

SCALIBUR

LEADING A REVOLUTION
IN BIOWASTE RECYCLING

Deliverable 2.3

Policy brief on European
policies for a circular
bioeconomy

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Deliverable fact sheet

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| Authors | Felix Schumacher, Lisa Mai, Anna-Carina Diedrich | |
| Reviewers | Cristina González Buch, Andrea Antonelli, Inés del Campo Colmenar, Martijn Bovée | |
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For enquiries on this publication, contact the CSCP-team at biowasteclubs@cscp.org.

ABSTRACT

Following the European Green Deal and its Circular Economy Action Plan, many policy frameworks, strategies and action plans have already been adapted both on European and on national and regional levels in the EU member states. While many of these policies are very ambitious and are already piloting and up-scaling promising initiatives, there are also still many challenges when it comes to developing a truly circular European bioeconomy.

A vast amount of work has already been carried out on assessing and comparing the various European and national legal frameworks and in suggesting policy changes and new pathways and solutions. Building on this extensive already existing work, the present policy brief will not replicate what has already been done with yet another analysis of the same policies, but take a rather new format.

Starting by giving a short overview of the extensive work already carried out by the SCALIBUR sister-projects VALUEWASTE and WAYSTUP, we continue by complementing their insights with the SCALIBUR perspective. Given that these 3 projects – together with also the HOOP and CITYLOOPS projects – are already successfully cooperating in a cross-project policy initiative, we then turn to the key policy recommendations of this wider ROOTS initiative, where the experiences and learnings from all projects are combined.

The final discussion will bring together the key policy aspects and topics that unite the work of the various projects and initiatives.

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1 INTRODUCTION

Over 100 million tons of biowaste per year are thrown away in the European Union (EU). Most of it is currently still incinerated or sent to landfill, leading to greenhouse gas emissions and contamination of soil and groundwater. The goals of the EU-funded H2020 project **SCALable Technologies for Bio-Urban Waste Recovery (SCALIBUR)** are to promote innovative approaches to collection, sorting and recycling of urban biowaste in Europe, to develop more sustainable and circular value chains and to produce high value products from biowaste conversion.

During the duration of SCALIBUR project, many policy learnings have been identified. Key learnings regarding national and regional policies in the 3 countries of the SCALIBUR pilot cities (Albano Laziale in Italy, Madrid in Spain and Kozani in Greece) have already been described both in the baseline analysis of each pilot city ([deliverable D2.1](#)) as well as in the SCALIBUR national action manuals ([D2.2](#)).

The SCALIBUR project is not alone in this endeavour, but closely linked to H2020 projects such as VALUEWASTE, WAYSTUP, CITYLOOPS and HOOP, which are also working on improving biowaste value chains and processes in Europe. In order to better exchange on their experiences, to scale-up their learnings and to reach out to a bigger audience, the SCALIBUR consortium and the consortia from the other 4 projects have teamed up in a shared cross-project initiative called ROOTS - **circulaR pOlicies for changing the biOWasTe System**. Also in the ROOTS initiative, SCALIBUR members contributed their policy learnings, this time on a European level. The key shared learnings and recommendations from the different ROOTS projects were summarized in a collective policy brief.

In order to not duplicate what has already been done in aforementioned deliverables, projects and initiatives, the following policy brief will build on the already existing work and try to take a broader perspective. Chapter 2 will start out by giving a short overview of the policy work carried out by SCALIBUR's sister projects and thereby also outlining the current status quo in European legislation on bioeconomy.

Chapter 3 will introduce the SCALIBUR perspective. Building on interviews carried out with the technical partners that are leading the developments of the SCALIBUR innovations and technologies, chapter 3 will illustrate key policy aspects relevant across the different SCALIBUR processes.

Linking the various projects and their initiatives is the [ROOTS position paper](#), which sums up seven key policy recommendations. This position paper served as basis for a shared policy conference at the Committee of Regions in Brussels in September 2022. The key discussion points raised, both in the policy brief and during the conference, will be illustrated in chapter 4. Finally, chapter 5 will discuss and summarise overarching themes and challenges that are linking the various initiatives.

2 CONTEXT: THE STATUS QUO

As indicated above, also the SCALIBUR sister-projects VALUEWASTE and WAYSTUP have carried out extensive policy analyses as part of their projects. In order to not replicate what has already been done, but acknowledge and built on their work, the following chapter will start by giving a short overview of the key publications relevant to understand EU and national policies and strategies on bioeconomy.

The first relevant paper was published by VALUEWASTE in June 2019 as deliverable "[D9.2 EU Policy on biowaste management: a review](#)" (EUBIA, 2019). This review summarizes the EU biowaste policy framework as well as related management strategies such as disposal and valorization methods. It concludes that the European policy framework follows a positive trend in introducing new technologies and products. It outlines key current EU regulation that influences the introduction of new biowaste solutions and concludes that in 2019 strong legal barriers regarding biowaste-derived products still exist in EU member states. Further, ambition from the waste sector and optimism from the industry and citizens towards innovations is, according to the authors, not yet sufficient.

In February 2021 WAYSTUP released the first paper of their two-part policy baseline analysis "[D7.1: Policy baseline analysis](#)" (Tsouti & Valta, 2021). The overall aim of this series was to assess the policy framework regarding biowaste valorization on four levels: the EU, national (in the five WAYSTUP pilot countries), regional and local level. In D7.1 EU and country-specific policy frameworks regarding biowaste were analyzed. It outlines that while national targets regarding biowaste recycling usually exist, these are oftentimes not adequately implemented on the regional and local level, leading to lower efficiency in waste management. Thus, while the key responsibility on implementing (bio-) waste recycling lies usually with regional and local authorities, these actors are not sufficiently involved in national policy making, nor supported in the implementation.

Further it is argued that there is a lack in transferring EU directives into national strategies. This also leads to a gap between the country-specific policy frameworks and their strategies regarding waste management. Moreover, the paper points out that none of the analysed countries had yet a comprehensive biowaste management strategy in place. Finally, the authors highlight the lack of specific end of waste criteria.

In WAYSTUP's second policy deliverable "[D7.5 Policy baseline analysis](#)" (Anthouli & Valta, 2021) the waste management status of each participating country in relation to the guidelines and frameworks set out in the main EU Directives is assessed. Focus was put on regional and local level and on the political framework for end-products made of biowaste. It especially evaluates the policies related to the WAYSTUP products. The analysis comes to the conclusion, that the

EU legislation primarily focusses on biofuels. Instead, it should also consider a comprehensive law for bioplastic and the promotion of biobased products. It further states that the EU prohibits insect production and growth with the use of biowaste. Moreover, there is a lack of a uniform, holistic policy approach for biochar, which are products generated e.g. through biowaste pyrolysis.

The analysis also highlights that the national policies for biowaste and biofuels are advanced or in the development of improving in the considered countries. In particular with regard to the development of biobased products, these national policies need however still to be further expanded. Again, it is concluded that there is a need to implement country-specific guidelines as there appear to be very diverse and uncoordinated approaches between different regions in the same country. Finally, it is recommended to implement regional and local action plans as they are found to be very useful. D7.5 also recommends to concretize the regulations on EU-level for biobased products that allow for multiple and safe reuse in line with the concepts of circular economy (CE).

3 THE SCALIBUR PERSPECTIVE

In order to collect and compare the experiences of the SCALIBUR technical partners with regard to biowaste legislation and its impact on SCALIBUR's work and proposed innovations, the CSCP team conducted qualitative interviews with the partners and WP-leaders of WPs 4, 5 and 6. The seven interview partners were located in Italy, Spain, Germany and the Netherlands. In the following, the key aspects that arose in all interviews will be discussed.

Harmonisation of bioeconomy strategies on national level

First of all, a key aspect that became evident from the interviews is the lack of harmonized national frameworks in many EU countries. There are two dimensions to this problem. Firstly, the missing translation of EU strategies into one coherent national bioeconomy framework. Secondly, the translation and implementation on regional levels.

National bioeconomy strategies exist in the countries of operation of the interviewed Spanish, Italian and German SCALIBUR partners (respectively called "[The Spanish Bioeconomy Strategy – 2030 Horizon](#)", "[Italian Bioeconomy Strategy](#)" and the "[German Bioeconomy Strategy](#)" (Gobierno de España, 2018; Italian Ministry for Economic Development, 2017; BMBF, 2020)). The representatives from AQUAMINERALS highlighted that while there are several bioeconomy frameworks in the Netherlands, there is not one clear, coherent national bioeconomy strategy (also compare BioBase4SME, 2018). There is a [strategy](#) on biobased and biodegradable plastics and several instruments on financing R&D. Additionally, Dutch frameworks like [SDE++](#) are seen mostly as funding schemes to promote the exploitation of bioenergy production (contribution to the financial gap between market price and production costs) and less on the funding of bio-based products. Though for R&D funding schemes are available for bio-based projects.

With regard to the implementation of the bioeconomy on *regional* level, it also became evident that approaches are not harmonized across regions within the operating countries of SCALIBUR. In Italy, for instance, there are sometimes many different local and regional bioeconomy and circular economy strategies addressing the same industry sector, but suggesting different approaches, which leads to non-harmonised and uncoordinated processes. The interviewee from UNIMORE however highlighted that in the region Emilia-Romagna, where UNIMORE is operating, the regional bioeconomy strategy is quite explicit and effective and is mainly focusing on funding research and businesses.

Similarly, the interviewee from ASA Enzyme described the German landscape of CE and bioeconomy strategies as "a patchwork rug". For the state of Niedersachsen in Germany, where ASA Enzymes is located – while focus of the regional strategy lies on supporting biotechnology, the pathway and vision how to achieve a circular economy regionally remains rather vague so

far according to the interviewees (e.g. [Niedersächsisches Ministerium für Wirtschaft, Arbeit, Verkehr und Digitalisierung et al., 2022](#)).

The representatives from AQUALIA and CENER highlighted that different types of regional bioeconomy and circular economy strategies exist within Spain. For instance, the region of Castilla-la-Mancha has a concrete and explicit regional bioeconomy strategy already in place, while in Navarre bioeconomy is included in the overall regional strategy of circular economy (Gobierno de Navarra, 2019).

For the Dutch situation, also on regional level, the interviewees from AQUAMINERALS highlighted the absence of clear regional bioeconomy strategies in the Netherlands and that bioeconomy approaches are so far only considered in specific value chains in the Netherlands (mainly around large-scale agricultural productions, such as potatoes or sugar beans), but not more strategic and cross-sector levels, whereas funding for sustainable energy production is much more incorporated in the national policies.

The lack of harmonization was also highlighted in the policy analyses of WAYSTUP and VALUEWASTE (as illustrated in the previous chapter), as well as in the workshops and policy conference of the ROOTS group (compare following chapter), and appears to be a key recurrent challenge for European cities and regions that are keen to establish a local circular bioeconomy. The argument of missing inter-regional harmonisation is further confirmed by a study issued by the European Commission itself (European Commission et al., 2022), which assesses bioeconomy strategies across EU region. The study comes to the conclusion that both in terms of content and scope there is a lot of variation across the regions in Europe. Firstly, there is a higher number of general circular economy strategies that “only” touch upon the bioeconomy topic than independent and explicit bioeconomy strategies across Europe’s regions. Secondly, many regions did at the point of the study not yet have any CE or bioeconomy strategy developed, underlining this heterogenous array (ibid.).

Lack of level playing field for materials from waste due to biogas promotion/funding

Furthermore, AQUAMINERALS stressed that the policies mentioned in COM/2022/108 final REPowerEU: Joint European Action for more affordable, secure and sustainable energy can lead to an uneven level playing field for biobased materials. Based on RePowerEU, the corresponding Dutch policy is based on an upcoming blending obligation of biogas/green gas into the Dutch National gas grid, which in turn can lead to a much higher price for biogas than natural gas, even if the prices in the natural gas market start to stabilize again. This will provide a good business case for technologies that convert organic waste streams into green gas. However, AQUAMINERALS is highly concerned about this development, as it can be expected that this policy will hinder the materials transition. This policy will, thus, have the effect that organic waste/ resources - which could be converted back into high-quality materials such as PHA and other biopolymers - are withdrawn from the market and used for low-grade

energy/heat generation (i.e. the application of green gas for the built environment). This policy appears to be even more unnecessary, given there are also good alternatives for sustainable energy and heat production (e.g. existing heat pumps).

Furthermore, for the production of energy, EU countries have promising funding schemes that subsidize the cost difference between the production costs of energy (wind, solar, biogas, etc) and the market prices. AQUAMINERALS criticized that such schemes are not yet available for materials such as bio-based plastics, while using the same organic waste streams such as waste water, agri-residues, source separated organic waste etc.

EU legislation

For the interview partners the following EU-legislations are most relevant to the SCALIBUR work:

| Legislations | Brief description | Source |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Waste Framework Directive 2008/98/EC | Sets a legal framework for waste treatment in the EU by aiming to increase the volume of the separately collected and recovered waste. | European Parliament & Council of the European Union, 2010 |
| Directive 2018/850 amending Directive 1999/31 on the landfill of waste | Comprises amendments but not limited to managing waste from the land-based extractive industries and which was collected separately in order to reuse or recycle it | European Parliament & Council of the European Union, 2018 |
| REACH directive | Aims at enhancing the early identification of inherent features of chemical substances through its four processes: registration, evaluation, authorization and restriction of chemicals. It further tries to improve the innovative and competitive character of the chemical industry. | European Parliament & the Council, 2022 |
| Council Directive 86/278/EEC on the protection of the environment | To prevent harmful effects of sludge on soil, vegetation, animal and humans | European Union, 2022 (1) |
| COM/2022/108 final | REPowerEU: Joint European Action for more affordable, secure and sustainable energy. | European Union, 2022 (2) |

Positively emphasized by various interview partners was the general commitment through the regulatory frameworks at EU, national and regional level to reduce CO2 emissions and the

recognition in each of the different frameworks that circular economy and bioeconomy are key tools to achieve the climate goals.

The European funding mechanisms and incentives – such as H2020 - were highlighted across all interviews as key tools to successfully boost the European bioeconomy and to allow for the development of new innovative products and services answering the cities' and regions' needs – innovations such as are being developed in SCALIBUR and its sister projects.

Although the existing bioeconomy and circular economy strategies and European funding mechanisms are regarded as boosters for bioeconomy, it was criticized that the maturity of biowaste technologies is still lacking behind its potential and, hence, to truly boost a European bioeconomy it needs more substantial and especially more long-term investments. As Cristina Gonzalez (ITENE, Spain) puts it, "there are more economic than regulatory barriers [inhibiting innovations in biowaste recycling]".

Terminology

– “waste” vs “resource”

With regard to the current EU legislation, the interviewees pointed out the following challenges. Above all, it was emphasized that the wording of “waste” in legislations represents a significant hindrance to develop products made from organic materials and to be able to bring these products to the market. It is, thus, highly relevant to reframe “waste” - especially biowaste – in order to allow biobased-products to be developed and brought to the market. For instance, in Italy, the moment food is served (e.g. in restaurants, catering etc.) and left-overs are generated, these are legally considered as waste and cannot be further (re-)used. One of the results is that insects grown on retail biowaste (as in SCALIBUR WP5, working with the larvae of the black soldier fly) cannot be used further, e.g. to be fed to livestock.

Further it was stressed that, following Italian legislation, waste can only be handled and processed by designated waste companies, hence making it difficult for research institutes and companies from different industrial sectors to use this “waste” as a resource and raw material for their research and to collaborate to develop new solutions. As Andrea Antonelli from UNIMORE concluded, there are currently “no good laws in practice in Italy to transform waste in a resource and recover materials from waste”.

Thus, in order to support the development of new bio-based solutions, it is crucial to improve European and national legislations and re-consider at what point a resource is considered and termed as “waste”.

Also related to the wording and framing, the lack of a common definition of bioplastic was criticized. Across the EU there are currently various criteria of what bioplastic may contain of and what usage it may be put to, which hinders both research and development as well as the communications across stakeholders, especially with regard to civil society acceptance and behaviour change.

Stakeholder engagement

There was also high agreement among interviewees that civil society plays a key role in the improvement of the quality of biowaste. First of all, because the base resource for any bio-based products is well separated and collected biowaste – requiring good separation at source. In the interviews several successful practices and pilot initiatives on citizen engagement were mentioned – many of them also being piloted and scaled-up in SCALIBUR, VALUEWASTE, WAYSTUP and HOOP.

However, despite the key role of citizens and households at the beginning of the waste value chain, stakeholder engagement of course needs to go beyond this group. As also all interviewees agreed, to ensure a successful bioeconomy, a close cooperation among all key stakeholders - from policy, research, civil society and industry - is essential.

On *European* level, a thorough stakeholder engagement appears to have already become the default – as can be seen both in the funding programs, as well as in wider European initiatives, such as the European Circular Economy Stakeholder Platform or the Circular Cities and Regions Initiative.

In the development of *national* strategies, action plans and in the end legislation, there is however often still a lack of stakeholder engagement. As criticized by various interviewees, usually mostly representatives from policy and waste industry sectors are involved in such processes of strategy development. It was, thus, considered to also foster and further institutionalize (also on national levels) broader stakeholder engagement processes, involving also civil society, research and different industry sectors.

In line with the lack of comprehensive stakeholder engagement processes, also when asked for the highest regulatory barriers, the disconnection of researchers and policymakers was highlighted by many interviewees. In order to understand better what technological solutions should or could be more promoted and funded, policymakers need to gain more in-depth expertise in this constantly evolving field of bioeconomy research. Hence, especially policymakers, scientists and technology-developers need to be supported further in establishing regular exchange formats, this way ensuring that the latest advances in bioeconomy research are reaching decision-makers and the developed solutions are given the opportunity to actually be taken up and tested in practice.

Finally, a concern issued by many SCALIBUR partners is that - in light of more ad-hoc global challenges (such as the COVID-19 crisis or the Russian invasion of the Ukraine) - the subjects of circular and bio-economy are, together with other environment and climate change topics, loosing public attention and political will and momentum in recent years. While this shift is understandable, there is a need to find a better balance between handling these rather ad-hoc global challenges and at the same time solving the similarly burning long-term challenges of

climate change, resource-overconsumption and transformation of the economy. In order to handle these various challenges at the same time, also here stakeholder engagement during policy-making processes is essential.

4 THE ROOTS POSITIONS

SCALIBUR, as one of three mother projects, is a predecessor of the larger H2020 HOOP project. The HOOP project, thus, continues and scales up the work of SCALIBUR, VALUEWASTE and WAYSTUP. This includes not only a scale-up of the activities, but also of the scope, now focusing on providing project development assistance (PDA) to a total of 8 lighthouse cities and regions. Together with the CITYLOOPS project, a total of five Horizon 2020 projects dealing with bio-waste recycling have thus merged forces in the joint initiative circular pOlicies for changing the biOwasTe System (ROOTS) to promote innovative solutions for the European circular economy and together work towards a better regulatory framework.

While the five projects all focus on different technologies and innovations, have different pilot cities and countries as well as different emphasis in their activities along the biowaste value chain, they nevertheless share many similar policy learnings, where legislation can function both as enablers and hindering factors of innovative practices on biowaste recycling.

Their shared policy recommendations were published in a first position paper in May 2021, updated in July 2022 and discussed with a wider audience in September 2022 during a public conference targeted at European policy makers.

The [position paper](#) does not focus again on the inhere introduction of bioeconomy legislation and critic points, but instead aims at adding new insights from the perspective of biowaste experts in the field about their concerns and recommendations regarding bioeconomy legislation. The insights gained are based on practical experience with the development of biowaste products and services in the five projects, hence represent a solid base for this policy brief.

Along the structure of both the position paper and the conference, the ROOTS policy recommendations will in the following be discussed in further detail based on the in total 6 panels discussed during the conference.

Quotations from the ROOTS position paper are included below as italicized text. The complete ROOTS position paper as well as the agenda of the ROOTS conference can be found in Annex 2.

1. Recycling targets and treatment plants

Despite separate collection of biowaste being mandatory from January 2024, there is no specific recycling target for biowaste at EU level. There is no reward mechanism for the collection and recycling of materials that could be treated in bio-refineries and fully valorised.

Recommendation: Set recycling targets for biowaste and efficient collection schemes. Develop new support mechanisms for the new biowaste treatment plants enabling the production of clean compost, bioenergy and new low impact biobased products.

The speakers (Pedro Gustavo Rodríguez (Prezero), Paula Marozzi (FFC) and Yeray Asensio Ramirez (Aqualia) perceived the recycling targets or rather the lack of biowaste recycling targets on EU-level in varying degrees. On the one hand it was argued that the gap between what the EU asks for with the overarching recycling targets and what is doable is rather big as municipalities can only work with a certain speed and capability in the implementation of the required infrastructure, e.g. on providing bins within a municipality. On-going communication campaigns and their funding also play a vital role in achieving those targets. In addition, there is a lack of resources in general within the municipality which leads to the argument that further support and funding is needed in order to achieve the overall recycling targets to move it up on the priority list within the municipal responsibilities. This also applies to certain research processes performed by the ROOTS projects. A high(er) TRL of the researched technologies is needed to work towards the recycling targets but also in order to draw investments that are required for the actual implementation. Especially for processes that have shown great results due to previous funding schemes, it would be worth the effort to further fund towards market readiness according to the speakers since vast improvements could already be shown in the last decade.

It was further highlighted that while recycling targets on quantity are important, the quality of the recycled materials remains the key success factor for high-value valorisation. For this, additional and constant campaigns and activities on all levels to improve the waste at the source will be essential.

2. Waste and by-products

There are overlaps and inconsistencies in the definitions of “by-products” and “waste” in the current legislation, specifically (Directive 2008/98/CE and Regulation 1069/2009). Recommendation: Products coming from biowaste should have more specific regulation/standardisation allowing for multiple re-use, aligned with the principles of the Circular Economy. This should help to clarify and simplify the whole framework.

During the ROOTS policy conference the speakers Maria Nicolas (SAV), Toralf Igesund (BIR), Ainhoa Bilbao (GAIKER) and Michael Jensen (UNIBIO) further underlined the point of waste and by-products arguing for regulation and especially clarification by taking up the topic of single-cell proteins as a clear example. In this regard, the speakers argued for the need of clearer regulation in order to foster much bigger uptake of single-cell protein production. With global needs of sustainable proteins, e.g. as feed stock, single-cell proteins can be such an alternative. It was argued that the single-cell protein doesn't necessarily have regulatory barriers per se, but rather a lack of regulation for the production based on biowaste, which brings a lot of uncertainty to the actors working or investing in the field: “How do we expect investments? How do we expect the industry to develop? We should make relevant regulations for the industry and promote it” stated speaker Toralf Igesund from BIR in Bergen.

In addition, the arguments that were made looked at the length and costs of processes for novel foods that hinder innovation, also in the field of single-cell proteins. It is clear that safety standards remain relevant and certain procedures are needed but nevertheless improvements, e.g. based on the research conducted in the ROOTS projects, would be favourable and a foundation to speed up the processes and clarify the regulation further.

Another argument looked at how the lack of end-of-waste status standardization also brings uncertainty and hindrance in innovation. Again, especially the lengthy procedure acts as a hindrance of innovation in novel business models for companies and start-ups.

3. Biopesticides

Biopesticides are defined as “low risk” plant protection products “not containing substances of concern, being sufficiently active, and not causing unnecessary pain and suffering to vertebrates to be controlled”, according to Regulation 1107/2009. However, they face the same barriers as chemical pesticides. This implies that even products completely renewable, biodegradable, coming from low-impact technologies cannot be used.

Recommendation: The EU should create a simplified regulatory framework allowing for an easier commercialisation of biopesticides, characterised by biodegradability and of 100% vegetable source.

Biopesticides were not discussed during the ROOTS conference in a separate panel. Since the SCALIBUR project, however, also includes advancing solutions for sustainable biopesticides, further insights into the regulatory barriers regarding biopesticides can be expected at the final SCALIBUR closing conference and the consecutive technical reports.

4. Insects for Animal Feed

Insects are a great source of proteins and using biowaste to grow and feed insects could unlock several economic opportunities. The projects of ROOTS are developing value chains based on insect-rearing for feed production. Until 2021, their use as feed ingredient was approved only for aquaculture. However, in the second half of 2021, the EU has made a major step forward by allowing the use of insect protein for pig and poultry feed. This is in line with objectives of the Farm to Fork strategy, aiming to make livestock farming more sustainable and seek alternative feed materials. Insect-protein could be the answer to this challenge.

Recommendation: The EU legislator should favour the uptake of insect-based animal feed by bringing down all the remaining regulatory impediments and further enlarge its use. Specifically, ROOTS pledges for the revision of Regulation 767/2009 and 1069/2009.

In line with the previous panel which focused mostly on single-cell-proteins, the arguments from the speakers María Cámara (Uni Alicante), Alba Cerisuelo (IVIA), Juan Cortés (ENTOMO), and Valeria Paganizza (UNIMORE – KOUR ENERGY SRL), regarding insects for animal feed, looked at aspects such as safety again. Here, a lack of clarity in terms of safety was showcased which led to the recommendation to fund further programmes to identify health risks and demonstrate the safety of novel products and value chains where possible or also to find ways to overcome safety risks. Results from the research in the projects showed in addition that insects as feed material offer great value to value chains (e.g. compared to established feed stocks) while already proving safe in many aspects. The fact that there are currently limitations in terms of how biowaste can be used for insect rearing also limits the further uptake of related industries. In essence, the regulation for insect rearing mostly lacks a focus on biowaste as a source and, similar to the single-cell proteins, requires further clarifications in accordance with safety standards. For this, it would be thinkable to also open up regulation to new waste stream collection streams such as the HoReCa sector to overcome the previously mentioned by-product issue.

The insect rearing panel also managed to showcase some overarching problems that the EU-regulations currently have. Regulation EC no 1069/2009 for example offers some translation problems with the same paragraphs having different contents depending on languages (i.e. some languages include kitchen-waste while others state table waste). This lack on unification makes implementation on national level inconsistent. In addition, the definition of by-products contradicts itself in several regulations (Waste directive vs. Regulation on by-products of animal origin) and also insufficient definitions of certain species of animal (Regulation (EU) no 1308/2013) add to those inconsistencies. Regulatory barriers can also be expanded to the status that those working in the field face. E.g. Researchers need to register as waste managers under current regulation which brings a lot of difficulty, while exemptions might ease the role that researches play in the field of insect rearing on biowaste.

5. (Bio)waste prevention

While improving biowaste valorisation is an absolute necessity, it is also crucial to prevent biowaste generation in the first instance, following the waste hierarchy. With the Farm to Fork Strategy, the European Commission has set ambitious food waste reduction targets. However, no such targets have been set for other categories of biowaste.

Recommendation: In parallel with food waste prevention and in line with the Farm to Fork Strategy, we ask for ambitious prevention targets for all streams of biowaste and for the provision of adequate support mechanisms for local authorities' waste prevention policies.

During the panel on biowaste prevention, Ms Gloria Sánchez gave an introduction to the waste recycling processes of the metropolitan area of Barcelona (Spain) and to the successes of learnings from Barcelona's "Metropolitan programme of prevention and management of municipal resources and wastes 2019-2025 (short PREMET25)" (Àrea Metropolitana de Barcelona, 2022). A key success in this programme was, for instance, the combined introduction of aerated buckets and compostable bags, which led to better sorting behaviour. Similarly, the implementation of measures to avoid the loss of food surpluses in educational centers, hospitals, restaurants, open markets and supermarkets as well as measures to promote responsible food consumption among citizens proved to be effective measures.

Concluding from these experiences, Ms Sánchez emphasized, among others, the necessity for cities and regions to develop clear waste prevention plans with specific targets for the different streams of municipal waste – in particular for biowaste – and to set compulsory food waste prevention targets and good practices for large producers such as restaurants, hotels, supermarkets, hospitals and schools.

Mr Daniel Freitas from the city of Porto (Portugal) complemented Ms Sánchez perspective, by giving an overview of Porto's different activities for biowaste prevention. Also here, the relevance of involving all actors in long-term campaigns became evident. Also both Ms Sánchez and Mr Freitas illustrated the successes of community composting programmes in raising awareness and triggering behaviour change and recommended for cities, regions and national governments to invest further into funding programmes on up-scaling such community programmes of composting, urban gardening, food hubs etc.

Simon Gresset from ICLEI built further on the potential dilemma of biowaste valorisation versus prevention and defined circular economy as a system that not only produces less waste, but also extracts and consumes less resources through the shortest possible material loops. Cities have a crucial role to play here, having not only the unique ability to target different stakeholders in public, households, restaurants etc, but also to directly test and implement different policy instruments. Mr Gresset argued for the importance to better connect the topic of biowaste recycling to food loss prevention and, accordingly, to better align and connect different policies on bioeconomy, circular economy and food. Along the lines of Sánchez, also Mr Gresset recommended to set clear waste prevention targets for all actors of the value chain, including for cities and regions.

6. The Behavioural problem

In the ROOTS workshop held in March 2022, the nine participating cities shared with the group their experiences and models in terms of biowaste management and valorisation pathways. They also discussed extensively about the issues and problems faced by their administration in such processes. One common issue that came up is linked to the quality of biowaste, which often contains impurities or other non-organic materials. This stems from careless sorting of biowaste at the household level, or lack

of knowledge about proper sorting. This is not a regulatory barrier but can be addressed by using policy tools.

Recommendation: The EU should devote more efforts and resources, via direct or indirect funding, to communication campaigns targeting citizens in Europe. These campaigns should promote a more careful sorting of biowaste, letting people understand why this will have a strong impact on their communities and on the circular economy.

Ms Anna-Carina Diedrich from CSCP kicked-off the panel on citizen awareness by first of all expanding the perspective of the panel to all key actors along the biowaste value chain and emphasizing the importance of a holistic stakeholder engagement. Ensuring close cooperation and co-creation among all actors along the bioeconomy recycling chains is crucial to achieve truly circular economies. For the policy dimension this not only means ensuring that any funding programmes and schemes also require stakeholder engagement processes, but also to make such engagement processes a mandatory pre-requisite during the development of any new circular economy and bioeconomy strategies, frameworks and policies. Along similar lines, Ms Lola Vicente-Almazán – representing Las Naves from Valencia, Spain – emphasized the key role of stakeholder engagement processes in transferring new knowledge to policy making and to translating the experiences of the city actors into public policies.

Ms Diedrich and Ms Vicente-Almazán – in line with previous speakers – also highlighted the relevance of legal and financial mechanisms to support national and regional up-scale of promising practices and to foster the exchange of experiences and transfer of results across cities and regions in Europe.

Additionally, Ms Vicente-Almazán argued for taking a holistic approach on sustainable bioeconomy by not only looking at recycling aspects, but already starting by food waste prevention and advocated not only for more and stronger environmental education programmes, but also for the implementation of reward system – e.g. through tax reductions – that incentivize food waste prevention.

Reporting on the experiences in citizen engagement in the city of Murcia, Spain, Mr Kasper van Hout illustrated with various examples of Murcia's campaigns and activities how crucial comprehensive and long-term communication campaigns and a wide set of citizen engagement formats are in order to achieve higher qualities and quantities of recycled biowaste. Also the introduction of financial penalization and rewards mechanisms, such as pay-as-you-throw tariffs – was again emphasized as a key tool to foster behaviour change.

Finally, Ms Mar Escarrabil from Science for Change brought panel 6 topics together again by showcasing successful examples of innovative stakeholder engagement tools and approaches along the quadruple helix model of civil society, academia, industry and public bodies. Ms Escarrabil in particular illustrated the importance of citizen involvement and co-creation in the

processes of developing communication campaigns. Citizen science was here emphasized as a successful methodology to both empower citizens and to efficiently inform public policies.

7. Investment needs

Another common concern evidenced by the cities involved in the [ROOTS] workshop was the need for more investments in the field of biowaste management and valorisation. Small or medium-size cities do not always have the infrastructure or the facilities to create new circular value chains and private actors do not always see opportunities in some peripheral contexts.

Recommendation: Via the use of structural and investment funds (ERDF, CF, InvestEU, etc.), the EU should push for the allocation of more resources to the biowaste valorisation compartment. These could be in the form of waste-to-energy or waste-to-products models, allowing for the creation of new opportunities and incentives in more territories to fully valorise biowaste.

During the final panel of the ROOTS conference in September 2022, Jorge Rodrigues de Almeida from RdA Climate Solutions expanded further on this recommendation and highlighted four key aspects of the “circular bioeconomy finance puzzle” (Rodrigues de Almeida, 2022): providing finance, developing the pipeline, building capacity and standardization.

Regarding the provision of finance Rodrigues de Almeida highlighted the importance of both project development finance, such as equity or soft loans, as well as long-term project finance, e.g. through debt mechanisms.

To further develop what is in the pipeline, the relevance of further technical assistance for the implementation of innovations as well as the importance of aggregating projects through procurement frameworks was emphasized.

Capacities need, according to Rodrigues de Almeida, to be further developed among all stakeholders – hence not only on level of the municipalities, but also on demand side (end users), supply side (along the entire supply chain) and in the finance industry.

Rodrigues de Almeida concluded this finance puzzle with the key recommendations that 1. Horizon 2020 research and innovation funding programmes should allocate resources to specifically deploy biowaste waste-to-energy or waste-to-product valorization, 2. LIFE research and innovation funding programmes should scale-up and deploy innovative solutions on these valorisation routes and 3. The EU Taxonomy should include circular bioeconomy criteria among technical screening criteria, thereby contributing to achieve the EU objective of transitioning to a Circular Economy.

5 DISCUSSION

Concluding from the above-described work carried out by the ROOTS initiative and in the various projects, as well as by the interviews conducted for this policy brief, it is evident that several policy steps still need to be taken to enable a truly circular European bioeconomy.

At the same time, as also shown above, certain structural problems with how policy is set-up should also be underlined. Topics such as harmonization, a “resource”-focused circular thinking, clear regulation that fosters uptake and investments of innovations or a more ambitious stakeholder and citizen engagement in policy-making, are key areas for improvement that connect more than one particular policy and give a broader perspective for how policies on bioeconomy need to be looked at.

As shown by many cases in the five projects of the ROOTS initiative, biowaste (and wastewater sludge) hold value for a continued material and energetic use. With end-of-waste criteria for other products such as copper scrap, the Waste Framework directive already proves that circular thinking can be implemented in EU legislation. But as many of the aforementioned examples from real implementers affected by legislation prove, the situation for biowaste leaves room for improvement both in terms of content as well as the processes that those working in the field have to endure, so circular resources truly remain in the circle – as resource and not as linear waste.

In addition, and in order to get on this track, broad involvement of stakeholders and citizens is another key for circular bio-economies. As substantial link in the circular value chains that the European circular bioeconomy citizens and other stakeholders play crucial roles as users of the bioproducts and those who dispose of the resources. Both the funding of further engagement activities that, e.g., aim at enhancing the knowledge of citizens about circular bioeconomy topics as well as concrete involvement of their opinions, e.g. on struggles in terms of bioproducts, in the policy making process could enrich the end results. Projects such as the ROOTS projects already showcase many findings and have and will continually publish results on the engagement of various stakeholders including citizens that can be taken into consideration.

Especially the ROOTS initiative and its latest policy conference showcased the vast and diverse amount of challenges that practitioners - ranging from researchers to waste companies and service providers to civil society to city representatives - still face. At the same time, this conference also illustrated the large pool of solutions, innovations and promising practises that the 5 cooperating projects and their networks can offer. As such, the ROOTS initiative in itself served as a prime example of how stakeholder engagement – in this case across H2020 projects and partnering networks – can improve the development of policy recommendations and contribute to better policy-making for a truly circular European bioeconomy.

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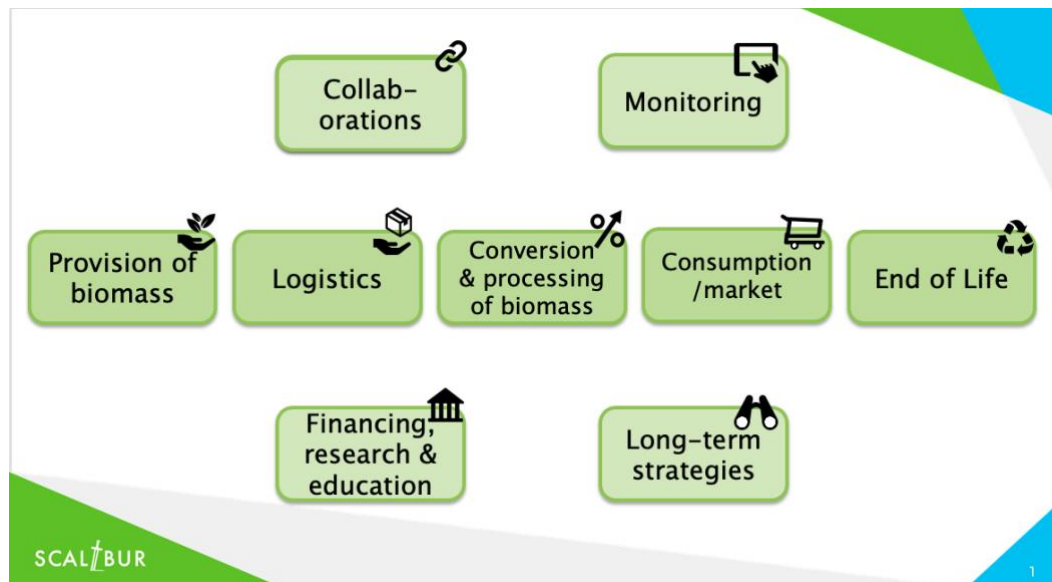
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7 ANNEX 1: QUESTIONNAIRE & LIST OF INTERVIEWEES FOR THE SCALIBUR PERSPECTIVE

Questionnaire for the interviews with SCALIBUR technical partners

1. How would you classify the **operating industry** of your company?
2. Where would you place your company in the **waste value chain**?



3. In which **country** or countries does your **company mainly operate**?
4. How long have you been **working for your company**?
5. How would you rate your **experience with bioeconomy policies** in general on a 5-point scale?
 - 1: you are not familiar with any policies regarding the bioeconomy
 - 2: you are slightly familiar
 - 3: you are moderately familiar
 - 4: you are very familiar
 - 5: you are extremely familiar (f. ex. you have dealt a lot with them during your work.)
6. In brief, could you **describe your technical solution** from SCALIBUR in **2 sentences**?
7. Is there a **national** bioeconomy strategy in your country?

8. Are there **regional** bioeconomy strategies in your country?
9. Do any of the **above strategies impact your SCALIBUR work**? If yes, please state how.
10. Which **EU-legislations**, directives etc. are **most relevant to your SCALIBUR work** and why?
11. What needs to be **changed regarding the current legislation** (e.g., on EU, national and/or regional level in general)?
12. What do you think is the **highest barrier for the bioeconomy** development in the regulatory framework (on any level)?
13. What do you think is the **strongest regulatory driver** for bioeconomy?
14. Is the national bioeconomy strategy in your country **monitored**?
15. Is there **anything you would like to add** regarding your challenges with biowaste valorization policies?

List of interviewees for the SCALIBUR perspective (chapter 3)

- Andrea Antonelli, Università di Modena e Reggio Emilia (UNIMORE), Italy
- Yeray Asensio Ramirez, Aqualia, Spain
- Martijn Bovée, AquaMinerals B.V., Netherlands
- Inés del Campo Colmenar, Centro Nacional de Energías Renovables (CENER), Spain
- Arno Cordes, ASA Spezialenzym GmbH, Germany
- Cristina González Buch, Instituto Tecnológico del Embalaje, Transporte y Logística (ITENE), Spain

8 ANNEX 2: ROOTS POSITION PAPER & AGENDA ROOTS CONFERENCE

On the following pages, find the latest version of the ROOTS position paper, published in July 2022 as well as the final agenda of the ROOTS conference, carried out September 27th, 2022 at the European Committee of Regions in Brussels, Belgium.

ROOTS - circular policies for changing the biowaste system

POSITION PAPER – JULY 2022

The circular economy has a huge potential to make our societies more sustainable and decarbonised, with a reduced impact on the planet's resources. The European Union (EU) has made a significant commitment to this model and several initiatives and projects have been launched since the approval of the first Circular Economy package (2015).

As up to 50% of European municipal waste is organic, valorisation of biowaste is a key tenet of a circular economy. Indeed, the EU Bioeconomy Strategy (2018) sees cities becoming major circular bioeconomy hubs, where biowaste is a feedstock for safe and sustainable biobased products. Changes in the EU waste legislation are expected to lead to more quality biowaste becoming available for use in biorefineries from 2024.

However, **numerous regulatory bottlenecks hinder the full deployment of revolutionary solutions in the field of urban biowaste valorisation and re-use.** The European Green Deal and associated legislative initiatives provide the opportunity to rectify this.

The ROOTS Initiative

In this framework, five Horizon 2020 projects working on biowaste valorisation have teamed up to promote innovative solutions for the European circular bioeconomy and bring down the regulatory barriers blocking a more sustainable future. This joint initiative is named **ROOTS - circular policies for changing the biowaste System.**

The projects **HOOP, VALUEWASTE, SCALIBUR, WaysTUP! and CITYLOOPS** are piloting new solutions to transform urban biowaste and wastewater into valuable products like Feed, Fertilisers, Bioplastics, Biopesticides, Proteins and Bioethanol. They use different processes and technologies, but they all rely on a higher level of recycling and propose valorisation solutions relevant to the uptake of a truly Circular Economy.



These projects have received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement Nos. 101000836, 817788, 818312, 818308 & 821033.

The promoters have discussed their views and shared their concerns on policy barriers hindering new innovations leading to the Circular Economy for urban biowaste. **The joint-work resulted in the release of a first Position Paper in May 2021 discussing four policy issues and the related proposed solutions.** After the release, the ROOTS group has grown and continued its work. In March 2022, a group of European cities participating in the five projects were asked to share their experiences and views regarding the barriers that still hinder the full valorisation of biowaste. The cities that participated were **Porto, Kalundborg, Kuopio, Albano Laziale, Kozani, Bergen, Murcia, Elliniko-Agrypouli** and **Vari-Voula-Vouliagmeni**. Their feedback has been used to prepare points 6 and 7.

1. Recycling targets and treatment plants

Despite separate collection of biowaste being mandatory from January 2024, there is no specific recycling target for biowaste at EU level. There is no reward mechanism for the collection and recycling of materials that could be treated in bio-refineries and fully valorised.

Recommendation: Set recycling targets for biowaste and efficient collection schemes. Develop new support mechanisms for the new biowaste treatment plants enabling the production of clean compost, bioenergy and new low impact biobased products.

2. Waste and by-products

There are overlaps and inconsistencies in the definitions of “by-products” and “waste” in the current legislation, specifically (Directive 2008/98/CE and Regulation 1069/2009).

Recommendation: Products coming from biowaste should have more specific regulation/standardisation allowing for multiple re-use, aligned with the principles of the Circular Economy. This should help to clarify and simplify the whole framework.

3. Biopesticides

Biopesticides are defined as “low risk” plant protection products “not containing substances of concern, being sufficiently active, and not causing unnecessary pain and suffering to vertebrates to be controlled”, according to Regulation 1107/2009. However, they face the same barriers as chemical pesticides. This implies that even products



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completely renewable, biodegradable, coming from low-impact technologies cannot be used.

Recommendation: The EU should create a simplified regulatory framework allowing for an easier commercialisation of biopesticides, characterised by biodegradability and of 100% vegetable source.

4. Insects for Animal Feed

Insects are a great source of proteins and using biowaste to grow and feed insects could unlock several economic opportunities. The projects of **ROOTS** are developing value chains based on insect-rearing for feed production. Until 2021, their use as feed ingredient was approved only for aquaculture. However, in the second half of 2021, the EU has made a major step forward by allowing the use of insect protein for pig and poultry feed. This is in line with objectives of the **Farm to Fork strategy**, aiming to make livestock farming more sustainable and seek alternative feed materials. Insect-protein could be the answer to this challenge.

Recommendation: The EU legislator should favour the uptake of insect-based animal feed by bringing down all the remaining regulatory impediments and further enlarge its use. Specifically, **ROOTS** pledges for the revision of Regulation 767/2009 and 1069/2009.

5. (Bio)waste prevention

While improving biowaste valorisation is an absolute necessity, it is also crucial to prevent biowaste generation in the first instance, following the waste hierarchy. With the Farm to Fork Strategy, the European Commission has set ambitious food waste reduction targets. However, no such targets have been set for other categories of biowaste.

Recommendation: In parallel with food waste prevention and in line with the Farm to Fork Strategy, we ask for ambitious prevention targets for all streams of biowaste and for the provision of adequate support mechanisms for local authorities' waste prevention policies.

6. The Behavioural problem

In the **ROOTS** workshop held in March 2022, the nine participating cities shared with the group their experiences and models in terms of biowaste management and valorisation



These projects have received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement Nos. 101000836, 817788, 818312, 818308 & 821033.

pathways. They also discussed extensively about the issues and problems faced by their administration in such processes. One common issue that came up is linked to the quality of biowaste, which often contains impurities or other non-organic materials. This stems from careless sorting of biowaste at the household level, or lack of knowledge about proper sorting. This is not a regulatory barrier but can be addressed by using policy tools.

Recommendation: The EU should devote more efforts and resources, via direct or indirect funding, to communication campaigns targeting citizens in Europe. These campaigns should promote a more careful sorting of biowaste, letting people understand why this will have a strong impact on their communities and on the circular economy.

7. Investment needs

Another common concern evidenced by the cities involved in the workshop was the need for more investments in the field of biowaste management and valorisation. Small or medium-size cities do not always have the infrastructure or the facilities to create new circular value chains and private actors do not always see opportunities in some peripheral contexts.

Recommendation: Via the use of structural and investment funds (ERDF, CF, InvestEU, etc.), the EU should push for the allocation of more resources to the biowaste valorisation compartment. These could be in the form of waste-to-energy or waste-to-products models, allowing for the creation of new opportunities and incentives in more territories to fully valorise biowaste.

The road ahead

The European Green Deal must address crucial topics for the Circular Economy, like those mentioned above. We express the wish that forthcoming policies will be guided by two clear principles:

- Simplify the regulatory framework.
- Unlock new opportunities in adherence with safety and health standards.

The **ROOTS** group wants to play an important role in achieving a more sustainable society through circular biowaste valorisation schemes. We want to show that Horizon 2020 projects and their partners can speak out loud and concretely contribute to transform and improve our society. For this reason, **we must combine the development of new**



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innovative solutions with the necessary dialogue with policy makers on regulatory barriers. Policy makers should pay more attention to the results arising from the hundreds of EU funded projects which constantly provide results, field experiences and best practices.

For this reason, on **27 September 2022 the ROOTS group will organize a high-level policy event in Brussels** to discuss in detail the content of this paper together with EU policy-makers and other relevant industrial stakeholders. All the details will be provided via the websites of the ROOTS partner projects.

Contact

Giulio Poggiaroni

European Biomass Industry Association

giulio.poggiaroni@eubia.org



These projects have received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement Nos. 101000836, 817788, 818312, 818308 & 821033.

#SaveTheDate

Circular Policies For Changing The Biowaste System

ROOTS
Policy Conference

27 September | 9:30 -17:00
European Committee of the Regions
Brussels



AGENDA

As up to 50% of European municipal waste is organic, valorisation of biowaste is a key tenet of a circular economy. However, numerous regulatory bottlenecks hinder the full deployment of revolutionary solutions in the field.

In this framework, five Horizon 2020 projects have teamed up to promote innovative solutions and bring down the regulatory barriers blocking a more sustainable future. This joint initiative is named ROOTS – circular pOlicies for changing the biOwasTe System.

On 27 September the ROOTS group will host a Policy Conference in Brussels to present their recommendations and discuss them with European policymakers and stakeholders.

The event will see the participation of several European companies and Cities involved to various degrees in the Five organizing projects, they will present their experiences and achievements related to different topics, from biowaste prevention to insect for feed production, up to citizen awareness. These actors will also expose their concerns and thoughts about the barriers limiting the uptake of circular economy solutions. The event will therefore be important for EU policymakers to learn lessons from the ground, in order to improve the regulatory framework.

Agenda

09:30-09:45

Institutional welcome

Adrián Zittelli, (Region of Murcia – CoR alternate member)

09:45-10:15

Introduction to the ROOTS projects and initiative

ValueWaste & HOOP: Gemma Castejón, Martin Soriano (CETENMA)

SCALIBUR: Cesar Aliaga (ITENE)

CITYLOOPS: Simon Gresset (ICLEI)

WaysTUP!: Belen Miranda (SAV)

ROOTS initiative: Giulio Poggiaroni (EUBIA)

10:15-11:00

PANEL 1 – Recycling targets and treatment plants

Pedro Gustavo Rodríguez (Prezero)

Paula Marozzi (FCC)

Yeray Asensio Ramirez (Aqualia)

Q&A

11:00-11:15

Coffee break

11:15-12:30

PANEL 2 – Waste and by-products

Maria Nicolas (SAV)

Toraf Igelsund (BIR)

Ainhoa Bilbao (GAIKER)

Michael Jensen (UNIBIO)

Q&A

12:30-13:30

Lunch break

13:30-14:30

PANEL 3 – Insects for animal feed

María Cámara (Uni Alicante)

Alba Cerisuelo (IVIA)

Diego Amores & Juan Cortés (ENTOMO)

Valeria Paganizza (UNIMORE – KOUR ENERGY SRL)

Q&A

14:30-15:10

PANEL 4 – Biowaste prevention

Gloria Sanchez (AMB Barcelona)

Daniel Freitas (City of Porto)

Simon Gresset (ICLEI)

Q&A

15:10-15:50

PANEL 5 – Citizen awareness

Carina Diedrich (CSCP)
Lola Vicente-Almazán (Las Naves – City of Valencia)
Mercedes Hernández (Murcia City Council)
Mar Escarrabill (Science for Change)
Q&A

15:50-16:30

PANEL 6 – Investment needs

Jorge Rodrigues de Almeida (RdA Climate Solutions)
Yannis Fallas (CluBE)
Q&A

16:30-17:00

Closing speech

Circular Cities and Regions Initiative

Registration is now closed.

You will be able to follow the event online via [this link](#).

Organised by



**European Committee
of the Regions**

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.



COORDINATOR

Cesar Aliaga
cesar.aliaga@itene.com

COMMUNICATIONS

James Ling
j.ling@greenovate-europe.eu

 @SCALIBUR_H2020

 SCALIBUR project

www.scalibur.eu

WP2 LEAD

Anna-Carina Diedrich
carina.diedrich@cscp.org

