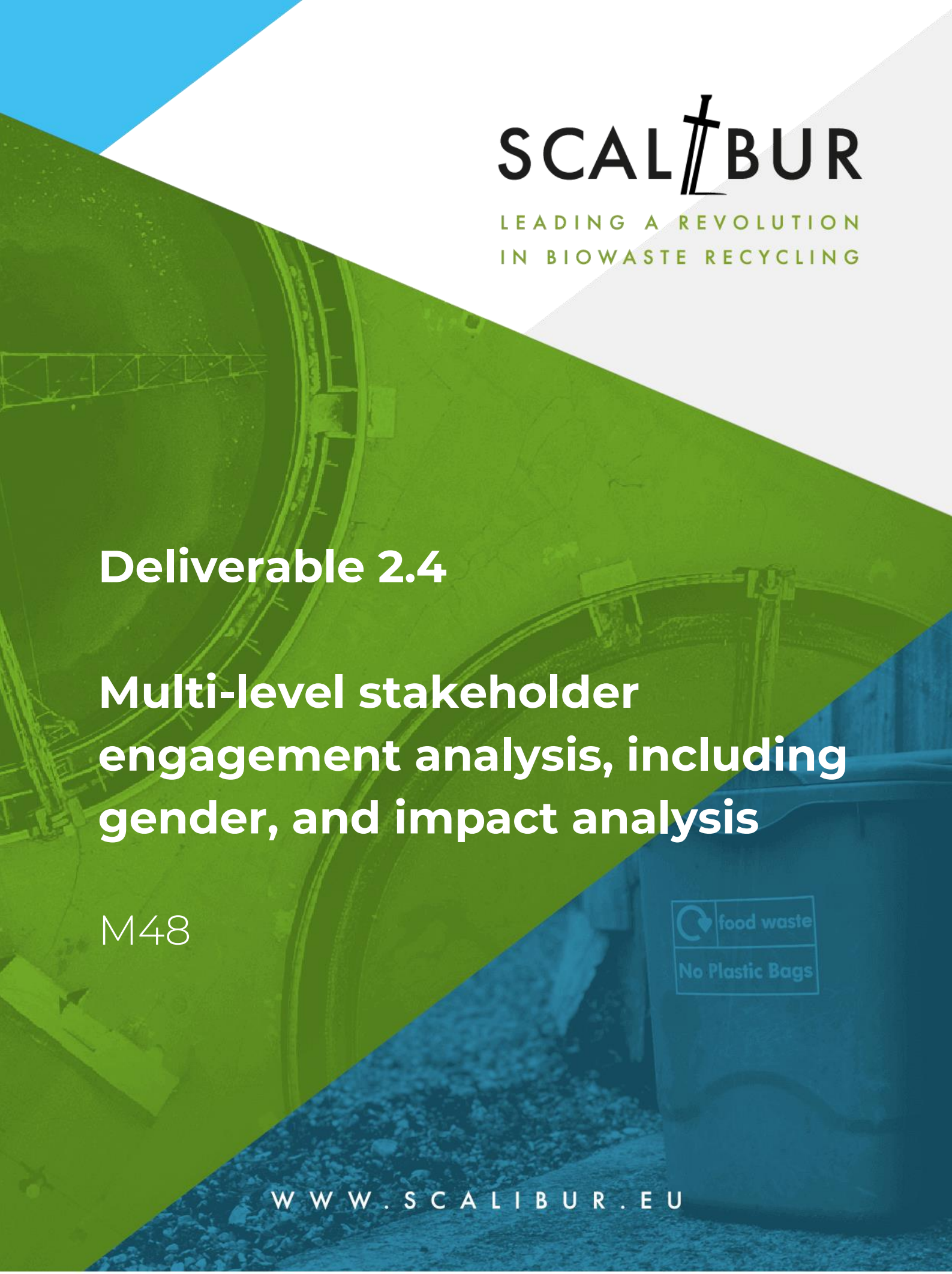

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ABSTRACT

In the SCALIBUR pilot cities Albano Laziale (Italy), Kozani (Greece) and Madrid (Spain) engaging all key local and national actors along the value chain is of vital importance to the project's success in promoting new circular economy approaches to recycle urban biowaste. As such, the following report illustrates the adopted SCALIBUR's multi- stakeholder engagement approach, process and tools and how these were implemented and let to concrete activities in the 3 pilot cities.

The report also illustrates the key analytical tools that were used to evaluate the project´s impacts on the stakeholders in the pilot cities and on their behaviour, perspectives and

participation. The report also assesses the overall impact and successes of stakeholder engagement in the SCALIBUR pilot cities.

CONTENTS

1 INTRODUCTION

1.1 The European context

In the EU, over 100 million tons of biowaste are thrown away each year. Currently, 75% of this goes to landfill or are incinerated, causing major environmental problems such as producing GHGs and contaminating the soil and groundwater. Biowaste in landfill sites already account for 3% of total EU greenhouse gas emissions (EEA 2019). The quantity of biowaste recycled has increased steadily since 2000, almost doubling in 20 years. In 2020, it has been estimated that 90kg per capita of biowaste were recycled in the EU27 (Eurostat). However, this only represents 41% of the total biowaste produced, as each EU citizen generates on average, an estimated 222kg of biowaste per year (ZWE and BIC). These challenges are compounded because only four out of 27 EU countries have sufficient biowaste treatment capacity for the waste they currently collect (EEA).

Landfilling goes not only against the principle of a circular economy, but is also a waste of nutrients, energy and resources for bioproducts. The EU aims to recycle 65% of urban waste by 2035. With biowaste accounting for 34% of municipal solid waste generated (EEA, 2020), understanding the role of biowaste recycling is of vital importance.

Over the years, there has been substantial research to identify the key motivations/barriers to recycling, and to design interventions to optimize waste management process while increasing (bio)waste separation. What it has emerged is that among the key drivers to proper (bio)waste separation are *"convenience and minimum efforts"*: the easier the recycling system is to navigate, the more likely it will be used (Knickmeyer 2020). This also well reflects other two significant barriers to waste management, the lack of proper infrastructures and of information about how (bio) waste should be separated correctly (Jesson 2014; Briguglio, 2016). To overcome these challenges different approaches have been tested and broadly implemented, ranging from the development of tailored communication campaigns by the municipalities - like in the city of Ljubljana, where residents receive free text reminders of the waste collection schedule (Oblad, 2018) - to the provision of color-coded recycling bins to simplify the (bio)waste separation in the household (Southerton et al., 2011).

A further set of drivers can be related to economic incentives. In many European cities good recycling practices are undertaken on a voluntarily basis. However, it has been proved that providing financial rewards to (bio)waste separation practices could significantly increase the quantity and quality of the collected (bio)waste (Miafodzyeva, 2012). A successful example is the adoption of the "Pay-As-You-Throw Tarif" (PAYT) in many municipalities, which sees individual households paying the waste tax on the basis of the quantity of waste generated (Reichenbach, 2008; Seyring, 2015). Furthermore, the combination of this approach with direct economic fees to disincentive "unfriendly recycling behaviours' as well as with positive rewards such vouchers/discounts in local shops have proved to foster positive behaviour change (Knickmeyer, 2020; Seyring 2015).

1.2 This report

Against this complex background, SCALIBUR's core objective is to promote innovative approaches to collection, sorting and recycling of urban biowaste in Europe. To achieve this objective, it is crucial to identify and engage all relevant stakeholders along the biowaste value chain to design, develop and implement new circular economy and bio-economy approaches both on the technical and social sides. This report illustrates the outcomes and impacts of the adopted SCALIBUR's multistakeholder engagement approach, process and tools throughout the project timeline. It evaluates the project´s direct and indirect impacts on the stakeholders in the pilot cities and regions Madrid (Spain), Albano Laziale (Italy) and Kozani (Greece).

In the initial sections of the report, we provide an overview of the SCALIBUR's multistakeholder engagement approach to contextualise the operational settings in which the multi-stakeholder engagement activities have been implemented. Moreover, the local contexts – in terms of legal and infrastructural systems - in the 3 project's pilot cities are presented via a baseline analysis.

Following, the report describes the launch of the engagement activity via SCALIBUR Biowaste Clubs meetings and further into the consultation phase section the focus and outcomes of those meetings in the three pilot cities are described. The section closes with the conducted citizens and value chain actors' surveys in Albano Laziale and Kozani. The surveys aim to determine the perception and behaviors of citizens and value chain actors, towards urban waste management (i.e., collection, separation and sorting).

The fifth section, focusing on the collaboration aspects of the project, the pilot activities designed and implemented in the SCALIBUR pilot cities are presented together with the targeted citizens engagement activities and "local champions" involvement. The concluding chapter embeds all the outcomes stemming from the variety of multi-stakeholder engagement activities conducted and provide an overview of short and long-term impacts.

2 THE SCALIBUR MULTI-STAKEHOLDER ENGAGEMENT APPROACH

A successful scale-up of novel technologies and processes for biowaste management requires increased social awareness, a change in behavioural patterns and the fostering of social innovations. In order to achieve this, it is crucial to involve all key actors – including citizens - from the start. Understanding key stakeholder´s characteristics is necessary to develop engagement mechanisms that account both for the impacts that the promoted technologies and activities may have on the different actors and vice versa the influence that the actors can exert by promoting or hindering certain processes. While there are different strategies that can be used to appeal to the different stakeholder categories, the stages by which an actor adopts an innovation, and whereby scaleup is accomplished are similar and include the following: awareness of the need for an innovation, decision to adopt (or reject) the innovation, initial use of the innovation to test it, and continued use of the innovation.

Accordingly, the SCALIBUR stakeholder engagement approach has been defined (see also D2.1 *Stakeholder engagement plan per pilot municipality and identification of current promising practices* and D2.4 first version M24) as a guided process during which all relevant actors are included through frequent exchanges and join forces to achieve common goals., in In the SCALIBUR case these goals include: promotion of a more sustainable and circular biowaste value chain. Stakeholders can be defined as any representatives of companies, industry sectors or public bodies, as well as common citizens - that are directly operating and/or are affected by the bio-waste value chain. The approach is structured in a two-fold manner and it has been practically implemented following four interconnected phases, see Figure 1.

Figure 1: The four phases of the SCALIBUR's multi-stakeholder engagement approach

The methodological approaches and tools that have been used in each phase are in detailed described in the following sections in detail, including the related outcomes and generated impacts.

3 THE IDENTIFICATION PHASE

The *"identification phase"* of the stakeholder engagement process has been characterised by the application of two qualitative analytical methods exemplified in mapping exercises and baseline analyses. These tools were used to gather get a better understanding of the context-based determinants and to gain an overview of key actors operating along the (bio)waste value chain at the local, regional and national levels.

To start, a snapshot of the biowaste management process in place was derived in each of the SCALIBUR pilot cities – Kozani, Albano Laziale, and Madrid – together with an overview of actors operating in those, including their interests, needs, motivations, and operational settings were developed. A summary of both activities can be found below, while a more detailed overview of the derived outputs is provided in *D2.1 Stakeholder engagement plan per pilot municipality and identification of current promising practices.*

3.1 Stakeholder mapping

The stakeholder mapping exercises determined a list of all key stakeholders (at the local, regional and national level), covering the whole value chain of (bio)waste in the three SCALIBUR pilot cities. These actors ranges from waste management companies, wastewater treatment plants / companies, municipalities, HORECA (Hotel, Restaurants and Catering), recycling centres; citizens, housing and consumers' associations, start-ups, to regional administrators, policy-makers, research institutions etc.

It is important to highlight that these mapping exercises represented an on-going project activity throughout the SCALIBUR lifespan. Each city's stakeholders' mapping has been regularly updated and expanded on the basis of the different project activities and meetings. This has enabled the project team to optimize multi-stakeholder engagement processes and to maximize the outcomes of the developed activities.

3.2 Baseline analyses

In order to address the identified major challenges and ensure the uptake of more sustainable recycling behaviours via key drivers, it is necessary to engage and collaborate with all key actors along the biowaste value chain. To start with it is crucial to gather a deeper knowledge of context-based determinants including existing stakeholders' networks and operational settings. The baseline analyses were then carried out focusing on barriers and opportunity areas of the local (urban) biowaste value chain infrastructure for each city.

3.2.1 Kozani baseline analysis

Since 2016, Kozani has implemented a pilot system of selective biowaste management, which has been expanding over time involving an increasing number of households. It started with 100 participating households, then reached 285 in 2017, and finally to more than 500 in 2018. This pilot program has been promoted by the legislation at the national and municipal level which focuses on implementing a separate collection of biowaste, minimizing the landfilled

waste, while concurrently implementing new biowaste treatments such as compost, anaerobic digestion.

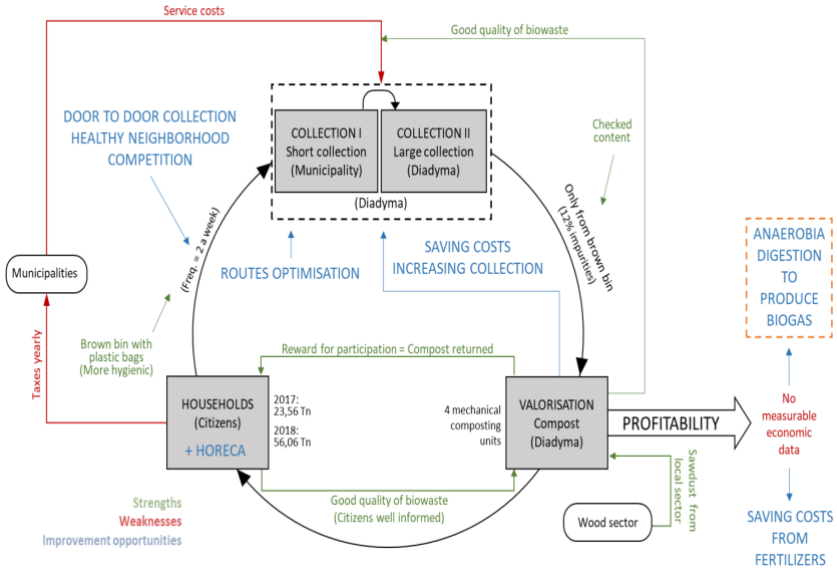


Figure 2. Waste management system (Kozani)

Looking at the local waste management system, in Kozani, household waste is collected twice per week. There are two main categories for waste collection: short and large. While short collection refers to the logistics of small amounts of waste from the city to the Local Waste Management Units (LWMU), large collection is the collection and transfer from LWMU to Mechanical and Biological Treatment plant (MBT). Initially, the municipal council manages the short collection, while large collections are managed by DIADYMA S.A. However, in some cases, short collections can be performed by DIADYMA as well. The biowaste is put in plastic bags and separate brown bins per house or block are provided. Only the waste from the brown bins is used for biowaste valorization. The valorisation plant consists of a composting plant with four mechanical composting units. It uses sawdust from the local wood and forestry sector, in order to improve the ratio of carbon to nitrogen (C:N), and also to reduce the moisture levels. The compost produced as a result of the pilot project is returned to the participating households with plants as a reward for their collaboration. The whole process is, therefore, highly dependent on correct sorting from the citizens. Thus, in order to ensure it, the municipality and the waste management company are constantly active to inform and raise citizens' knowledge on the proper (bio)waste sorting while concurrently the waste is checked to identify impurities and incorrect sorting during the collection and transfer to the sorting plant. In most checks the quality of the biowaste appears to be high (88% purity), suggesting that the households are so far motivated and well-informed as to how to separate their waste properly.

From the baseline analysis, a series of key weaknesses also emerged. They are mainly linked to the existing legislation. Currently, value added products (such as biofertilizers) stemming from biowaste cannot be used in the agricultural sector, thus making such products unmarketable. Furthermore, there is no provision for financial incentives for citizens to increase at-source separation and/or recycling. Waste taxes are still calculated based on the square meters of the household and not on the quantity and quality of the waste sorted and collected.

3.2.2 Albano Laziale baseline analysis

In the city of Albano Laziale, waste is separated and collected into different fractions, namely wet fraction, plastic, paper and cardboard, metal and glass packaging, paper and cardboard, road cleaning residues and undifferentiated waste (dry, non-recyclable). Biowaste is collected, sorted and pre-treated in an automated system, using magnets and screens. Finally, on the basis of the best offer from the plants that treat each EWC code, the municipality sends them the wet fraction as well as the other types of urban waste.

In 2019, the municipality of Albano Laziale changed the waste collection system, transitioning from a system, which is based on different large bins located around the city, to an individual household "door-to-door" system. This transition was combined with the implementation of a new taxation system called TARIP. It is based on the concept of "Pay as you throw". Accordingly, the tax is calculated on the number of persons living in a single household. Each household is provided with a single smaller bin for non-recyclable waste with a computer chip installed inside. For example, a one-person household will pay a TARIP tax fee that includes emptying the non-recyclable waste bin 16 times. Every additional time that the non-recyclable waste bin will need to be emptied, the household will have to pay additionally €1.10. However, should the person manage to reduce the amount of emptying the non-recyclable waste bin to less than 13 times throughout a year, a discount of €1.10 for each time, that the bin has not been emptied, will be provided. Naturally, the system provides special dispensations for households including kids (up to 3 years) and elderly or sick persons.

With the door-to-door system citizens have been engaged on a deeper level in the (bio)waste management. The success of the approach lies indeed in citizens' understanding, awareness and engagement: e.g., they have to separate the waste properly and display their waste bins outside of their houses/apartments at specific days during the week depending on the type of waste to be collected.

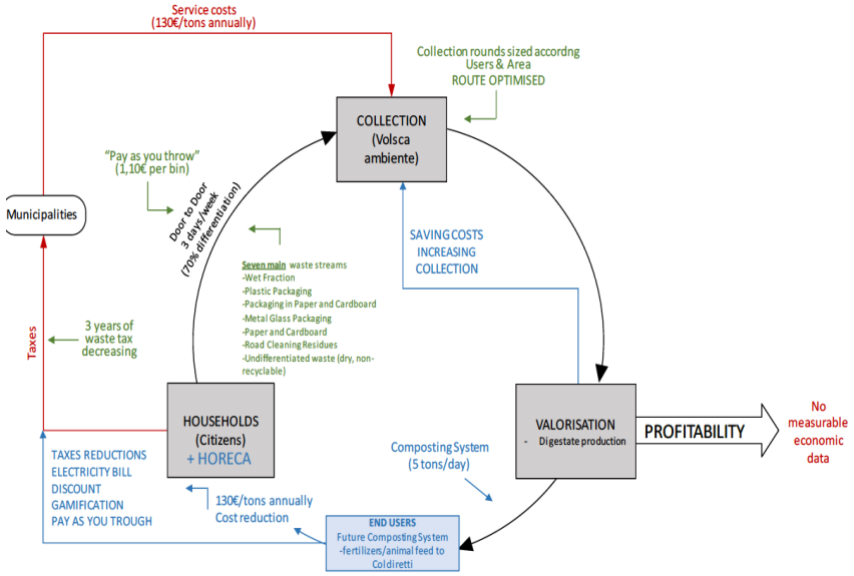


Figure 3. Waste management system (Albano Laziale)

The city of Albano Laziale proved how the switching to a more individual based system can not only improved the quality of the waste collected, but it has also resulted in economic advantages for the citizens: the new TARIP tax is 5% lower in comparison to the previous one and if citizens (as per household members) reduce their overall production of non-recyclable waste, the tax reduction can reach up to 10%. The switching to the new system has also required tailored awareness and knowledge sharing campaigns to guarantee the adequate involvement of citizens. The municipality of Albano Laziale, has organized a series of public meetings/events, and massively widespread knowledge about the new system via social media.

The key identified challenges in Albano Laziale concern the rather complex legislative system in place in the country. In brief, due to national legislations, regional authorities plan waste management strategies, provincial authorities control the waste collection process, and municipal authorities implement the operational strategies. This leads to strong geographical heterogeneity in waste management and recycling, with substantial cross-regional differences: with strong macro-area (regional level) and micro-areas (municipalities) presenting substantial variations that also affect the efficiency and increased the costs of sorting and collecting waste.

3.2.3 Madrid baseline analysis

Waste in Madrid is separated into five different fractions: packaging, glass, paper & cardboard, mixed waste and biowaste. They are sorted in different surface and door-to-door containers, following a colour code and mainly collected on a daily basis. Collection and the transport are performed by private collectors hired by the City Council with a fleet using natural gas and electricity as fuels. All the waste collected is treated in the waste treatment industrial complex Valdemingomez Technology Park. There, the biowaste collected is valorized via two processes: biogas production, to produce biomethane that is injected in the general gas grid system of Spain and electricity; and secondly, digestate production to obtain fertiliser.

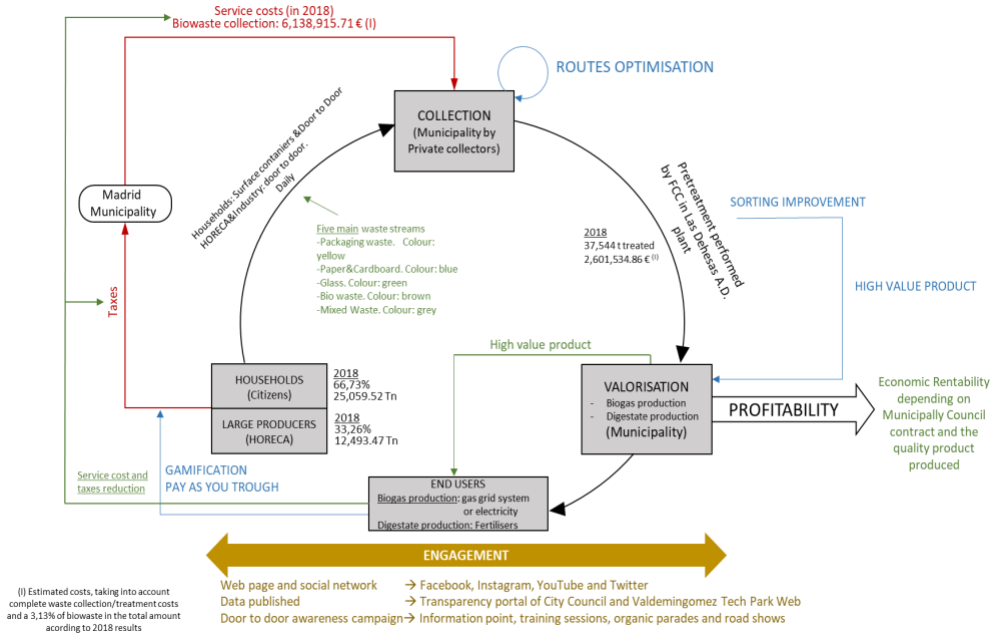


Figure 4. Waste management system (Madrid)

Based on the most recent local legislation a system for selective biowaste collection was implemented in large areas of the city. The process finished in September 2020, reaching 100% of the population (1,307,682 households) in the 21 districts. Since then, five different fractions of waste are collected separately, both from private households as well as from large producers (mainly HORECA). All the information related to this selective waste collection program is communicated to citizens in order to engage them in the process. To inform them about the system, different communication channels were used, such as: web pages, social networks, transparency portal and different campaigns and live workshops. Also this dissemination and engagement campaigns are done through the environmental educational program that yearly runs on Valdemingómez Technology Park.

In terms of weakness, Madrid's ones concern the regulatory and tax systems. While the national legislation on waste provides set definitions of waste and biowaste the disconnection among this waste legislation and the fertilizers legislation, limits and even inhibits the commercialization of value-added products like the compost coming from biowaste, thus leaving 7.016 tonnes of compost produced during 2020 unexploited. Current legislations also do not sufficiently make provisions for an extended producer responsibility for biowaste, therefore failing to provide incentives for the reduction and/or valorization of biowaste. Furthermore, there is not a single waste tax fee, but these costs are embedded in a city tax paid annually to the municipality. Therefore, there are no direct linkages between how well citizens separate or recycle the (bio)waste and what they pay. The whole system is voluntary and relies on the citizen's willingness.

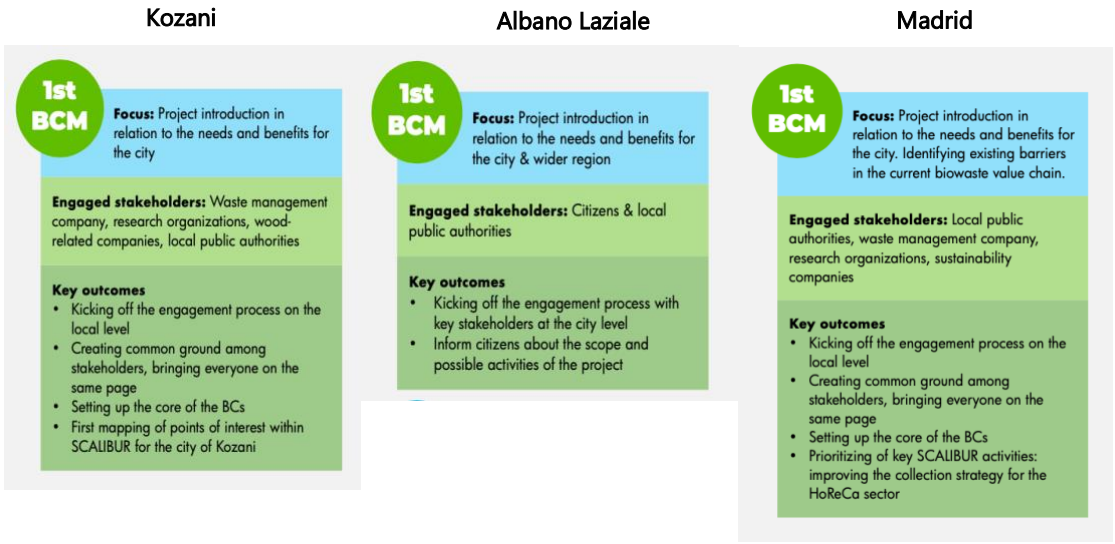
4 THE ENGAGEMENT PHASE

4.1 The launch of the SCALIBUR Biowaste Clubs

Drawing on the stakeholder mapping exercises and baseline analyse findings, in the three SCALIBUR pilot cities, the SCALIBUR "engagement phase" was kicked off. It started with the selection of key stakeholders to be engaged in each pilot city on the basis of the developed maps. Specifically, identified stakeholders were ranked on the basis of a set of criteria including, among others, actors' influence on the project goals, their interest in the project activities or the already built experiences of local partners in working with these actors. On the basis of these rankings and of the identified key challenges and possible opportunities areas, so-called "engagement plans" were developed for each pilot city (for a more detailed overview of the engagement plans please see *D2.1 Stakeholder engagement plan per pilot municipality and identification of current promising practices*). The following steps consisted in the setting up of the SCALIBUR Biowaste Clubs in the cities.

The Biowaste Clubs represented open and inclusive dialogue platforms that enabled those identified groups of actors to exchange knowledge and information on gathered challenges, needs and opportunities areas and further exploit the possibilities to implement innovative strategies and solutions at the local and/or regional level. A Biowaste Club as a tool was applied

via a series of events, workshops, trainings, public exhibitions. It provided the necessary neutral stage to meet, discuss, and collaborate to develop a shared (bio)waste management and valorization vision for the city; define a roadmap on how to support the city in the transition towards a more circular economy; share knowledge and experiences at the city level, but also across other cities and regions; enhance communication between key actors and foster local leadership etc. The below graphic provides a brief summary of the key focus, engaged stakeholders and outcomes derived by the launch and implementation of the SCALIBUR Biowaste Clubs activities.



Following these initial kick-off events, a series of dedicated meetings and related activities was organized. Section 4 of this report digs deeper into those subsequent Biowaste Club meetings and activities as well as into the first round of value chain actors and citizens' consultation run via ad-hoc surveys.

5 THE CONSULTATION PHASE

Accordingly, each SCALIBUR pilot city ran different types of Biowaste Clubs meetings and activities addressing different focus areas and actors across the 4 project years. The sections below provide a snapshot of the scope, outcomes, key actors involved of those meetings per pilot city.

5.1 The Kozani Biowaste Club

The baseline analysis conducted for the city of Kozani and the initial mapping of the area's key stakeholders and their interests were the starting point for the Biowaste Club Meeting topics in Kozani. More specifically, following the discussions of the 1st and the 2nd Biowaste Club Meeting - held respectively in January and July 2019 - stakeholders from the waste management company, research organizations and local public authorities came together and mapped the key challenges in the current biowaste value chain in Kozani. This led to the key prioritization of activities that could be undertaken to improve the collection of biowaste as well as the

quantity and quality of the collected fraction. The activities implemented include the development and installation of sensors on bins to optimize the collection routes and the expansion of the separate collection of biowaste from open markets to increase and improve the organic fraction collected. Therefore, the 3rd BCM took place in October 2020 in the largest open market in Kozani. There local partners engaged with the local vendors and producers in order to explain to them how the separate collection would take place and also address any hesitations or open questions from their side.

2nd BCM	3rd BCM
Focus: Challenges on the current biowaste value chain (collection, sorting, treatment, engagement, policy)	**Focus:** Separate collection of biowaste from open markets
Engaged stakeholders: Waste management company, research organizations, wood- related companies, local public authorities	**Engaged stakeholders:** Waste management company, local public authorities, producer associations, producers & vendors
Key outcomes: - Clear prioritisation of key activities according to first identification of areas in need of improvement emerging from the baseline analysis - 1st step: optimizing collection through the development of sensors and developing detailed plan with the waste management company for the activity - 2nd step: expanding separate collection to the main open market with view of expanding to the other two	**Key outcomes:** - Active engagement of new target group (Producers and vendors) and wider dissemination of Biowaste Clubs and SCALIBUR activities - Improving the quantity of collected waste - Understanding perceptions, challenges and limitations of producers - Piloting the activity: collecting learnings and identifying what can be improved

The 4th 5th and 6th BCMs held in June 2021, September 2021 and June 2022 respectively, aimed at exploring the opportunities that lie in the valorization of spent coffee grounds from HoReCa activities. These meetings were co-hosted by SCALUBUR and HOOP[1] to ensure the smooth transition and continuation of the engagement activities. Valorizing spent coffee grounds will be one of the main activities for the region of Western Macedonia and the city of Kozani in HOOP. Therefore, these meetings focused on introducing the activity to several HoReCa actors in the city to start building the network of participating actors. Key stakeholders such as HoReCa actors, the waste management company, CluBe and the local public authorities came together in order to detail an action plan for the rollout of this activity. Currently, next to adding further partners in the participating network, local project partners are working towards collecting necessary data (quantity and quality of coffee residues, needs for collection, etc.) to implement the activity.

4th BCM	5th BCM	6th BCM
Focus: Introduction of HOOP and exploring the separate collection and valorisation of spent coffee grounds	**Focus:** Separate collection of biowaste from open markets	
Engaged stakeholders: HoReCa representatives, waste management company, public authorities	**Engaged stakeholders:** HoReCa representatives**,** waste management company	**Engaged stakeholders:** HoReCa representatives**, waste management company**
Key outcomes - Active engagement of new target group (Producers and vendors) and wider dissemination of Biowaste Clubs and SCALIBUR activities - Improving the quantity of collected waste	**Key outcomes** - Expansion of businesses interested to participate - Further detailing of the roll-out of the pilot activity - Need to collect data pertaining to the quantity and quality of coffee ground produced by each business - Need to specify collection routes and frequency	

[1] https://hoopproject.eu/

- Understanding perceptions, challenges and limitations of HoReCa actors
- Next step: agree on best valorisation route

Lastly, the most recent BCM which took place in September 2022 had a bit of a different focus. As citizen engagement is a key component to improving the separation of household waste and one of SCALIBUR's core objectives, a special meeting was hosted engaging with the "local champions" but also citizens of Kozani.

The aim of this participatory workshop was to ask citizens to bring forward their circular ideas about activities that can be implemented in Kozani. The citizens and local champions discussed their individual visions for the city with respect to the 4 R's of circular economy: refuse, reduce, reuse and recycle. The ideas discussed were mapped and follow-up meetings are planned in the upcoming months for HOOP ("Circular city hubs to enhance investments for the valorisation of urban organic waste and waste water") projects. The HOOP project supports eight lighthouse cities and regions – including Albano Laziale and the Lazio region - in developing large-scale urban circular bioeconomy initiatives that will focus on recovering valuable resources from urban biowaste and wastewater to make bio-based products.

7th BCM

Focus: Co-designing bottom-up circular ideas for Kozani

Engaged stakeholders: Citizens, local public authorities, local circular entrepreneurs (local champions)

Key outcomes:

- Need for making the term "circular economy" more accessible to citizens
- Need to demonstrate simple, easy to implement solutions
- Behavior change interventions in schools
- Several ideas for pilot activities to be implemented in HOOP (e.g., circular communities, DIY workshops on circularity topics, awareness raising campaigns)

Lastly, the final Biowaste Club Meeting for SCALIBUR was held on the 26th of October. Key regional stakeholders including local and regional public authorities, the waste management company and representatives from the University of Western Macedonia came together to discuss the results of SCALIBUR and their importance for the region of Western Macedonia. More specifically, CluBE gave an extensive presentation of the outcomes of the SCALIBUR pilot activities, focusing especially on the optimization of the collection routes through the installation of sensors on the bins. The stakeholders discussed the results and how the activity can be scaled up in other neighbourhoods in Kozani and possibly other municipalities in Western Macedonia. For this, HOOP presents an excellent opportunity to continue the work started in SCALIBUR and take it a step further as to carry on with the improvement of biowaste valorization.

8th BCM

Focus: Presenting SCALIBUR's final results

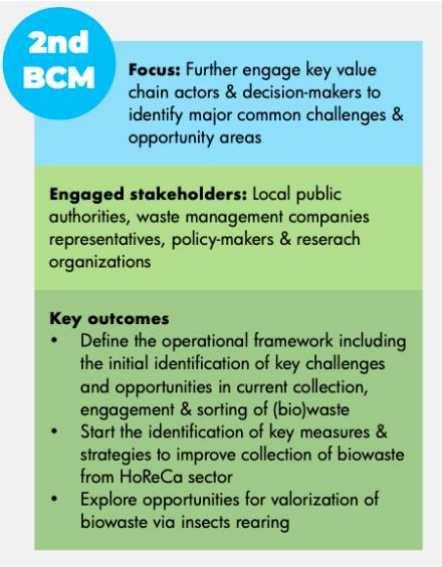
Engaged stakeholders: Local and regional public authorities, waste management company, University of Western Macedonia

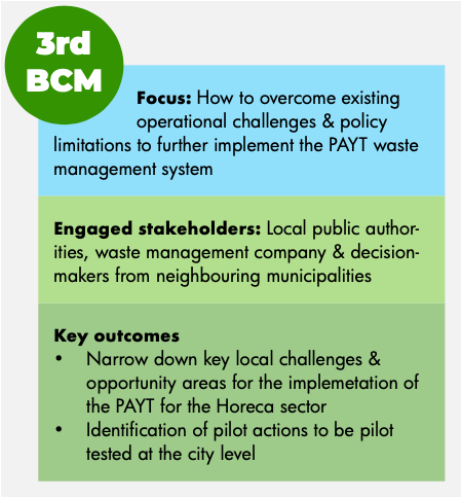
Key outcomes:

- Presentation of the outcomes of the pilot activities; recapping what has been achieved locally and regionally
- Discussion on how to improve and upscale the pilot activities
- Linking SCALIBUR results to upcoming HOOP activities

5.2 The Albano Laziale Biowaste Club

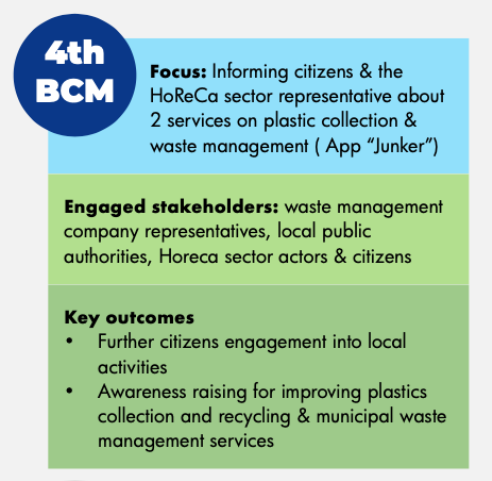
Starting from the hotspots identified via the baseline analysis, the second and third Biowaste Club meetings, in Albano Laziale, were held in February and October 2019, respectively. Those events brought together a broad range of actors, including local and regional decision- makers, such as mayors of neighbouring cities/towns, and representatives of regional governmental bodies as well as research organizations. The objective was to focus these initial discussions around the challenges and opportunities areas gathered by the baseline analysis in order to kick-off the identification of key measures and strategies to improve the management and collection of (bio)waste starting from the adoption of the TARIP for the HoReCa sector; the setting up of a new municipal biowaste treatment centre; local strategies to reduce overall food waste and packaging and explore opportunities for valorisation of biowaste via insect rearing. Accordingly, the second meeting also actively engaged Albano Laziale's citizens as one of the key aims was to further inform citizens about the implementation of the new door-to-door waste collection system and on the related introduction of the new waste tax, TARIP.

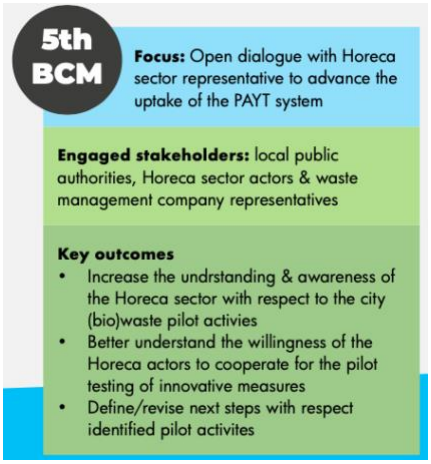




The following Biowaste Clubs meeting was a public event organized in the central place of the city on November 2019. The key objective was to inform citizens and HoReCa sector representatives about the additional services – on plastic collection and waste management – provided by the "Junker" app in collaboration with the waste management company Volsca Ambiente and the municipality. Along the same rationale, the 5th Biowaste Club meeting in Albano Laziale – which took place in June 2021 due to the COVID pandemic - consisted of an

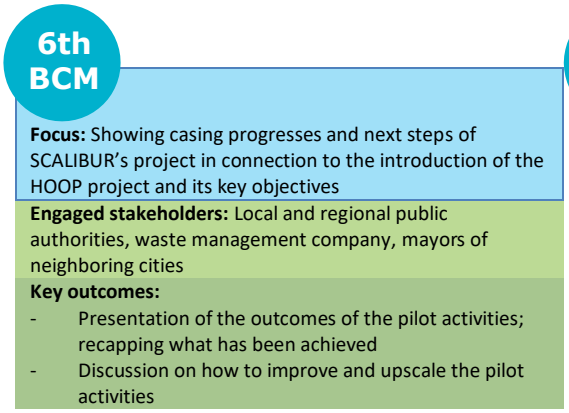
open dialogue with selected HoReCa representatives to drive forward the implementation of the TARIP for the sector at the municipal level.

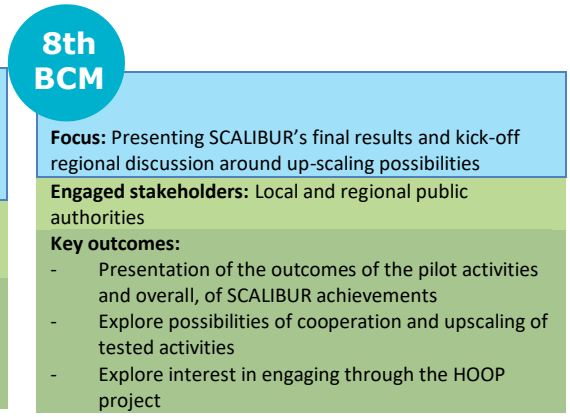




The subsequent 6th Biowaste Club meeting in Albano Laziale was the first one organized under the umbrella of the SCALIBUR and HOOP. Accordingly, this Biowaste Club meeting held in December 2021, had a two-fold scope, namely from one side recapping on the so-far conducted activities under the SCALIBUR project while concurrently interlinked them with the services and expertise provided by the HOOP project. Specifically, the event enabled Volsca Ambiemente, the municipality and ANCI Lazio to provide an overview of the identified and implemented pilot activities in Albano Laziale (further described under section 5) and to kick-off the discussion around financial mechanism needed to enlarge and replicate them at a broader level.

Afterwards, the 7th Biowaste Club meeting was embedded in a special event defined as the "Circular Economy Week" which took place in May 2022 and it is further described under section 5. While, the 8th and last Biowaste Clubs meeting in Albano Laziale was organized on September 2022 within the framework of a training camp addressing the municipal administrators operating in the Lazio region. The aim was to further share the knowledge, expertise and success stories derived from the SCALIBUR multi-stakeholder and pilot activities in order to set into motion of a replication and wide-spreading process in which others municipalities of the Lazio region will exploit the outcomes generated in the project. Specifically, the event focused on the SCALIBUR collection of good practices, the National Action Manual(s) and the HOOP financial expertise and assistance to drive forward innovative (bio)waste and wastewater management processes.





- Linking those SCALIBUR results to upcoming HOOP activities

5.3 The Madrid Biowaste Club

Based on the outcomes of the First BCM in Madrid, key barriers were identified for the current biowaste value chain in Madrid, thus providing a common ground of understanding for key stakeholders that participated in the BCM and supporting them to identify actions and solutions to biowaste management challenges. Subsequently, the Second BCM in Madrid was implemented in Valdemingómez Technological Park on November 2021, bringing key stakeholders together to discuss about the most pressing issues and identifying strategies and technology innovations for a sustainable biowaste management in Madrid. This BCM included networking spaces for all participants and a field visit to "Las Dehsas" plant installation in Madrid. Moreover, the BCM focused on providing a comprehensive overview of several topics related to the biowaste value chain in Madrid, which included strategies and policies, main challenges in city, the role of citizens in biowaste management, experiences on biowaste management, selective biowaste pick up and logistics in urban areas, innovative technologies for sludge valorisation, advance processes to biowaste valorisation through insects, among others. Stakeholder attendance in this second BCM included waste management companies, local authorities, city council representatives, technology and research organisations.

The Third BCM in Madrid took place as a virtual webinar on May 2022, bringing together supermarkets in Madrid that were interested in learning about biowaste management and solutions to address key sustainability challenges such as food waste. In cooperation with the Spanish Association of Distributors, Self-Service and Supermarkets (ASEDAS), the virtual webinar was titled "*Sustainable trends and opportunities sustainable trends and opportunities in the retail industry*" and it consisted on delivering a training program exclusively for representatives of the retail sector in Spain. Furthermore, specific objectives of the webinar were to analyse the opportunities and challenges of the retail value chain, to provide best practices for biowaste management and to support the development of sustainable strategies and the upscaling innovations in supermarkets.

2nd BCM

Focus: engagement of actors and discussion about biowaste management challenges & solutions in Madrid

Engaged stakeholders: waste management, local authorities, companies, technology & research organisations and city council representatives

Key outcomes

- Create dialogue and exchange about current challenges in Madrid & implication of policies in Spain / EU
- Identify opportunities related to the role of citizens in biowaste management
- Share experiences in bio-waste management and technology innovation

3rd BCM

Focus: promote sustainable trends and opportunities in the retail industry

Engaged stakeholders: retail sector association and supermarkets in Spain

Key outcomes

- Identify opportunities and challenges in the Spanish retail sector
- Share best practices and inspired supermarkets to improve their actions towards biowaste management
- Provide perspectives on future consumption and production trends

Furthermore, the Fourth BCM took place on September 2022, bringing together a group of stakeholders from the "Federation of Grouped Trade and Markets of the Community of Madrid (COCAM)" which represents several markets actors in Madrid. The BCM included Seminar on Waste Recovery at the FCC facilities and "Las Dehesas" Biomethanization Plant in Madrid, and it aimed to increase the awareness of stakeholders about bio-waste recovery, tools and information for a correct biowaste classification. The BCM event included a tour to FCC facilities and several presentations related to biowaste management, including waste management in Madrid (current situation of biowaste management in Spain & Valdemingómez Technological Park); valorisation of Organic Fraction of Municipal Solid Waste (OFMSW) at Las Dehesas Biomethanization plant and presentations about the bio-methanization process to produce products such as biogas and digestate. Also, challenges of separation at origin in the markets of the Community of Madrid were presented, identifying good practices, resources and infrastructure for a correct biowaste management and classification.

4th BCM

Focus: stakeholder engagement and awareness about biowaste collection and valorisation processes in Madrid

Engaged stakeholders: the "Federation of Grouped Trade and Markets of the Community of Madrid (COCAM)"

Key outcomes

- Promote awareness about the current situation of biowaste management in Spain and Madrid
- Visit and tour to FCC facilities "Las Dehesas" Biomethanization plant and the "Research and Development Center"
- Provide tools, resources and good practices for a correct classification of biowaste in markets

5.4 The SCALIBUR Surveys

5.4.1 Background

Since multi-stakeholder engagement and co-creation activities are key to reach the mentioned SCALIBUR's objectives, the better understanding of citizens and value chain actors' knowledge and perceptions of (bio)waste as a resource have been central elements of the project. In order to gain this knowledge two ad-hoc surveys have been developed and launched in Kozani and Albano Laziale, each designed for an engagement group, namely citizens and value chain experts (the complete surveys can be found in Annex 1). The focus of the surveys' questions has been based on the outcomes of the baselines analysis as well as of the initial Biowaste Club meetings while the design - closed-ended, multiple choice or checkbox questions – aimed to maximize participation and concurrently decreasing the risk of uncomplete answers. In order to enable the assessment of possible changes in knowledge, understanding of biowaste management and acceptance of derived value-added products, two rounds of surveys were conducted for both target groups in the two cities. Participating in the surveys was always voluntary and no incentive for participation was offered.

In Madrid, this specific consultation activity was not implemented as a vast array of qualitative data on this matter were already available. This due to the extensive engagement activities

implemented by the company Anthesis Lavola which under close collaboration with the municipality and the waste management companies has run campaigns door-to-door, in schools and shops; designed itinerant dissemination and outreaching activities and stands in markets, squares, and city festivals, and conducted different surveys to reach the largest possible number of social groups in the city.

5.4.2 Surveys' structure

The citizen' survey was divided into 7 sections:

1. Personal information
2. Biowaste knowledge and opinions
3. Separation behavior and challenges
4. COVID 19 impacts & outlook on biowaste recycling
5. Biobased products, health and safety and product transparency
6. Feedback mechanism and privacy
7. End of life responsibility

The citizens survey started with an introductory information sheet, a consent part and instructions on how to fill it out. The first section "personal information" included questions on gender, education, age range and living conditions. The second section "biowaste knowledge and opinions" questions were directed to understand the perception of respondents on what "biowaste" means for them as well as their understanding and perception of biowaste recycling impacts on sustainability. The third "separation behaviors and challenges" aimed to determine the behaviors adopted by citizens when separating biowaste as well as to identify the key challenges they face. Since the COVID outbreak also had impacts on multiple aspects of society, questions related to the pandemic were also included in the fourth section "COVID 19 impacts & outlook on biowaste recycling". The aim was to understand the influence of COVID 19 in biowaste separating behaviors. The fifth section "Biobased products, health and safety and product transparency" included questions to evaluate the willingness of respondents to use specific biowaste products (e.g., food, hygiene, fertilizers, etc.) and to assess the role that product safety information plays with respect to behaviors. The sixth section "Feedback mechanism and privacy" and the seventh section "End of life responsibility" addressed post-purchasing behaviors, in terms of feedback provided to companies and consumers' confidence towards data privacy.

The value chain experts survey was structured according to 9 sections:

1. Personal information
2. Performances, challenges, opportunities and waste management
3. SCALIBUR & outlook
4. Health and safety
5. Feedback mechanism and privacy
6. End of life responsibility
7. Human rights
8. Socio economic repercussion
9. Working conditions

This survey also started with an introductory page including an informed consent. Participants were then asked to indicate the type of organization they work (e.g., SME, municipality, waste management company, research organization etc.) and their field(s) of expertise. As for the citizens survey the section on "Personal information" included questions on gender, age and education. In the following section, namely "Performances, challenges, opportunities and waste management", they were asked to provide their perceptions regarding the role of citizens in waste management processes. Additionally, an open question was also included to explore the gather an understanding of the biggest challenges and existing opportunities with respect to biowaste recycling and bio-based derived products. In the third section "SCALIBUR & outlook", participants indicated their actual knowledge about the project their expectations and interested in terms of key engagement activities and communication channels.

For this group, it was also important to derive information complementing the LCA assessment conducted in WP8 with a social component. According, an array of questions was included focusing on health and safety issues" at the company level (e.g., awareness, complaints). The next section of the survey "Feedback mechanism & privacy" explored consumers' satisfaction with respect to the company`s activities while the "End of life responsibility" section addressed the company's engagement in ad-hoc sustainability initiatives. Participants of this survey were also asked to provide information about human rights (e.g., existence of a code of conduct that protects human rights, gender equality etc.). In addition, a social repercussion section was also included to collect data on existing policies towards social responsibility and sustainability. The final section focused on the "working conditions" and it aimed to identify social benefits (e.g., bonus, health insurance etc.) and potential stress factors.

5.4.3 Methodology & data collection

The surveys were initially developed in English and then with the support of local partners translated in Italian and in Greek in order to reduce the risk of law participation on the basis of language barriers.

Following, an estimation was made on the number of participants needed in order for the outcomes to fairly and sufficiently represent each target groups. Accordingly, the sampling size for each target group in each pilot city has been calculated using the following formula:

$$n = z2 * p * (1 - p) / e2$$

where n = sample size; z = level of confidence according to the standard normal distribution (for a level of confidence of 95%, z = 1.96); p = estimated proportion of the population that presents the characteristic expressed in decimal. Here p = 0.5 was applied and e = tolerated margin of error: here an error of 5% was considered. This resulted in the following sample size:

	Citizens	Value Chain Experts
Kozani	378	40
Albano Laziale	321	23

It is important to highlight that the applied formula was mainly used to provide a rough indication of the ideal number of citizens and value chains experts to be engaged and thus supported the design of the surveys as well as the identification of the most appropriate dissemination channels to be used. Specifically, the distribution of the citizens surveys was deployed by applying a multi-channel approach. Accordingly, an array of different channels was used including: municipalities websites and social media pages (i.e., Facebook); waste management companies' websites and Facebook pages; local partners websites and Facebook and LinkedIn, Twitter accounts (i.e., CluBE and ANCI Lazio), local newspapers; leaflets in schools; via existing app such as "Junker"; and naturally the SCALIBUR website as well as the project partners webpages and social media (CSCP, ITENE etc.). This approach also implies that it was not possible to have the same participants taking part in the ex-ante and ex-post surveys in the two cities. Accordingly, the outcomes of those surveys should be considered and interpreted keeping in mind that variations (both positive or negative) could be also due to this.

On the contrary, for the value chain expert surveys a direct-contact approach was deployed using existing local networks and contacts. The surveys were hence distributed via email to selected groups of experts. This approach was the preferred option given the different focus of the questions proposed.

5.4.4 Analytical approach

SCALIBUR multi-stakeholder engagement is a complex process implying a variety of actors, each having his/her own needs, challenges, expectations, background knowledge resulting in a multitude of variables determining single decisions and behaviours. In order to account for this complexity and to best analyse the data gathered through the surveys, a qualitative content analysis has been applied. Qualitative content analysis is a research method which examines textual data to single out patterns and structures to then derive categories and aggregate them into perceptible constructs (McTavish & Pirro, 1990; Tesch, 1990). Text data might be in verbal, print, or electronic form and might have been obtained from narrative responses, open-ended survey questions, interviews, focus groups, observations, or print media such as articles, books, or manuals (Kondracki & Wellman, 2002).

Within this analytical approach an inductive content analysis was applied. This approach is generally used with a study design whose aim is to describe a phenomenon, in this case the level of knowledge, understanding and information of engaged actors in terms of biowaste management and acceptance level of bio-waste added value products. Applied to our specific analysis, it enabled the identification of options that are most or least desirable and to discern key citizens and value chain actors´ interests and needs, thus supporting the refinement of existing processes and development of new activities.

Finally, given the diversity of the pilot cities' local context, a comparative analysis has been conducted to provide an explanation as to why similar processes yield different results, but also to help pinpoint the elements responsible for these differences providing insights into the underlying causal patterns and complexities.

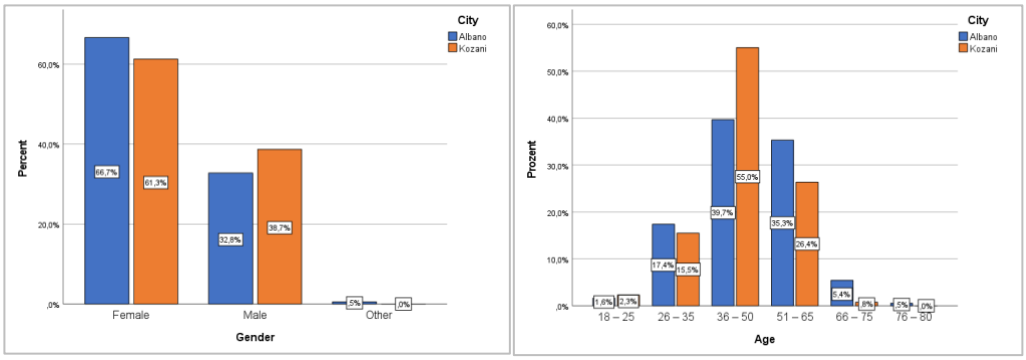
5.5 The surveys outcomes

The surveys were disseminated and sent out in both Kozani and Albano Laziale between May 2021 and August 2021 ex-post surveys and between May 2022 and September 2022 ex-post surveys. The rationale in both instances was to operate within a broader timeline to maximize participation through a series of planned reminders and targeted communication posts. In terms of respondents, the surveys saw the participation of a total of 287 citizens in Kozani and 355 in Albano Laziale and of 18 value chain experts in Kozani and 29 in Albano Laziale. A snapshot of the key analytical outcomes is provided in the next sections.

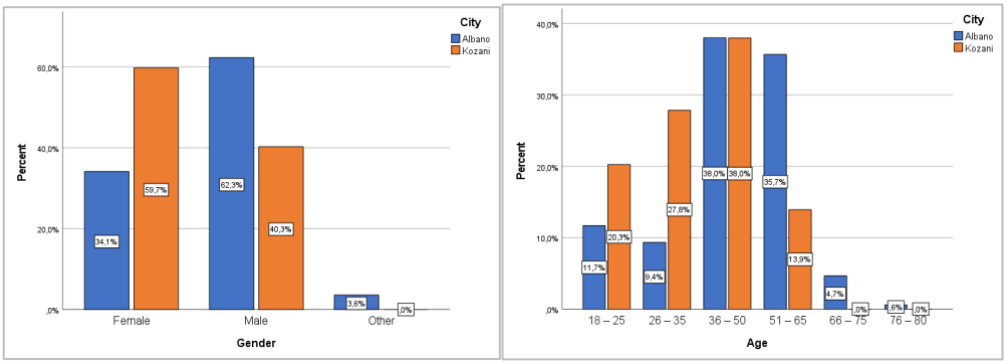
5.5.1 Citizens' surveys

Starting with the gender aspect[2] it can be noticed that overall, for both Kozani and Albano Laziale women were more active in taking part on the surveys. This data mirrors the still dominant socio-cultural aspect in both countries where mostly women are taking care of the household and consequently are more directly involved in biowaste separation at the household level. Nonetheless, the ex-post survey in Albano Laziale[3] also showed an interesting diverging trend with a majority of male respondents.

Gender & age dimension ex-ante surveys



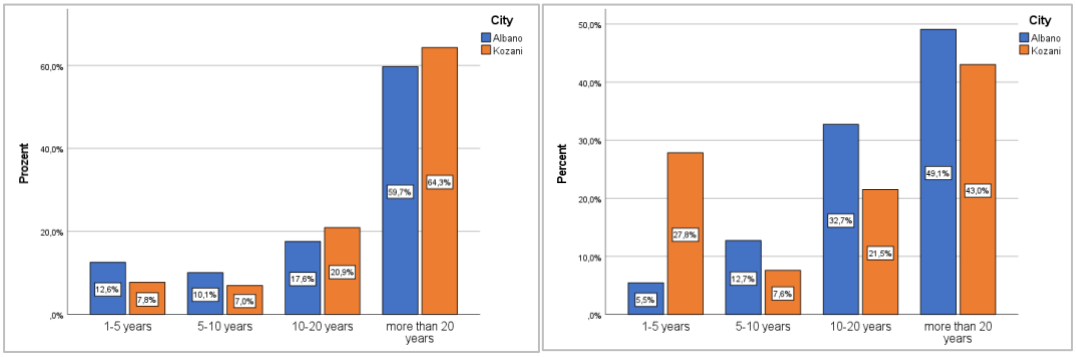
Gender & age dimension ex-post surveys



[2] A chi-square test was used to compare the city of origin and gender: no expected cell frequencies were below 5, and results show no significant small difference, p = .418 between the two pilot cities.
[3] A chi-square test was used to compare the city of origin and gender. No expected cell frequencies were below 5. Results show a significant small difference, $\chi^2(2)$ = 24,361, p <.001, V = .275.

While no relevant difference was identified in terms of the gender dimension, the majority of respondents were between age 36-50. The analysis showed an age gap between the two cities, namely Albano Laziale's respondents were slightly younger than those of Kozani[4]. This also well reflects the fact that Albano Laziale's participants have been living in the city for a shorter period of time compared to the Kozani's respondents as shown in the below graphic[5]. While, even though the ex-post surveys indicated a majority of participants in the age-group 36-50, it also showed for Kozani an higher number of younger respondents compared to Albano Laziale.[6] This also mirrors the outcomes concerning the time respondents have lived in each city, which for the ex-post surveys increased for Albano Laziale.[7]

Time lived in the city



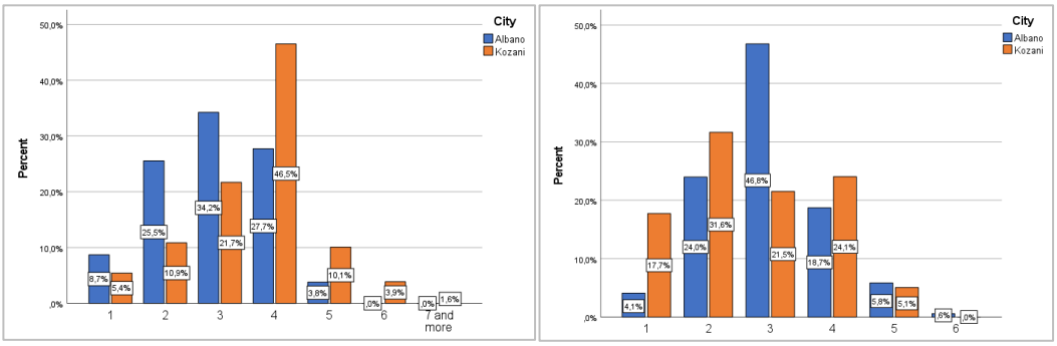
Ex-ante Surveys

Ex-post Surveys

Another interesting element is the households' composition in the respective cities. Kozani's household are composed by 4 or more members while in Albano Laziale the numbers ranged between 2 and 3 members[8]. The ex-post surveys showed a similar composition, even though smaller households composed of 1, 2 or 3 members were also reported for the second round of surveys. Although, at first sight this factor can seem irrelevant the implementation of new tax system needs to well account for those variables. For instance, in Albano Laziale – as well as in other Italian cities – the calculation of the pay-as-you-throw tariff (TARIP) is based on a combination of the square meters and members of the household. While in Kozani the current system is based solely on the square meters of the house which could be a false parameter when having to account for the amount of waste produced and recycled.

[4] A Mann-Whitney-U-Test was calculated to determine if there were differences in age between Kozani and Albano citizens. There was a statistically significant difference between both groups, U = 10416,000, Z = -1,979, p < .05.
[5] A Mann-Whitney-U-Test was calculated to determine if there were differences the time lived in the city between Kozani and Albano citizens. There was a statistically significant difference between both groups, U = 9554,500, Z = -3,264, p < .001.
[6] A Mann-Whitney-U-Test was calculated to determine if there were differences in age between Kozani and Albano citizens. There was a statistically significant difference between both groups, U = 8555,000, Z = -5,995, p < .001
[7] A Mann-Whitney-U-Test was calculated to determine if there were differences the time lived in the city between Kozani and Albano citizens. There was a statistically significant difference between both groups, U = 3612,000, Z = -1,979 p < .05.
[8] A Mann-Whitney-U-Test was calculated to determine if there were differences in the number of people living in one household between Kozani and Albano citizens. There was a statistically significant difference between both groups, U = 7756,500, Z = -5,431, p < .001.

Household composition

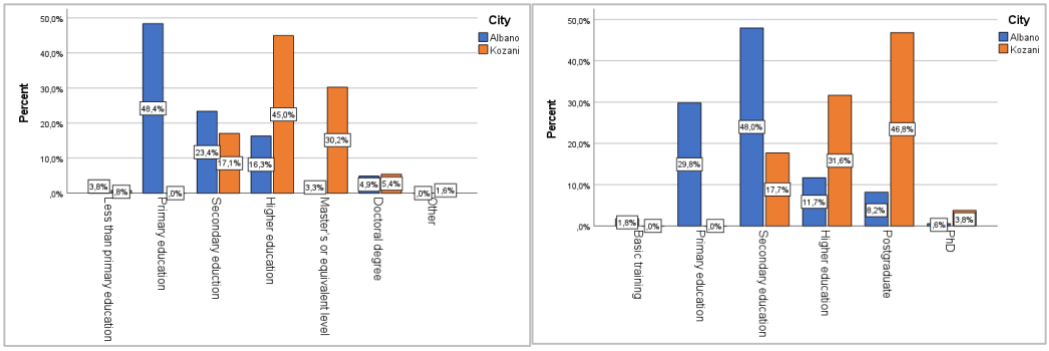


Ex-ante Surveys

Ex-post Surveys

When looking at respondents' information, it is also interesting to notice that in terms of education, most of the respondents in the city of Kozani had a bachelor's degree educational level, while in Albano, the higher reported was an upper secondary level.

Education level

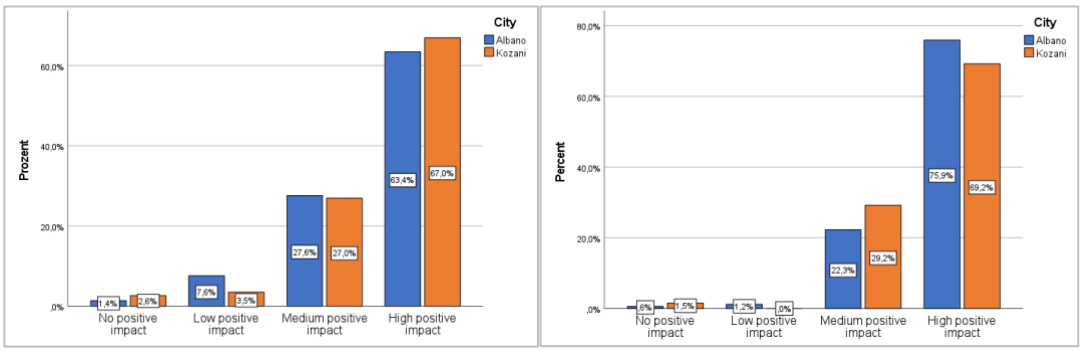


Ex-ante Surveys

Ex-post Surveys

Although some differences have been spotted between the two cities, it is interesting to notice that for the majority of citizens – in the two round of surveys - recycling practices have high positive impacts on the environment and human health as well as on pollution, as show from the two graphics below.

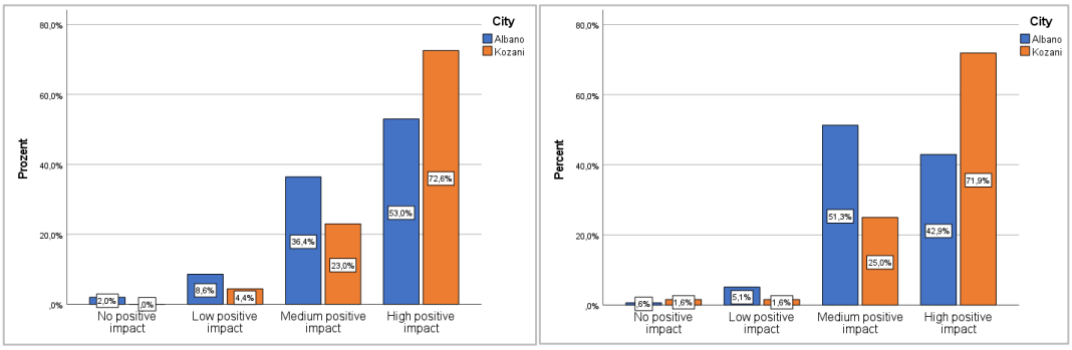
Environmental and health impacts



Ex-ante Surveys

Ex-post Surveys

Pollution impacts



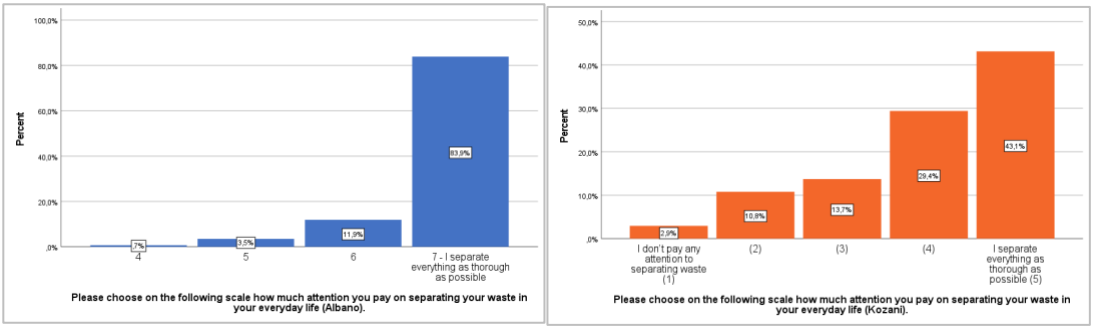
Ex-ante Surveys

Ex-post Surveys

Nonetheless, it also emerged that Albano Laziale citizens considers the impacts of recycling on pollution slightly less positive than those of Kozani[9]. While in the second round Kozani's respondents value the importance recycling more has having medium impact on pollution rather than high ones compared to Albano Laziale's participants.[10]

It is also interesting to derive that when asked to provide three words associated with biowaste, the majority of respondents in Albano Laziale indicated "compost" while in Kozani the most mentioned word was "food waste". In connection to those wording and concept's association, it was also interesting to see the outcomes of citizens (bio)waste separation habits. In Albano Laziale, 83,9% indicated an extremely high level of attention to (bio)waste separation. Similar results can be observed in Kozani, even though there, answers were more spread across of the provided values scale, as shown by the respective graphics below.

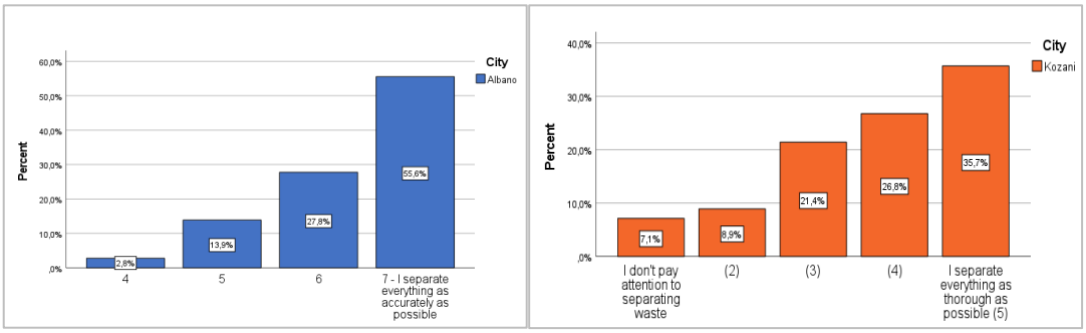
Level of attention to (bio)waste separation in Albano Laziale and Kozani ex-ante surveys



[9] A Mann-Whitney-U-Test was calculated to determine if there were differences in the expected impact of recycling on pollution between Kozani and Albano citizens. There was a statistically significant difference between both groups, U = 7782,500, Z = -3,313, p < .001.

[10] A Mann-Whitney-U-Test was calculated to determine if there were differences in the expected impact of recycling on pollution between Kozani and Albano citizens. There was a statistically significant difference between both groups, U = 7119,000, Z = -4,762, p < .001

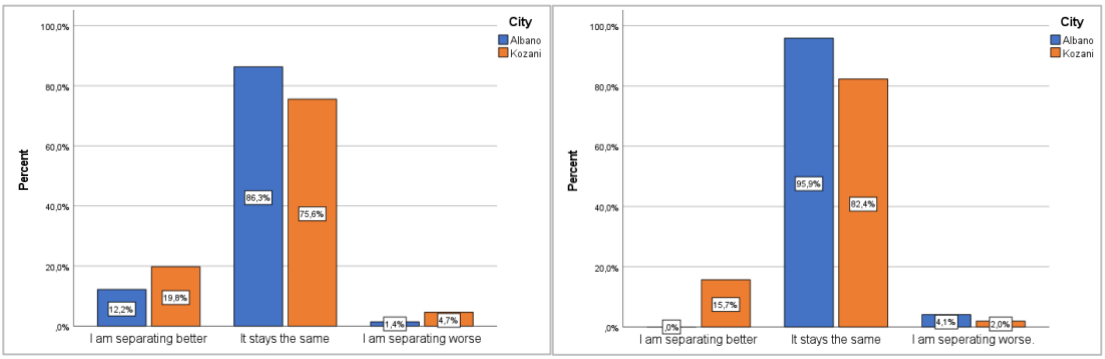
Level of attention to (bio)waste separation in Albano Laziale and Kozani ex-post surveys



As it can be observed the ex-post surveys presented lower percentages of respondents in both cities indicating that they separate everything as accurately as possible. Additionally, for Albano Laziale it is also evident how participants reported lower value across the scale. While, in Kozani values increased at the lower end of the scale. Although, this could be initially interpreted as a negative outcome, it should be considered that different engagement activities and information campaigns were conducted regarding (bio)waste separation. Accordingly, the reported value could also reflect an increased awareness and understanding of appropriate (bio)waste separation habits.

Furthermore, it is also interesting to notice that citizens indicated no change in their habits due to the COVID 19 pandemic in 2021 and 2022 as shown in the graphic below. However, the ex-post surveys presented a slightly different overview with respect to the options of separating better or worse: with a decrease in Albano Laziale about the better separation options and an increased percentage for the worst separation option; while Kozani's a lower percentage was reported for the option of separating worse.

Biowaste separation behaviour during COVID-19



Ex-ante Surveys

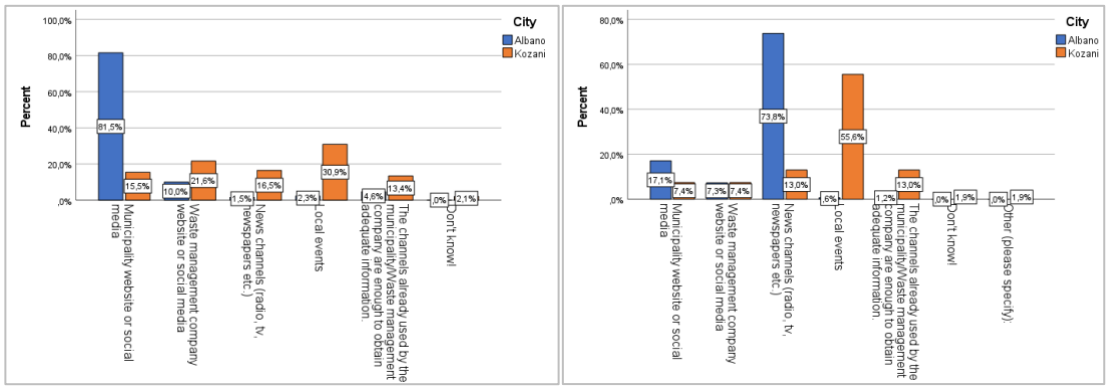
Ex-post Surveys

Based on the above answers, it was also extremely important to analyze the reported challenges in the two cities to gather a better understanding of the realities that citizens deal with in their everyday life. According to the surveys' results, it is noticeable that the majority of citizens in Albano Laziale indicated that they do not have any challenges on properly separating biowaste. This information provides clear indication that the separation and collection systems are working effectively and the level of information provided to citizens is sufficient. On the other hand, citizens in Kozani reported a series of challenges that influence their levels of waste

separation and thus their behaviors. For the Greek city, it is evident that the main challenges concern the existing waste infrastructure, equipment and logistics, namely lack of proper bins, lack of space inside the household and problems related to biowaste collection frequencies such as bad smell, insects and flies. Naturally, in relation to those challenges citizens have also indicated a series of actions that would support them in improving their (bio)waste separation behaviors. Among others, in both cities: *having more knowledge on how to properly separate waste*; *having proper or different bins also accounting for limited space in the house*; *having more information on the product composition; higher pick-up frequency,* were selected.

Another crucial aspect linked to the identified challenges concerns the preferred way of accessing information regarding (bio)waste separation and collection. The two cities showed significant difference with respect to the data collected during the ex-ante surveys (graphic on the left-hand side). In Albano Laziale, the most used channels were: the municipality and the waste management company websites and/or their social media channels, while in Kozani, citizens used a broad array of channels including radio, TV, newspapers and local events, as shown by the graphic.[11] When looking at though at the results of the ex-post surveys it is interesting to notice how the majority of citizens in Albano Laziale reported to be using the radio, TV and newspapers while the majority of participants in Kozani reported local events.

Preferred communication channels



Ex-ante Surveys

Ex-post Surveys

Along the same rationale, it has been also interesting to analyze the results regarding the top three ways that citizens indicated as suitable to enhance their knowledge and improve their behavior in terms of (bio)waste separation and recycling.

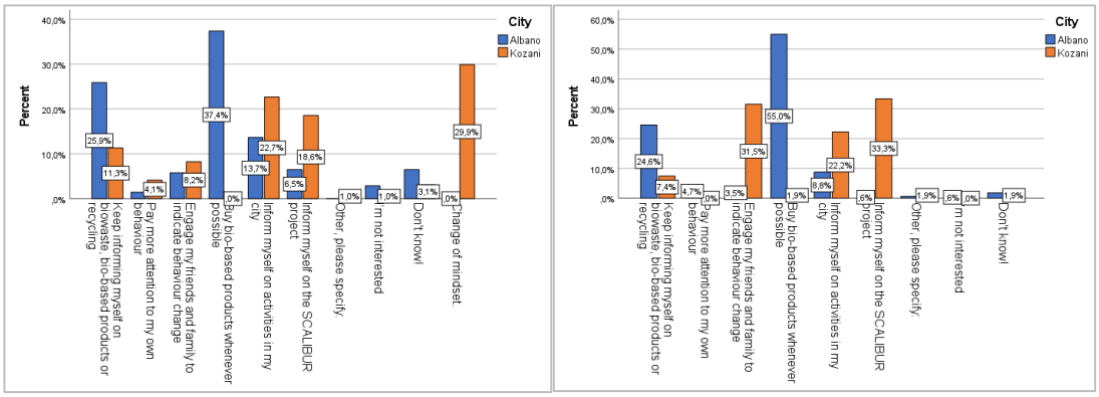
The graphs below show remarkable differences between Albano Laziale and Kozani for the ex-ante surveys. Specifically, in Albano Laziale citizens claimed to keep themselves informed and also to buy - whenever possible - bio-based products. However, it is also worth mentioning that some indicated that are neither aware or interested in those aspects. In Kozani an higher level of interest and engagement has been depicted, and citizens seem to be kept themselves aware and motived via exchanges with family and friends as well as through city initiatives when it comes to (bio)waste related behaviours and knowledge. It is also outstanding that 29,9% of

[11] A chi-square test was used to compare the city of origin and desired communication channels on biowaste separation. No expected cell frequencies were below 5. Results show a significant large difference, $\chi^2(5) = 105{,}307$, $p < .001$, V = .681.

citizens indicated that a crucial aspect to enhance knowledge and improve behaviours is linked to a change of mindset.

When looking at the outcomes of the ex-post surveys, the two cities still reported significant differences. Most interestingly, in Kozani participants indicated an even higher engagement with family and friends as well as via the SCALIBUR project. In Albano Laziale, the percentage regarding the SCALIBUR project decreased so less respondents seemed to used it to motivate or keep themselves informed and an even higher percentages indicated the purchasing of bio-waste products as the preferred options. This could be possibly explained as indirect outcomes of the different citizens' engagement activities implemented in the two cities: in Kozani the majority of actions focused on enhancing citizens' awareness and understanding about the benefits that proper (bio)waste management can bring along. Whereas, in Albano Laziale the focus of engagement activities was shifted to the HoReCa sector and to the setting up of an efficient anaerobic digestion plant at the city level.

Top 3 ways to enhance knowledge and improve behaviours in terms of biowaste separation and recycling



Ex-ante Surveys

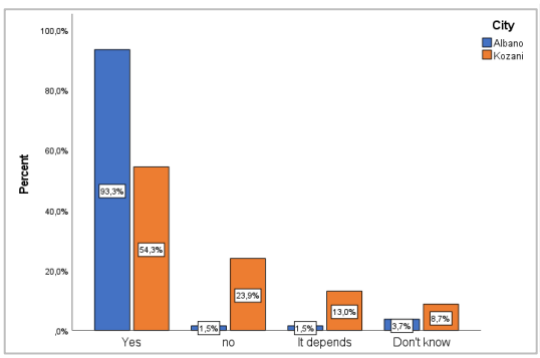
Ex-post Surveys

This also mirrors the difference between Albano Laziale e Kozani's citizens with respect to their perceptions of companies. The outcomes of the ex-ante surveys indicated that most citizens in Kozani (62%) had negative perceptions about companies' caring of negative impacts on the environment, while this percentage was only of 28% in Albano Laziale. Similar outcomes were derived from the ex-post survey: in Kozani still roughly 52% indicated a negative perception, whilst it dropped to only roughly 9% in Albano Laziale. These data are important to consider since a widespread negative perception could also hinder the perceptions that citizens have about the waste management processes and thus negatively affecting their engagement as well as motivations to positively change their behaviour.

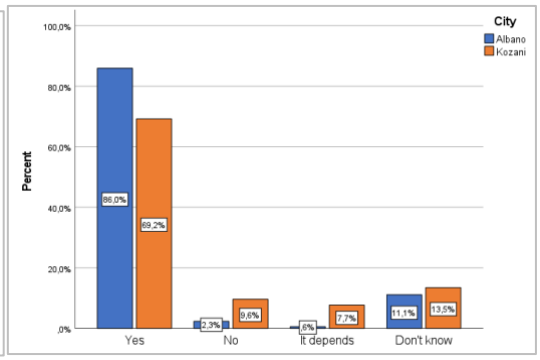
Finally, the analysis assessed the willingness to use (bio)waste value-added products. Three different products categories were taken into account and as the graphics show the majority of citizens in both cities signalled high level of acceptance. Specifically, it is interesting to highlight that hygiene items packaging (e.g., shampoo in biobased bottes) and food grown with bio-based fertilizers are the products that both Albano Laziale and Kozani's citizens are mostly willing to use. Slightly lower percentages were reported for food packaging. Nonetheless,

overall citizens signaled high level of acceptance towards those type of derived bio-waste products.

Hygiene items packaging

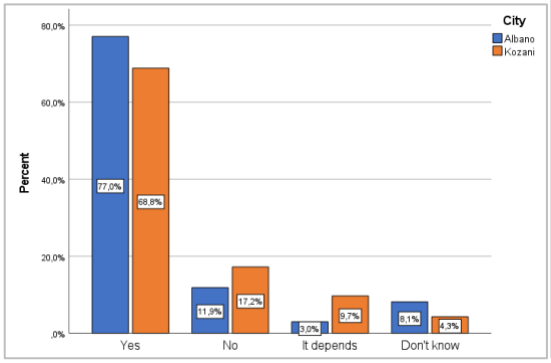


Ex-ante Surveys

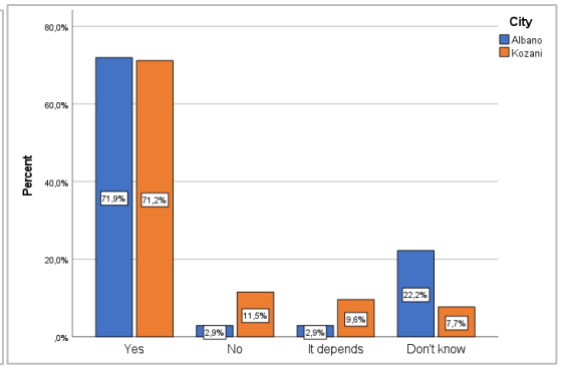


Ex-post Surveys

Food packaging

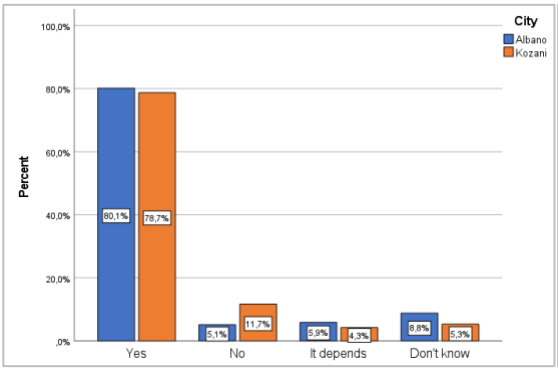


Ex-ante Surveys

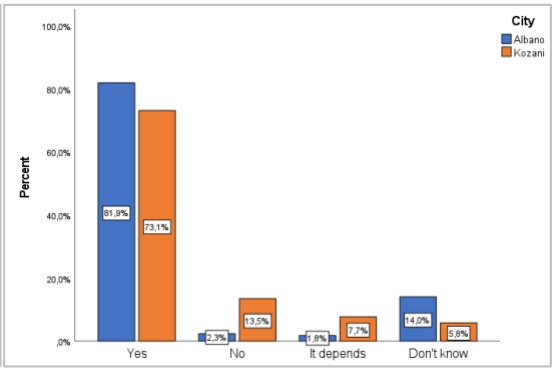


Ex-post Surveys

Food grown using bio-based fertilizers



Ex-ante Surveys



Ex-post Surveys

It was also important to depict that in both cities, just over half of respondents usually look at safety information on product packaging and that those information influences their opinion of whether to buying a product or not. This aspect was also reflected in the answer their provided concerning complaints about products' safety. In the ex-ante surveys, most citizens in Kozani (78%) and Albano Laziale (61%) had never complained about product safety. It also emerged that the citizens in Albano Laziale have complained more about inadequate product safety information compared to Kozani citizens with a 34% and 18%, respectively. The outcomes of the ex-post surveys showed a similar tendency with 70% in Albano Laziale while a significant

different percentage for the citizens of Kozani 42%. Regarding, issued complaints the second round of surveys also outlines a significant change to start with Albano Laziale where the percentage of citizens issuing a complaint increased reaching roughly 53%, while in Kozani strongly decrease with a 6%.

Finally, among the crucial aspect to consider, the surveys provided interesting insights into citizens' participation to community initiatives related to sustainable aspects/environmental impacts. For the ex-ante surveys, in both cities, most residents have never participated in community initiatives regarding environmental issues (66% and 81% in Kozani and Albano Laziale, respectively). The majority of respondents in Albano Laziale claimed that they have not heard of any community initiatives regarding environmental issues (36%). While in Kozani, the majority indicated that they have heard about community initiatives (55%). The outcome of the ex-post surveys indicated though a quite reverse situation, with 74% in Albano Laziale reporting that they heard and participated in a community-based initiatives. Regarding participation the percentage in Kozani was of 25%. When looking about knowledge of community-based initiatives, data collected reported 15% in Albano Laziale, indicating an increased awareness among citizens while a decreased for Kozani's one with 37.5%.

5.5.2 Value chain experts' surveys

As for the citizens surveys, also for the value experts' survey two rounds were conducted. The timeline was as above-mentioned exactly simultaneous to the citizens' surveys, namely between May 2021 and August 2021 ex-post surveys and between May 2022 and September 2022 ex-post surveys.

Given the target audience and focus of this second survey, the first question concerned the type of organisation the participant works for (e.g., SME) and his/her field of expertise. Additionally, the first section included the usual "personal information", questions on gender and age. In the second section "Performances, challenges, opportunities and waste management", perceptions on the current performance of citizens as relevant actors were assessed in multiple aspects and from a professional/expert point of view. The same held for biowaste management at the municipal level (e.g., amount of, quality) and for the production of bio-based products. Following, an open question explored the biggest challenges and opportunities to achieve the goals of increasing and improving biowaste recycling and market access of bio-based products, and whether sustainability issues were relevant to the daily life of the company. Moreover, in the third section "SCALIBUR & outlook", participants indicated their actual knowledge about the project (e.g., if they have heard about the project / their respective of, communication channels) and their (e.g., expectations and overall rationale for their interest in it.

In addition, since social assessment is also an important component of the SCALIBUR project (WP8) an array of questions focused on health and safety issues" at the company level (e.g., awareness, complaints). Followed by a section on "feedback mechanism & privacy" which explored whether the participant`s company investigated consumer' satisfaction, and another section focusing on "end of life responsibility". This latter aimed to check if participant has joined any initiatives regarding waste management - which also involved local communities –

through his/her company's activities/initiatives. Finally, the survey required to provide information on "human rights", namely the existence of a code of conduct that protects human rights, gender equality, and on "working conditions" (e.g., bonus, health insurance, and stress level of employees). In addition, a specific "social repercussion" section was included to better understand and collected data on existing policies towards social responsibility and specific SDGs.

Looking at the type of engaged value chain experts, it is important to highlight that most respondents in Albano Laziale were actually not living in the city. This aspect slightly affected the completeness of the survey as well as the provided knowledge, as some respondents feel they did not have the full overview and/or understanding of certain issues happening in the city. This challenge was not encountered in Kozani.

Starting to look at the type of organizations that took part in the exercise, it is important to notice that in Albano Laziale, those were mainly service providers. While, in Greece the organizations engaged were more diverse, including e.g., waste service provider, research organizations, local public authorities, industry and juridical experts.

In regards to gender, the representation of male respondents was significantly higher in both cities. Looking at the age of experts in Albano Laziale the majority was between 50-64 years old, whereas in Kozani they were slightly younger with an age range between 35 and 50. This overview holds true for both the ex-ante and ex-post surveys.

When looking at the waste management system of each city, it was important to understand the experts' opinions about its effectiveness from different angles. Thus, according to the Albano Laziale's value chain experts, the current waste management system enables citizens to correctly and easily separate their (bio)waste: 37.5% ex-ante survey; 68% ex-post survey. These percentages should not be interpreted as a result of a change in the waste management system, but rather as a result of the fact that for the ex-ante survey, many experts interviewed do not live in Albano Laziale. In the city of Kozani, the number were different with an equal split between experts who did think that the current system does not properly support citizens, while the other half reporting the opposite opinion (for both surveys).

Along the same lines, value chain experts also indicated whether according to them citizens know how to properly separate their biowaste: for the ex-ante surveys, in Albano Laziale 25% reported that citizens do know how to properly separate (bio)waste, while the number was only 16% in Kozani. When looking at the ex-post surveys, in Albano Laziale the percentage increased to 52%, while in Kozani it decreases reaching only 8,6%. When looking at citizens' acceptance of bio-waste derived products, in Kozani 60% of the value chain experts indicated a good acceptance level while in Albano Laziale 50% of the experts indicated a lack of knowledge about this issue which again could have been biased given the fact those experts did not live in the city. Indeed, the outcomes of the ex-post surveys, reported a lower lack of knowledge about the issue with only 15.8% answering with "I do not know" in Albano Laziale. Kozani's experts in this second round 41.7% indicated a good acceptance level, thus mirroring the perceptions and opinions of the ex-ante surveys.

Experts were also asked to provide their feedback about the quality of the collected biowaste and of added value products that could be derived from it. Similar challenges emerged in the two cities: for Albano Laziale the majority of experts reported a lack of knowledge, while for Kozani the majority of answers ranged between "I do not know" or "strongly disagree/disagree". The ex-post survey results mirror those initial outcomes for Kozani, with 41.7% indicating a lack of knowledge, whereas in Albano Laziale in the second round only 5.3% reported a lack of knowledge while 42% indicated a good quality of the collected biowaste.

The surveys also provided the opportunity to collect value chain experts' opinions on what kind of actions are needed at the city level to improve (bio)waste management. In Albano Laziale, respondents indicated:

- Correct information about the benefits of biowaste treatment through a local anaerobic waste treatment plant
- Better and clearer information about the long-term environmental, economic and social impacts of biowaste recovery, reuse and processing
- Improved the quality of biowaste produced by the HoReCa sector
- Enhanced market access for high-quality compost
- Decrease tariff for operators
- Develop a better and more efficient infrastructure for the collection of (bio)waste
- Promote European policies instead of territorial segmentation for waste management
- Stop the extensive use of landfills incinerators
- Increased investments for research on the topic
- Evaluate and exploit business opportunities linked to biowaste valorisation

In Kozani, among the main issue, information and awareness raising were also central aspects. Nonetheless, experts also indicated:

- Increased collaborations between companies,
- Enhanced coordination among stakeholders operating along the (bio)waste value chain to also improved the quality of the collected biowaste
- Increase collection points and bin network
- Improved knowledge and information about (bio)waste recycling processes and infrastructure
- Higher citizens' engagement and further development of a circular economy culture via new products and local initiatives
- Better understanding and assessment of energy recovery from biowaste
- Evaluate and exploit business opportunities linked to biowaste valorisation

After having gathered a better overview of key challenges and opportunities areas, it was interesting to understand how the engaged experts scored the SCALIBUR project and how they came to know it. Positively, the majority of the respondents in Albano Laziale (88%) heard about the SCALIBUR project prior to taking part in the survey, in Kozani this percentage was 83%. The ex-post surveys, indicated 100% for Albano Laziale, though a lower one for Kozani with 66.7%.

In addition, the answers also provided an overview of the type of channels through which respondents came in contact with the project: in the ex-ante surveys, work environment 71% and personal connection 29% were the most indicated means in Albano Laziale, while in Kozani in addition to work environment, online sources (e.g., social media, project website, etc.) 60%, followed by personal connections and Biowaste Club Meetings 20% were mentioned. In the ex-post surveys, those channels broadened up for Albano Laziale, with experts reporting: work environment (47,4%), followed by personal relations (26,3%) and Biowaste Club Meetings (21,1%). On the contrary, Kozani roughly confirmed the first results with: work environment and online sources (e.g., social media, project website, etc.) (60%), followed by personal relations (20%) and Biowaste Club Meetings (20%).

Finally, interesting insights were gathered in terms of expectations regarding upcoming SCALIBUR activities. For the ex-ante surveys, in Albano Laziale, the majority reported:

- Participation in activities related to the project (like Biowaste Club meeting) (43%);
- Awareness raising about environmental and sustainability issues in the city (43%);
- Learning more about what Albano Laziale is doing to improve the (bio) waste value chain (14%)

For Kozani a broader variety of activities was collected:

- Participation in activities related to the project (like Biowaste Club meetings) (100%);
- Learning about European best practises and good examples on (bio)waste recycling (100%);
- Awareness raising about environmental and sustainability issues in Kozani (75%);
- Learning about what Kozani has been and is currently doing to improve the (bio)waste value chain (75%) and gather a better knowledge about Kozani's activities concerning (bio)waste management (25%)
- Exploring business opportunities (25%)
- Further exchanging and engaging with key stakeholders from Kozani (25%) and/or across Europe (25%).

6 THE COLLABORATION PHASE

6.1 The SCALIBUR pilot activities

The "Engagement & Consultation Phases" activities have proved extremely helpful in gathering the needed overview and data to then develop on-the ground pilot activities for stakeholders, HoReCa actors as well as for citizens. In order to better shape those activities and Biowaste Clubs' activities, the collected knowledge was put in relation with existing waste management processes and identified challenges at the city level. For example, Kozani had introduced a new waste collection system which allows citizens to properly dispose biowaste by using plastic bags and placing them in separated brown bins per house (or per block). Albano Laziale adopted

the TARIP tax system for citizen's and was working towards the implementation of a similar system for the HoReCa sector.

Accordingly, on the basis of these status-quo the pilot activities revolved around key specific challenges with the common aim of contributing to increasing and improving the quantity and quality of collected urban biowaste. More specifically, the following key aims were defined for each pilot city under WP3 Task 3.5:

- Albano Laziale (IT): Implementation of best practices for collection, transport & characterization of OFMSW and HORECA waste
- Kozani (EL): Implementation of best practices for collection, transport and characterization of OFMSW and HORECA waste
- Madrid (ES): Implementation of social awareness best practices on collection of OFMSW, as well as sorting, pre-treatment and characterization of OFMSW

Prior to the design and implementation of targeted pilot activities a series of analytical steps were undertaken in order to better understand status-quo, opportunities areas and overall local interests and driving factors. To start with, the cities' baseline analyses together with stakeholders' mapping and analysis of interests and motivations provide a snapshot of potential areas of improvements, where SCALIBUR could operate with innovative solutions, see Table 1.

Table 1: Areas of improvement per city

	Albano Laziale	Kozani	Madrid
Collection	Collection of HoReCa Waste	Bad waste quality	No uniformity in containers
	Illegal dumping	Collection of HoReCa waste	Overfilling of the containers before collection of waste
	Lack of a biowaste collection centre		
Transport	High cost of transport	No optimization of the collection routes	No optimization of the collection routes
Social Awareness	A door-to-door collection system for OFMSW from housing is implemented since 2019, including a "Pay as you Throw" (PAYT) model. The objective is to progress in this direction for HORECA waste	Lack of knowledge of the people on how to correctly recycle	No motivation to recycle
		Waste tax is based on the m2 of the household and no connection is made with the quality of the waste collected	No reward mechanism, the taxes to the municipality are paid regardless how well citizens separate or recycle
			There is a lack of knowledge on how to separate waste

Following, an analysis of international European best practices performed by ITENE yielded a good set of solutions from which SCALIBUR partners took inspiration and derived the array of pilot activities that have been then discussed with local stakeholders and from which a narrow set of on-the-ground activities has then been derived. A comprehensive list of possible pilot activities can be found in Table 2.

Table 2: List of pilot activities per city

Albano	Madrid	Kozani
Collection: **C4.** Containers with chip to register filling levels. **C8.** Efficient collection during summer. As the sensors detect the filling level and in summer more waste is produced, the collection during this season is more frequent not allowing neither exceeded containers nor bad odours. **C9.** Selective collection of biowaste from the HORECA waste. In Albano only the HORECA waste is going to be collected with SCALIBUR techniques because the rest is being collected with a "pay as you throw" system, and it's already developed and implemented. **C13.** Build an anaerobic digestion plant		**Collection:** **C4.** Containers with chip to register filling levels (in addition to gas emissions, CO2 and CH4). **C6.** Start biowaste collection at schools. **C8.** Efficient collection during summer. As the sensors detect the filling level and the gas emissions (CO2 and CH4), and in summer more waste is produced, the collection during this season is more frequent not allowing neither exceeded containers nor bad odours.
Transport: **T1.** Software designed optimized waste collection route **T4.** Truck traceability. It's done though the platform.		**Transport:** **T1.** Software designed optimized waste collection route **T4.** Truck traceability. It's done though the platform.
Social awareness: **SA2.** Pay as you throw principle for fee calculation. Explained above in C9 point. **SA4.** Events, roadshows and workshops. **SA10.** Website on biowaste and recycling (the SCALIBUR website)	**Social awareness:** **SA4.** Events, roadshows and workshops. **SA10.** Website on biowaste and recycling (the SCALIBUR website) **SA13.** Dissemination of the environmental and economic benefits of biowaste recycling	**Social awareness:** **SA3.** Educational areas in recycling yards. **SA4.** Events, roadshows, and workshops. **SA6.** School campaign. **SA10.** Website on biowaste and recycling (the SCALIBUR website)
Characterization: **CH1.** Data collection and monitoring quality parameters	**Characterization:** **CH1.** Data collection and monitoring quality parameters	**Characterization:** **CH1.** Data collection and monitoring quality parameters
	Sorting and pre-treatment: **SP1.** Live characterization of OFMSW with the IRIS system **SP2.** Improvements on pre-treatments to raise the OFMSW quality	

A detailed analysis of the pilot preparation, implementation and results can be found in D3.6 *"Best practices factsheets and performance analysis of the improved systems on selective collection, transport, sorting and pre-treatment during the pilot implementation in municipalities ".*

6.2 The Local Champions & the Action Weeks

In addition to the pilot activities, targeted stakeholders, citizens' engagement activities were organized in May and June 2002, and also saw the participation of so-called SCALIBUR "local champions" namely inspired citizens, start-ups, associations, and small companies operating at the local and regional level, who are highly committed to support their cities and fellow citizens

in adopting circular, sustainable approaches and lifestyles. Detailed information about their local champions and their innovative business models can be found in the booklet entitled *"Local Circular Economy Champion – Inspiring stories from Italy, Greece and Spain"* while the conducted engagement activities are described in details in the following sections.

6.2.1 The Climate Neutral Week in Kozani

The most recent Biowaste Club Meeting was held on 6 June 2022 and was part of a larger event, namely the "Climate Neutral Week" in Kozani, that took place 30 May to 6 June 2022. Kozani is aiming at reaching climate neutrality by 2030 and so the Climate Neutral Week presented an opportunity for local, regional and national stakeholders to come together and exchange on how climate neutrality can be achieved in different sectors (waste management, energy efficiency, smart mobility and sustainable tourism). A total of six hybrid events was organized focusing on the barriers and opportunities posed by the transition to climate neutrality. Best practices from the areas of waste management, smart mobility, clean energy, digital transformation, sustainable tourism, and waste valorisation from the agricultural sector were presented in order for them to be replicated and scaled up on the national level.

The case of Kozani was featured as a leading city in Greece in topics of waste and wastewater management. Experiences and insights gained through Kozani's participation in European projects such as SCALIBUR and HOOP were prominently featured and discussed during this week. Furthermore, a special event was hosted under this week, focusing primarily on financial tools available for achieving climate neutrality. Local and regional stakeholders were presented with different opportunities on the regional, national and European level for financing the green transition in Kozani and also the benefits and investment opportunities by the development of business parks in the region of Western Macedonia. On the topic of biowaste valorisation, the economic potential and the financing opportunities for urban circular bio-economy projects were discussed and European funding and financing opportunities were presented.

The last two days of the Climate Neutral Week aimed at raising awareness among citizens and instigating their active participation in the city's circular waste management efforts. These activities included

"reduce- reuse- recycle" DIY workshops, an exhibition of circular products, a story-telling session to introduce children to the concepts of circular economy and its key principles, as well as games and interactive learn through play activities on proper waste sorting addressing children of all ages. During these events, participants and visitors had the opportunity to talk and engage with 'local champions', which in the case of Kozani were active citizens and social start-ups who are promoting the concept of circular economy through their business model or day-to-day activities. Kozani saw the participation of the following "local champions": Allotino Catering; BIO2CHIP; Espresso World; Evgenia Karapatsiou; Lila Kyrou; Ramma; and Save your Hood.

6.2.2 The Circular Economy Week in Albano Laziale

The event entitled "The Circular Economy Week" in Albano Laziale consisted of a series of different events revolving around the concepts of the bio- and circular economy at the city and regional level. The aim was to promote knowledge around emerging technological solutions and applications for the generation of products on an organic basis (starting from a variety of biomass from carbon-rich raw materials, including biodegradable waste collected from gardens and parks, food waste and cooking products from households, from the HoReCa sector, and from the organic fractions of municipal solid waste and urban wastewater) as well as to share the outcomes of the work carried out by the city of Albano Laziale within the framework of the SCALIBUR and HOOP projects.

The week opened with a public seminar dedicated to international best practices for the circular

economy and for the improvement of individual and collective consumption models "International best practices". An expert meeting followed entitled "New frontiers for the

circular economy: investing in the bioeconomy" during which the Investors Committee (HOOP) illustrated the new potential scenarios in terms of economic and employment opportunities offered by new technologies.

The third event was a participatory process consisting of two separate sessions: the first engaged students (c/o Liceo Ginnasio Statale "Ugo Foscolo" in Albano Laziale) with the aim to further promote the adoption of the educational platform "Green Learning 360°" (promoted by ANCI Lazio and Regione Lazio and produced by Ancitel Energia e Ambiente) and to explore the future of Albano Laziale as a circular city in the year 2030; the second session, instead was open to the wider public addressing a similar objective, namely to further contribute to the design of circular cities in Italy. The week concluded with an exhibition displaying the innovative business models and products of the Italian SCALIBUR "local champions" a diversified group of local and regional including start-ups, associations and small companies united by the aim to support the transition towards a circular economy through the up-take pf more sustainable production and consumption practices. Specifically, they are: DIM Design Lab; Foo Reuse Design; Junker; Laboratorio Linfa; Midorj; Occhio del Reciclone; Reware; and RIscARTI.

6.2.3 The Madrid Local Champions

Given Madrid previously conducted citizens and stakeholder engagement activities, the SCALIBUR approach there was slightly different and took place via the established format of the Biowaste Club Meeting. Specifically, the fifth Spanish meeting took place as a virtual event entitled "*Local Champions Madrid*" on October 2022. It aimed to identify opportunities to boost the uptake of a circular economy in Madrid while concurrently contributing to improve the waste management processes. It was also structured and organised in order to provide a space for exchange and generate a dialogue among different identified local realities and thus to drive forward and upscale those good and innovative practices.

It saw the participation of start-ups and initiatives committed to generate positive changes and impacts in the city, specifically in terms of circular economy, waste management and community development. The virtual event served as a stage to bring together these local initiatives with experts from SCALIBUR project (CSCP, ITENE and FCC) fostering discussions around key pressing challenges and opportunities. Additionally, the local champions had the opportunity to pitch their organisation and role in promoting sustainability, showcasing best practices related to circular economy, resource efficiency and sustainable waste management in the

respective operational areas (i.e., textiles, fashion, design, construction, urban development, etc.). The engaged champions were: Asociación El Olivar; Asociación Naturbana; Huerto Alameda de Osuna; Fundación para la Economia Circular; NoTime; Revolución Limo; and the Circular Project Shop.

7 IMPACT ASSESSMENT

7.1 The impact assessment framework

The previous sections provided the complete overview of the multi-stakeholder engagement activities that have been developed and implemented throughout the four years of the SCALIBUR project in the three pilot cities. The central aim of those activities was to foster a dialogue between the variety of stakeholders operating along the value chain in the three cities and set up fruitful cooperation at the urban and regional level, as well as to better understand citizens' challenges and needs and to support the uptake of innovative behaviour change interventions given the complexity of the European context and the variety of differences existing between European countries and within them at the regional and municipal level.

Accordingly, the objective of this impact assessment is to provide tangible qualitative information on the social impacts achieved by the conducted activities. This objective can be framed within the broader concept of social sustainability which can be described as a multi-dimensional concept focusing on shared social goals of sustainable development. These goals often relate to personal well-being as well as to meaningful interactions with others and include aspects such as social innovation, cohesion, inclusion and justice. Specifically, social impacts have been defined as changes to a person or people's way of life, culture, community, political system, environment, health and well-being, personal and private property rights, as well as fear and aspirations.

A number of tools have been developed to assess social impact broadly – such as the International Guidelines and Principles for Social Impact Assessment or the International Standards Organization (ISO) has developed the standard ISO 26000 – and across these approaches, there are numerous ways to classify social impacts among a range of categories, comprising qualitative and quantitative indicators, classifications, and assessment criteria as well as some quantitative indicators. This impact assessment consisted of a combination of qualitative tools derived from the diversified range of multi-stakeholder and citizens engagement activities conducted. The evaluation is also intended to serve the assessment of public policy frameworks in terms of waste management processes and initiatives and to monitor progresses over time beyond the SCALIBUR's project timeline.

From a qualitative point of view, the multi-stakeholder engagement activities were evaluated in terms of four categories:

- Awareness
- Learning

- Gender aspects
- Behavioural change and social innovation

The next sub-sections, therefore, contain the overall evaluation of the results of the SCALIBUR implemented engagement and awareness raising activities, as measured by qualitative data collected via the Biowaste Club meetings, questionnaires, workshops, trainings and implemented pilot activities.

7.1.1 Qualitative assessment: Awareness

This part of the evaluation attempts to assess the extent to which the stakeholders and citizens have enhanced knowledge and/or improved skills or attitudes through the engagement processes. It builds upon the assumption that improved knowledge and increased awareness enable a more effective implementation of innovative (bio)waste management processes at the urban and regional level.

Specifically, this evaluation focuses on the variations in the level of understanding and reactions of citizens, HoReCa sectors representatives, small businesses, waste management companies and policy-makers. It measures how engaged actors behaved when confronted with a series of thorny topics such as: (bio)waste separation and collection practices; use of derived bio-waste products; recycling and reusing of materials; legal and economic frameworks. A positive reaction and a collaborative attitude are usually conducive to increased learning while a negative reaction is a hindrance to learning.

It has been observed how those actors have engaged into discussions around those topics. It can be noticed also from the focus of the conducted Biowaste Clubs and from the results of value chain experts' surveys that initial Biowaste Club meeting were characterised by more sceptical reactions mainly due to the complexity given by the legal frameworks in the respective countries and lack of collaboration. Over time, however, the provision of a neutral stage to discuss enabled stakeholders to meet more regularly and discuss respective concerns and challenges and thus to pave the way to a common understanding of most pressing issues and needed solutions.

Concurrently, citizens' engagement was also broadly discussed and although at the beginning policy-makers and waste management representatives were more reluctant to engage in innovative awareness raising and communication campaigns, thanks to an increased awareness level they slowly but steadily changed their mindsets. This resulted in a series of innovative engagement activities conducted both physically and online, such as the "action weeks" in Albano Laziale and Kozani and the hybrid event in Madrid targeting local champions.

7.1.2 Qualitative assessment: Learning

As mentioned throughout this report, the essence of the SCALIBUR multi-stakeholder engagement process and activities consisted of an interdisciplinary and co-creative approach that allowed discussing in a neutral setting, possible solutions to identified challenges that waste managers, policy-makers, citizens and HoReCa sector representative face in their daily

working and life contexts. This type of evaluation, therefore, assesses the resulting learning process and the increased understanding observed on a variety of economic, environmental and socio-cultural aspects.

Criteria such as understanding of local-context barriers and opportunity areas, stakeholders' needs, motivations and interests, existing limitations and possible opportunity areas were also assessed against the design and implementation of on-the-ground technical and engagement activities. It emerged that both stakeholders and citizens gathered deeper knowledge and derived key learnings, on e.g., technical operational challenges of current waste collection systems and resulting economic and environmental impacts; logistic challenges of citizens linked to the size of the bins or for trucks in picking up waste in narrow streets and remote areas; economic challenges in defining an appropriate PAYT for the HoReCa sector; importance of targeted and frequent communication campaigns for citizens to enhance the quality of the (bio)waste collected; the importance of engaging with local actors, including neighboring municipalities, to improve waste management practices while reducing costs.

7.1.3 Qualitative assessment: Gender aspects

Gender aspects, such as gender representation and inclusiveness were considered during the planning and implementation of SCALIBUR engagement activities. More specifically, several reports and studies conducted for EU countries show gender differences in behaviours towards managing household waste. The reports argued that women are more prone to reduce their household waste, whilst men are slightly more likely than women to think that better enforcement of existing antilitter laws would be effective (37% vs. 32%). In addition, women are more likely to argue that reducing waste and sorting recyclable waste at home would make the biggest difference (54% vs. 49%). Furthermore, the case has been made that gender may play a relevant role on the social acceptance of waste management costs. Hence, taking these findings into consideration, we designed the SCALIBUR engagement activities to encompass the gender perspective as well as possible and we aimed at examining to what extent these findings apply to the settings of Albano Laziale, Kozani and Madrid.

During the Biowaste Club Meetings and other stakeholder events, agendas were designed in a way as to achieve a gender balance and give equal opportunities to participants and speakers from all genders to be involved.

Additionally, citizen engagement activities sought to be gender inclusive and therefore, a special focus was placed on this aspect when engaging the local champions. The selection process was designed in such a way as to make sure that genders are equally represented and that the work of the local champions (initiatives, entrepreneurs, etc.) also encompasses the social and gender dimensions. All events were designed to be inclusive and everyone was invited and encouraged to participate.

When reflecting on the SCALIBUR engagement activities from a gender perspective, some observations can be made:

- Drawing from the results of the citizen surveys, it appears that in Kozani and Albano all participants regardless of gender feel equally involved in biowaste separation
- The participation in the Biowaste Club Meetings showed that both in Albano Laziale and Kozani the meetings were oftentimes male dominated, indicating that positions in

waste management as well as in higher levels of public administration in these cities and/or regions seem to be mostly occupied by men. This represents an opportunity area that can be leveraged by future work on the topic.

- In other events, such as a citizen workshop in Kozani, where participants learned how to make their own beeswax food wraps, participants were mostly female. This might be correlated to the statistics showing that in Greece, women are the main responsible for doing the housework (Statista, 2018). This, too, represents an area where further analysis and work is needed to achieve gender equality.

7.1.4 Qualitative assessment: Behavior change and social innovation

This part of the impact evaluation consists of two steps. The first level of evaluation (behavioural change) focuses on the extent to which engaged actors have in fact changed as a result of the conducted SCALIBUR multi-stakeholder engagement activities. It seeks to establish if newly acquired knowledge, skills or attitudes have been applied in their daily environment leading to changes in their habits. The second level of assessment (social innovation) focuses on the societal changes resulting from implemented pilot and engagement activities. The methodology used to identify behavioural changes and social innovation was based on self-assessment, through the outcomes of the Biowaste Club meetings, workshops, of the citizens and value chain experts' surveys, the collection of feedback expressed via experts' interviews, and by the different activities conducted during the action weeks as well as by the engagement of local champions.

When addressing behaviour change and its impacts the first route to explore is social influence. Citizens are often impacted by the presence, behaviours and expectations of others. Social factors are one of the most influential aspects in terms of behaviour change (Abrahamse and Steg 2013). Throughout the multi-stakeholder engagement and pilot activities conducted in SCALIBUR, three different facets of social influence, namely social norms, social identities, and social desirability have been taken into account in terms of their influence to shift citizens behaviors towards a circular economy. Social norms define what is socially appropriate and approved of in a given context, can have a powerful influence on sustainable citizens behaviors. They predict behaviors such as avoiding littering, composting and recycling conserving energy, choosing sustainably sourced food, selecting eco-friendly transportation etc. Social identities stem from group memberships: for example, citizens are more likely to engage in sustainable actions if ingroup members are doing so. Applied to the (bio)waste management field, seeing the self as similar to a "typical good (bio)waste recycler" predicts intentions, over and above other factors such as attitudes, subjective norms, and perceived behavioral control. Thirdly, social desirability is another means by which social influence can impact sustainable behaviors. Citizens tend to select sustainable options to make a positive impression on others (Green and Peloza 2013), and they endorse high-involvement in sustainable options to convey social status to others. However, it should be noticed that this is not always the case. As we have observed in Albano Laziale and Kozani during the "Action weeks" males might avoid engaging in certain sustainable/circular economy practices because those are associated with female traits and/or responsibilities within the society.

Taking into account these social components and the cultural contexts of the three SCALIBUR cities, different type of behavior change activities have been conducted. This has been due to the fact that whereas some sustainable behaviors require only a one-time action, many other sustainable behaviors involve repeated actions that require new habit formation. Habits refer to behaviors that persist because they have become relatively automatic over time as a result of regularly encountered contextual cues (Kurz et al. 2014). Because many common habits are unsustainable, habit change is a critical component of more sustainable and circular behaviors. Accordingly, interventions that break repetition, such as discontinuity and penalties, can disrupt bad habits, but also actions that encourage repetition, such as making sustainable actions easy and utilizing prompts, incentives, and feedback, can strengthen positive habits.

In the SCALIBUR different activities have been carried out accounting for different socio-cultural norms. To start with penalties and reward systems were used as top-down approaches, such as, the PAYT tariff, or discounts linked to recycling of plastics etc. The combination of these two types of actions has proved to be more successful than a system based on just penalties as often these can trigger backfire effects if the penalty seems unreasonable to the target group (White et al., 2019). Secondly, discontinuous activities to change "bad habits" were implemented via the project's pilot activities addressing collection aspects at the household level. Practically, citizens and HoReCa sector representatives were confronted with a new system that disrupt the previous stable context in which automatic behaviors arise and thus create the condition for habit change. In the short-term, impacts linked to those activities are difficult to measures, nonetheless, it has been observed a high-level of engagement and participation in those activities which will stem result over a longer timeframe as those activities will continue beyond the SCALIBUR project. Thirdly, activities with a focus on what in the literature are defined as "prompts" were conducted (White et al., 2019). Prompts are messages that are given before the behavior occurs to remind the citizens of what the desired behavior is. Prompts can positively affect many behaviors including waste disposal and recycling. Prompts to engage in sustainable behaviors work best when they are large, clear, easy to follow, and placed in proximity to where the behavior will be performed. These means were mainly used throughout the Biowaste Clubs meetings, conducted experts' workshops, trainings in schools, and via the engagement of the local champions. The focus of those activities was to increase knowledge and understanding via a series of positive messages including easy accessibility and feasibility of behavior change towards circularity as well as by making (bio)waste value-added products fashionable. The combination of these activities resulted in enhanced understanding of the importance to properly separate (bio)waste and to an increased acceptance of certain derived products. Naturally, as for the pilot activities it is not possible to detect individual behavior change but an overall engagement and interest of citizens resulted and translated into a series of follow-up activities which will be implemented beyond the project lifetime, such as trainings and workshops in local schools, up-scaling of good practices to neighboring cities, long-term engagement of identified local champions (the HOOP project has already been identified as the likely follow-up stage to start with).

When accounting for behavior change factors, as it has been described, it is necessary to look into socio-cultural aspects and thus to some extent into social innovation. Given SCALIBUR key objectives and working structure, a new definition of social innovation which is flexible and also

highly connected to technological innovation has been applied within the project: social innovation is a process encompassing the adoption of socially creative strategies that reconfigure social relations/practices in order to actualize a given social goal. The resulting social impacts can thus include: impacts on how people live, work, play and interact with one another on a day-to-day; changes to community values and/or the way the community functions. Within the project activities, social innovation has been observed within the conduction of the "Action Weeks" and in the engagement of local champions. Although, in the such a short timeframe impacts cannot be properly evaluated, the emergence of innovative and creative strategies with respect to (bio)waste separation and recycling of materials have paved the way to an increased engagement level and understanding of the importance of the circular economy in citizens' daily life.

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9 ANNEX 1

9.1 Citizens Survey

SCALIBUR SURVEY

BIOWASTE & BIO-BASED PRODUCTS

The city of XXX together with xyz waste company and XXX has partnered in an international, 4-years EU-funded project called SCALIBUR (SCALable technologIes for Bio-Urban waste Recovery). The goal of the project is to improve bio-waste collection, sorting and transport systems and thus enhancing the quality of the to-be-recycled materials and contributing to lower waste management costs in your city.

You as a citizen can give your contribution by filling out the following this survey.

Agreement & key Information

Participating in this survey is voluntary. You can stop the survey at any point in time. In case of a termination, you don't have to state any reason whatsoever for doing so.

By participating in this survey, you consent to the use of the gathered answers only for the research activities of the SCALIBUR project. We would like to highlight that all answers will be completely anonymous and in no way will be published or can be linked to you personally. In case you choose to participate you agree on the following points:

- That you have read and understood the objective and scope of the survey
- That your consent is voluntary
- You are currently a citizen of Albano and live there primarily
- You are 18 years or older
- We can use your answers for the SCALIBUR activities

Survey Instructions

Please note: Filling out the survey should not take longer than 15 minutes!

IMPORTANT: Please fill out this survey only once!

Please read every question and answer thoroughly before advancing to the next page. In case you filled out something wrong, there is an option for you to move back to the previous page(s). When moving backwards, we would like to ask you to not change your answers based on new realizations or knowledge from the next questions. In addition, we want to highlight that there are right or wrong answers and assure you that there will always be an option to answer the question. This can be done through a "don't know" answer or similar options. In case you have not answered any of the questions you get a reminder to answer every question before advancing to the next page.

Personal Information

1. Please indicate your gender

[ ] Female
[ ] Male
[ ] Other
[ ] I don't want to answer

2. What is the highest level of education you have attained?

[ ] Less than primary education
[ ] Primary education
[ ] Lower secondary education
[ ] Upper secondary education
[ ] Post-secondary non-tertiary education
[ ] Short cycle tertiary education
[ ] Bachelor's or equivalent level
[ ] Master's or equivalent level
[ ] Doctoral degree
[ ] Other

3. What is your age range?

[ ] 18 – 25

[ ] 25 – 35

[ ] 35 – 50

[ ] 50 – 65

[ ] 65 – 75

[ ] 75 – 80

[ ] 80 – 85

[ ] Older than 85

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4. Including yourself, how many people live in your household at present?

[ ] 1

[ ] 2

[ ] 3

[ ] 4

[ ] 5

[ ] 6

[ ] 7 and more

5. How long have you been living in XXX?

[ ] 1 – 5 years

[ ] 5 – 10 years

[ ] 10 – 20 years

[ ] more than 20 years

Section: Bio-waste knowledge & opinions

6. Which are the first 3 words/ associations that come to your mind when you think about biowaste?

#	Answers	
1.		
2.		
3.		
4.	Don't know or any additional words	

7. Which positive impact do you think the recycling of biowaste has on the following sustainability topics? (Please provide your answer by crossing one of the options ranging from "No positive impact" to "High positive impact")

#	Topic	No positive impact	Low positive impact	Medium positive impact	High positive impact	Don't know
1.	**Environmental topics:**					
1.1.	Reducing pollution in natural habitats (e.g. rivers, lakes, lagoons, forests, grasslands, swamps, etc.)					
1.2.	Reducing pollution in agriculture lands and rural areas					
1.3.	Reducing pollution in cities and urban/industrialised areas					
1.4.	Reducing energy consumption and GHG emissions					
1.5.	Reducing biodiversity loss					
2.	**Socio-economic Topics**					
2.1.	Increasing jobs opportunities					
2.2.	Increasing business models and start-ups					
2.3.	Reducing energy consumption costs					
2.4	Reducing dependence on raw materials derived from natural resources					
2.5.	Increasing health and well-being of citizens					
2.6.	Increasing education and environmental awareness					
2.7.	Reducing taxes					

Section: Separation behaviour and challenges

8. Please choose on the following scale how much attention you pay on separating your waste in your everyday life. (Only one answer possible)

I don't pay any attention to separating waste						I separate everything as thorough as possible	Don't know
1	2	3	4	5	6	7	

9. What are key challenges for you when separating bio-waste? Please choose the 3 main challenges for you in the provided list.

#	Challenge	Answer
1.	I don't have the time to separate bio-waste better	
2.	Separating bio-waste is too dirty for me to separate better	
3.	I don't see any point in separating bio-waste thoroughly	
4.	I lack the right bins to separate better	
5.	It is unclear what counts as bio-waste and how to separate properly	
6.	It is not required by clear rules	
7.	I don't see any benefits, incentives or penalties for separation behaviour	
8.	I don't have the space in my house to separate better	
9.	Biowaste pickup frequency problems (not enough space, bad smell, fruit flies and other insects, etc.)	
10.	Other, please specify:	
11.	I don't face any challenges	
12.	Don't know	

10. Can you please indicate what already helps you, would help you or wouldn't help you to better separate biowaste? (Please fill out one answer in each row)

#	(Potential) help	Already helps	Would help	Not helpful	Don't know
1.	Time to separate properly				
2.	Knowledge about the purpose of separating and recycling or how to do it properly				
3.	Change of personal habits				
4.	Better or more bins for separating				
5.	Knowledge about what biowaste is				
6.	Easier to separate product design				
7.	Clearer rules/regulations on separation				
8.	Benefits or incentives (including penalties for misbehaviour)				
9.	More space in my house				
10.	Higher pickup frequency				

11.	Other, please specify:				
12.	I don't need any help				

11. Do you think that companies in your environment care about reducing the negative environmental consequences of their activity?

[ ] Yes

[ ] No

[ ] I don't know

Section: Covid-19 Impacts & Outlook on biowaste recycling

12. How do you consider your biowaste separation behaviour since the beginning of the Covid-19 crisis? Please provide one answer.

1.	2.	3.	4.
I am separating better	It stays the same	I am separating worse	Don't know

For answers 1 & 3 continue with 11.1. – For Answers 2 & 4 continue with Question 12.

12.1. Can you select the 3 reasons that have mostly influenced your biowaste separation habits/behavior during the COVID-19 crisis?

#	Reason	Answer
1.	Changed home cooking behaviour	
2.	More time to separate biowaste	
3.	More attention on separating due to the virus	
4.	New instructions from the city	
5.	Other, please specify:	
6.	Don't know	

13. When it comes to new information on biowaste in XXX including what citizens can and have to do; how would you like to be informed? (Multiple answers possible)

#	Channel	Answer
1.	Municipality website or social media	
2.	Waste management company website or social media	
3.	News channels (radio, tv, newspapers etc.)	
4.	Local events	
5.	The channels already used by the municipality/waste management company of XXX are enough to obtain adequate information	

6.	Other, please specify:	
7.	Don't know	

14. Which are the top 3 ways to enhance your knowledge and improve your behaviours in terms of biowaste separation and recycling? (Multiple answers possible)

#	Participation options	Choices
1.	Keep informing myself on biowaste, bio-based products or recycling	
2.	Pay more attention to my own behaviour	
3.	Engage my friends and family to indicate behaviour change	
4.	Buy bio-based products whenever possible	
5.	Inform myself on activities in my city	
6.	Inform myself on the SCALIBUR project	
7.	Other, please specify:	
8.	I'm not interested	
9.	Don't know	

Section: Bio-based Products, Health and Safety, and Product Transparency

15. Which of the following bio-based products would you use while knowing that they are made from bio-waste? You can only answer once in each row. In case you answer with "depends on" please give us a brief explanation of what it depends on for you.

Product	Answer yes	Answer no	Depends on*	Don't know	*Explanation for what it depends on:
Hygiene items packaging (e.g. shampoo in bio-based bottles)					
Food packaging					
Food grown with bio-based fertilizers					

16. Do you usually look at the safety product information? (Only One answer possible):

#	Behaviour	Answer
1	No, I never look at the safety product information. I do not think it will affect my opinion of buying it.	
2	No, I never look at the safety product information. Although I think it will affect my opinion of buying it.	
3	Sometimes I look at the safety information, but it does not affect my opinion if I finally buy the product	
4	I usually look at the safety information because It affects to my opinion to buy the product	
5	Don't know	

17. Safety information of the products is often not well explained or sufficient: have you ever complained about product safety information? (Only one answer possible):

#	Behaviour	Answer
1	No, I have never complained about product safety.	
2	Yes, I have complained one time about the product safety information as it was not enough.	
3	Yes, I have complained more than one time about the product safety information as it was not enough.	
4	Don't know	

18. Some people pay attention to the safety and environmental information given by organisations. Do you recognise yourself under this description? (Only one answer possible):

#	Behaviour	Answer
1	No. I never pay attention to the information related to safety and environmental issues given by the organisations.	
2	I sometimes pay attention to the information related to safety and environmental issues given by the organisations.	
3	I always pay attention to the information related to safety and environmental issues given by the organisations. I consider this information as highly important.	
4	Don't know	

Section: Feedback Mechanism & Privacy

19. Do you like to give your feedback to the companies whenever you buy a product? (Only one answer possible):

#	Behaviour	Answer
1	No. I never give any feedback to the company when I buy a product.	
2	I will try to give my feedback to the companies if it was easier and I knew where I can give my opinion.	
3	Yes. I sometimes like to give my feedback when I buy a product.	
4	Yes. I always try to give my feedback of the products that I buy. I tend to fill in consumer satisfaction questionnaires.	
5	Don't know	

20. Do you think that the private information (address, telephone number, e-mail, bank account…) you give to the different companies is well stored? Please mark the option where you feel recognized. (Only one answer possible):

#	Opinion	Answer
1	No	
2	Yes	
3	Don't know	

Section: End of life responsibility

21. Are there in your community initiatives regarding environmental issues where you can participate (urban orchard, picking up waste, plating trees…)? (Multiple answers possible)

#	Knowledge/Behaviour	Answer
1	No, I have not heard of any community initiatives regarding environmental issues	
2	Yes, I heard that there are community initiatives but I have never participated in any of them	
3	Yes, I have participated in planting trees, or creating urban orchard.	

4	Yes, I have participated in i picking up waste form the floor or the beach.	
5	Yes, I have participated in environmental awareness campaign.	
6	Yes, I have participated in other initiatives than the ones here (Please specify)	
7	Don't know	

Thank you for your participation in the survey!

If you would like to further help our project and your city, feel free to share the survey link with your friends, colleagues and neighbours living in Albano!

For any questions regarding the survey or the SCALIBUR project feel free to contact XXX at "xyz@xyz" and check out:

- the project website (http://www.scalibur.eu/)
- xyz social media platform" or "xyz other website".

Furthermore, if you are interested and would like to hear more about bio-waste related activities and initiatives in Albano as well as be more engaged write to XXX so that we will include you in the contact list of the Albano Biowaste Club.

9.2 Value Chain Experts Survey

SCALIBUR SURVEY

BIOWASTE & BIO-BASED PRODUCTS

The city of XXX together with xyz waste company and XXX has partnered in an international, 4-years EU-funded project SCALIBUR (SCALable technologies for Bio-Urban waste Recovery). The goal of the project is to improve bio-waste collection, sorting and transport systems and thus enhancing the quality of the to-be-recycled materials and consequently contributing to lower waste management costs in your city. The survey is directed at a wide range of experts and other stakeholders that are in some way involved directly or indirectly with the topics of biowaste, bio-based products or anything related to this or just experts on the topics without direct involvement for the city of XXX. If you are a part of this in XXX you can give your contribution by filling out this survey.

Agreement & key Information

Participating in this survey is voluntary. You can stop the survey at any point in time. In case of a termination, you don't have to state any reason whatsoever for doing so. If you can't answer a question or don't want to answer, there is always a possibility to select e.g. "don't know" option.

By participating in the survey, you consent to the use of the gathered answers for the research activities of the SCALIBUR project. We would like to highlight that all answers will be completely anonymous and in no way will be published or can be linked to you personally. In case you choose to participate you agree on the following points:

- That you have read and understood the objective and scope of the survey
- That your consent is voluntary
- You are 18 years or older
- We can use your answers for the SCALIBUR activities

Survey Instructions

Filling out the survey should not take longer than 15 minutes!

IMPORTANT: Please fill out this survey only once!

Please read every question and answer thoroughly before advancing to the next page. In case you filled out something wrong, there is an option for you to move back to the previous page(s). When moving backwards, we would like to ask you to not change your answers based on new realizations or knowledge from the next questions. We want to assure, that no question or answer is missed by accident which is why we always give an option to answer, even if you don't know what to answer. This can be done through a "don't know" answer or similar options. In case you have not answered any of the questions you get a reminder to answer every question before advancing to the next page.

Personal information

What type of organization are you representing/ do you work for? (Multiple answers possible)

[Value Chain Actors]

[ ] Service providers, focus waste (e.g. waste collectors, treatment plants, waste management)
[ ] Other service providers (e.g. energy)
[ ] Industry (large scale (e.g. corporations)
[ ] Industry experts/sector professionals
[ ] Business (medium-to small-scale): SMEs and/or local business owners
[ ] Business (small-scale): entrepreneurs/start-ups
[Other Group]
[ ] Investors
[ ] Research & Development
[ ] Local public bodies (e.g. city council or municipality)
[ ] Regional public bodies (e.g. regional government)
[ ] National public bodies (e.g. ministries)
[ ] Other:

(In the following questionnaire, additional questions for value chain actors will be written in green and not asked for other stakeholders from the "Other Group")

(2) Please indicate your field(s) of expertise (Multiple answers possible)

[ ] Waste and Recycling

[ ] Politics

[ ] Environment

[ ] Energy

[ ] Agriculture or other producing sectors

[ ] (Bio-)Technology

[ ] Food and other Groceries (Hotels, Restaurants, Catering, Retail, etc.)

[ ] Packaging and other industries

[ ] Transportation

[ ] Citizen engagement or consumer communication

[ ] Research or education

[ ] Other, please specify:

(3) Please indicate your gender

[ ] Female
[ ] Male
[ ] Other
[ ] I don't want to answer this.

(4) What is your age range?

[ ] 18 – 25

[ ] 25 – 35

[ ] 35 – 50

[ ] 50 – 65

[ ] 65 – 75

[ ] 75 – 80

[ ] 80 – 85

[ ] Older than 85

Section: Performances, challenges, opportunities & Waste Management

(5) How would you rate the current performance of the different actors in the following aspects from your professional/expert point of view? Answer by stating how much you agree with the following statements using the scale from 1 (No Agreement) to 5 (Full agreement). (Please answer only once per row. If you are not sure, feel free to use the "Don't know" answer.)

#	Aspect	I don't agree at all				I fully agree	Don't know
		1	2	3	4	5	
1.	**Citizens:**						
1.1.	Citizens are informed when it comes to biowaste separation and recycling						
1.2.	Citizens are able to communicate their needs, wishes and problems regarding waste management						
1.3.	The current system is enabling citizens to separate their biowaste easily						
1.4.	Citizens are currently separating their biowaste properly						
1.5.	Citizens perception of bio-based products is good						
1.6.	Citizens know what bio-based products are						
1.7.	Citizens currently have opportunities to purchase bio-based products						
2.	**Biowaste:**						
2.1.	The biowaste quality in the city is good						
2.2.	The right amount of biowaste is produced in the city						
3.	**Bio-based products & value chains**						
3.1.	The city has a good supply of bio-based products						

3.2.	How would you rate the consistency of the supply of local, bio based products?						
3.3.	Stakeholders have knowledge about bio-based products produced in my town						
3.4.	Currently, there are business activities related to bio-based products in my town						
3.5.	I see potential for new bio-based value chains and business opportunities in my city						
3.6.	I am in frequent exchange with all key stakeholders along my cities (bio) waste value chain						
	Out of those points, which are in your opinion the three most urgent ones to improve upon and why? 1. 2. 3.						

(5) Where do you see the biggest current challenges and current opportunities to achieve the goals of increasing and improving biowaste recycling and implementing bio-based products in XXX?

Challenges:

Opportunities:	

7 Do you consider that sustainability issues are relevant to the daily life of the company?

#	Relevancy	Answer
1	No, sustainability issues are not an issue that motivates the company	
2	Yes, sustainability issues are an issue that slightly motivates the company	
3	Yes, sustainability issues are an issue that highly motivates the company	
4	Don't know	

8 Have you complained regarding the waste management system within the last year?

#	Behaviour	Answer
1	No, I have not complained	
2	Yes, I have complained once	
3	Yes, I have complained between 1-3	
4	Yes, I have complained more than 3 times	

5	Don't know	

Section: SCALIBUR & Outlook

(9) Have you ever heard about the SCALIBUR project, before participating in this survey?

#	Option	Answer
1	Yes	
2	No	

(10) How useful do you consider a European project like SCALIBUR for the local implementation of measures on biowaste-recycling and bio-based product value chains? Why?

Unnecessary				Useful	Don't know
1	2	3	4	5	
Can you please explain:					

Depending on question 9: For answer 1 (from question 9), continue with 11., for answer 2, continue to question 13.

(11) How did you hear about the project?

#	Channel	Answer
1.	Work environment	
2.	Personal relations	
3.	Citizens survey	
4.	Online resources (social media, websites, etc.)	
6.	News or commercials	
	Invitation to Biowaste Club	
8.	Other, please specify:	
9.	Don't know	

(12) What are you expecting from the SCALIBUR project? (Multiple answers possible)

#	Interest	Answer
1.	I want to participate in activities related to the project (like Biowaste Club meetings and other upcoming events)	
2.	I am hoping for business opportunities for my business	
3.	I expect SCALIBUR to raise awareness about environment and sustainability issues in my town	
4.	The topic and research results are relevant to my work	
5.	I want to learn what my city is doing to improve the (bio) waste value chain	
6.	I want to learn about European best practises and good examples in (bio) waste recycling	

7.	I want to exchange with further key stakeholders from my city	
8.	I want to exchange with further key stakeholders across Europe	
9.	I want to know about my cities' activities in general	
10.	Other, please specify:	
11.	I do not have specific interests in the SCALIBUR project	

Health and Safety

This part of the survey is focused on the health and safety issues of the companies. The answers will help to analyse which kind of problems regarding health and safety, have the companies involved in the project. It is an important part of the Social assessment we are carrying out.

13 How does the organization demonstrate the awareness of health and safety issues? (Multiple answers possible)

#	Demonstration method	Answer
1	The organization gives information to the workers every year regarding health and safety issues	
2	The organization trains the workers every year regarding health and safety issues	
3	The organization organizes health and safety workshops	
4	The organization has a health and safety management system established	
5	Other: please specify	
6	Don't know	

14 Have you complained about safety and health issues within the last year? (Multiple answer possible)

#	Number of Complaints	Answer
1	Yes, about the measures against Covid as they were not enough	
2	Yes, about the installations because they are not in well state	
3	Yes, because the protective equipment was not enough	
4	Others (Please specify)	
5	Don't know	

Feedback Mechanisms & Privacy

15 Does the company have consumer satisfaction questionnaires? (Only one answer possible)

#	Existence of questionnaire	Answer
1	No,	
2	Yes,	

3	Don't know	

16 Have you received any complaint regarding privacy data loss? (Only one answer possible)

#	Number of Complaints	Answer
1	No, we have not received any complain	
2	Yes, we have received less than 5 complaints	
3	Yes, we have received more than 5 complaints.	
4	Don't know	

End of life responsibility

17 Has the company participated or organize any community initiatives regarding waste management or end-of-life options within the last 3 years? (Multiple answers possible)

#	Initiatives	Answer
1	No, we have not organised or participate in any community initiative	
2	Yes, we have organised or participate in initiatives such as planting trees or creating urban orchard.	
3	Yes, we have participated or organised initiatives such as picking up waste form the floor or the beach.	
4	Yes, we have participated or organised environmental awareness campaign.	
5	Others (Please specify)	

Human rights

18 Does the company have an explicit code of conduct that protects human rights? (Only one answer possible)

#	Existence of Code	Answer
1	No, it does not have a explicit code of conduct that protects human rights.	
2	Yes, it has an explicit code of conduct that protects human rights.	
3	Other, please specify:	
4	Don't know	

19 Does the company has a gender equality policy? (Only one answer possible)

#	Existence of policy	Answer
1	No, it does not have a gender equality policy.	
2	Yes, it has a gender equality policy	
3	Other. Please specify	

20 What is the percentage of women in the labour force of the company? In case you don't know the answer, please respond with the number of women in your department. (Only one answer possible)

#	Existence of policy	Mark
1	Percentage of the women in the labour force of the company	
2	Number of women in my department	

20.1 (If they choose Percentage of the women in the labour force of the company:

#	Percentage of women	%

20.2 If they choose number of women in my department

#	Number of women in the department	Answer
1	Department where you work	
2	Total number of people working in it	
3	Total number of women working in it	

21 Are there presence of workers identified as members of association able to organize themselves and/or bargain collectively? (Only one answer possible)

#	Possibility	Answer
1	No, there are not	
2	Yes, there are	
3	Don't know	

Socio-economic repercussion

22 Does the company have a social responsibility policy? (Only one answer possible)

#	Existence of code	Answer
1	No,	
2	Yes,	
3	Other, please specify	
4	Don't know	

23. Does your company has a social responsibility or sustainability memory?

#	Existence of code	Answer
1	No	
2	Yes,	
3	Don't know	

24. Which of the following sustainable development goals do you believe your company is promoting and acting?

#	Sustainable development goals	Answer
1	No poverty	
2	Zero hunger	
3	Good health and well-being	

4	Quality education	
5	Gender equality	
6	Clean water and sanitation	
7	Affordable and clean energy	
8	Decent work and economic growth	
9	Industry, innovation and infrastructure	
10	Reduced inequalities	
11	Sustainability cities and communities	
12	Responsible consumption and production	
13	Climate action	
14	Life below water	
15	Life on land	
16	Peace, justice and strong institutions	
17	Partnerships for the goals	

25. Do you think that the products obtained in SCALIBUR from biowaste could have an impact in employment and economy?

#	Number of Jobs created	Answer
1	Yes, please specify why	
2	No, please specify why	

Working Conditions

26. Some companies offer social benefits to their workers, could you please mark the social benefits that you are offered? More than one option is possible

#	Number of Jobs created	Answer
1	I have tickets for lunch. I do not have to pay it on my own	
2	I have a bonus transport	
3	The company offers the nursey voucher	
4	The company offers health insurance	
5	The company offers us training courses	
6	We have a gym in the office	
7	We have the day off in our birthday	
8	We have flexible work hours	
9	We are offered tickets for different events: concerts, cinemas, sporting events…	
10	We have summer reduced working hours	
11	I do not know	
12	We do not have social benefits	

13	Others. Please specify	

27 Do you consider that working in your company can be stressful?

No, it is not stress ful		Yes, sometimes we do extra hours		Yes, is always stressful	Don't know
1	2	3	4	5	
Can you please explain:					

Thank you for your participation in the survey!

For any questions regarding the survey or the related SCALIBUR project feel free to contact XXX at "xyz@xyz" and check out:

- the project website (http://www.scalibur.eu/)
- xyz social media platform" or "xyz other website".

Furthermore, if you are interested and would like to hear more about bio-waste related activities and initiatives in XXX as well as to be more engaged write to XXX so that we will include you in the contact list of the XXX Biowaste Club.

SCALIBUR (Scalable technologies for bio-urban waste recovery) brings together a unique blend of organisations and expertise, led by **ITENE Packaging, Transport & Logistics Research Center**. The project began in November 2018 and will run for four years.

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