



Replication Roadmap – PDCA Toolbox (D1.2)



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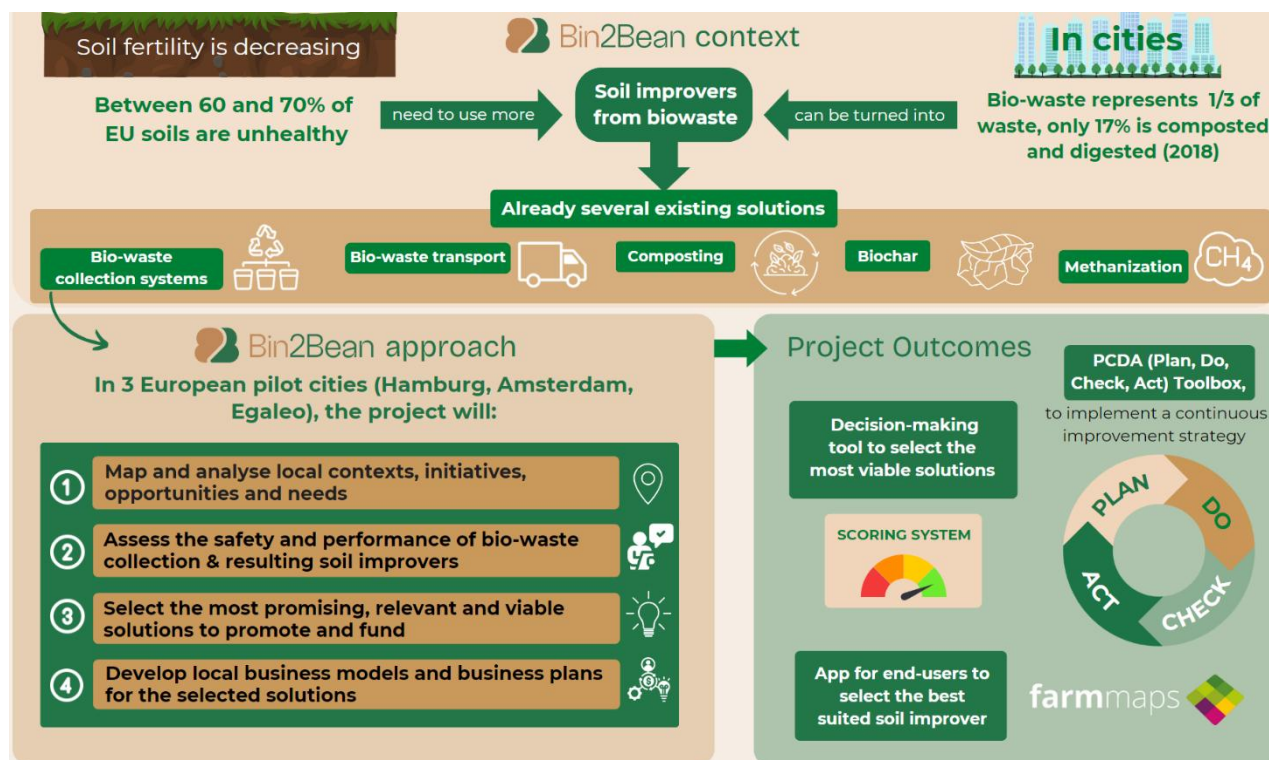
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What is Bin2Bean?

[Bin2Bean](#) is a research-action project, co-funded by the European Commission under the Mission Soil, which aims to optimise the performance of bio-waste collection and transformation into soil improvers. It started in September 2023 and will last 3 years.



Bin2Bean collaborates with 3 City-Region Living Labs ([Amsterdam](#), [Egaleo](#) and [Hamburg](#)), which have different states of progress and levels of experience on the topic, to implement a series of activities:

1. **Map local contexts**, in terms of state-of-progress, existing initiatives, needs, material and monetary flows.
2. **Design a tailored evaluation framework** to demonstrate the safety, environmental and socio-economic performance of bio-waste collection systems and soil improvers.
3. **Develop a scoring system**, fed by data from the evaluation framework, to help cities select the most effective and market-ready solutions adapted to their context.
4. **Develop tailored and viable business and/or community models** for the highest scored solutions, according to stakeholders' willingness-to-adopt.
5. **Draft local, national and EU policy roadmaps**, including waste charging policies and citizen awareness campaigns.

All this will feed into a **PDCA (Plan, Do, Check, Act) toolbox**, enabling any city-region to create a continuous improvement loop towards effective bio-waste recycling and regenerative soil systems.

What is in this toolbox?

This Toolbox aims at presenting all Bin2Bean activities that can be replicated and/or reused, as part of a **Plan Do Check Act** cycle.

This toolbox is mainly targeted at **City-Regions** and **waste management actors** to support and optimise bio-waste collection and its transformation into soil improvers.

WHAT IS PLAN, DO, CHECK, ACT (PDCA)?

The **PDCA (Plan-Do-Check-Act)** cycle is a four-step iterative management method used by organizations to achieve continuous improvement in their processes, products, or services. According to the **American Society for Quality (ASQ)**¹, it is primarily used to solve business problems, optimize workflows, and prevent recurring errors by establishing a structured, data-driven approach to change management.

As outlined by **Moen and Norman (2010)**², the four stages break down as follows:

- **Plan:** Identify a problem or an opportunity for improvement. Analyse the current state, establish objectives, and develop a detailed plan or hypothesis for testing a solution.
- **Do:** Implement the plan on a small, controlled scale. This serves as a pilot or test phase to collect data and evaluate the initial effectiveness of the proposed change without disrupting full operations.
- **Check:** Analyse the results collected during the "Do" phase. Compare the actual outcomes against the original objectives defined in the "Plan" stage to determine whether the change was successful or if gaps remain.
- **Act:** Based on the findings, take action. If the pilot was successful, standardize and implement the new process on a wider scale. If it failed, reflect on the lessons learned and restart the cycle with a modified plan.

- Clearly defining the problem
- Setting specific, measurable objectives
- Writing a project plan

- Use insights from the Check phase to determine next steps
- Make the necessary decisions regarding the choice of solutions, but also identify areas for improvement



- Process that sets in motion a cycle of actions, preparation and, consequently, solutions.
- Implement the plan through a pilot or small-scale trial
- Analyzing the results from the Do phase against the expected outcomes outlined in the Plan phase
- Supports data-driven decision-making

The PDCA approach adapts very well to bio-waste collection and its transformation into soil improvers for the following reasons:

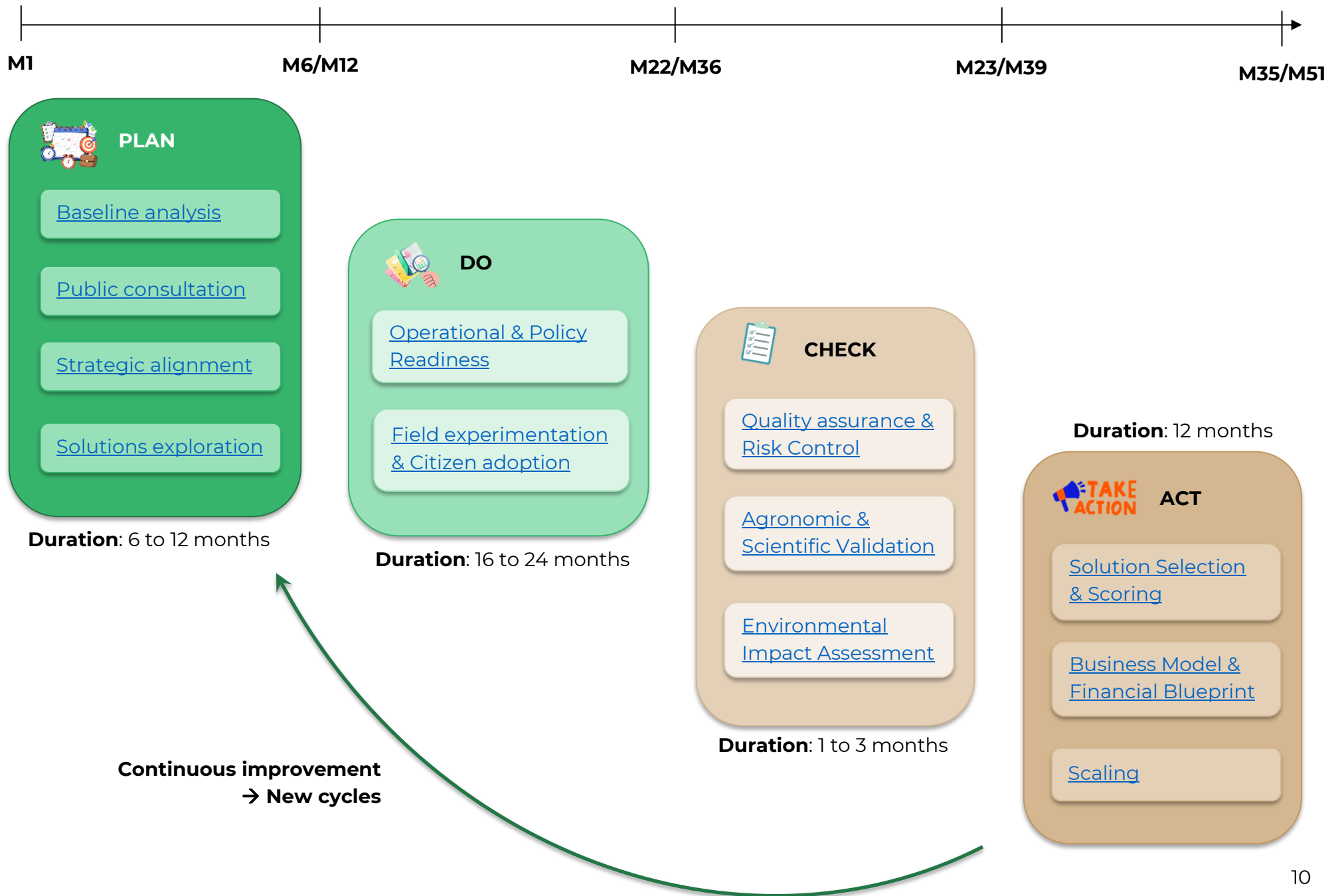
¹ **American Society for Quality (ASQ):** *What is the Plan-Do-Check-Act (PDCA) Cycle?* (asq.org)

² **Moen, R., & Norman, C. (2010):** *Circling Back: Clearing up myths about the Shewhart and Deming cycles.* Quality Progress, 43(11).

- **Feedstock flexibility:** It allows operators to constantly adjust processing parameters to handle the natural fluctuations in bio-waste composition and moisture.
- **Quality and safety compliance:** It ensures strict, continuous laboratory testing (*Check*) to meet safety regulations before certifying the final compost or digestate as a soil improver.
- **Behavioural alignment:** It iteratively refines community education and bin infrastructure to match and improve evolving citizen sorting habits, minimizing plastic contamination at the source.

Feel free to also check this other Bin2Bean toolbox for more information on the Plan phase in a Living Lab context: [Toolbox to set up and run a City-Region Living Lab](#).

The scheme in the next page suggests a timeline for the Bin2Bean PDCA approach.





PLAN

In this first phase, the goal is to build strong foundations: understand the local context, listen to the territory, and align all stakeholders to establish a shared vision before making key decisions.

Baseline analysis



LAYING THE GROUNDWORK: REGULATORY AND POLICY SCREENING

Before a city can transform its bio-waste into valuable soil improvers, it must first navigate the invisible but critical landscape of laws, quality standards, and compliance boundaries. This activity provides a vital reality check at the very outset of your bio-waste to soil journey. It systematically maps out European, national, and local regulations to highlight existing gaps, potential barriers, and mandatory sanitization or environmental standards before any investments are made.

- **Who leads it:** Your city's internal legal or policy unit should steer the ship, closely collaborating with national environmental ministries, bio-waste processors, and regional farmer organizations to ensure all angles of the value chain are covered.
- **What needs to be done:** Start by scoping out your governance levels and value chain stages. Then, use the Bin2Bean structured Excel template to collect, translate, and cross-reference relevant environmental directives. Finally, compile a concise, non-technical brief for decision-makers and host a validation workshop with local stakeholders to turn cold legal data into a shared, actionable roadmap.
- **Timeline:** 1 to 2 months if your country is already covered by Bin2Bean data, or 3 to 6 months for a full, fresh mapping.

[Activity Abstract](#)

[Template](#)

[Results](#)



MAPPING EXISTING LOCAL INITIATIVES AND SOLUTIONS

Identifying and mapping existing local initiatives, grassroots practices, and circular bio-waste projects is essential to avoid reinventing the wheel and build upon existing local momentum. This activity systematically catalogues current bio-waste collection, composting, and soil-improvement

practices in the region. By assessing their scope, operational models, and local acceptance, municipalities can integrate, replicate, or scale up proven bottom-up solutions within the broader urban bioeconomy strategy.

- **Who leads it:** The municipality's sustainability or waste management department, collaborating with local community groups, NGOs, urban agriculture networks, housing associations, and research partners.
- **What needs to be done:** Compile an inventory of ongoing municipal, community, and private bio-waste initiatives (e.g., neighborhood composting, school programs, farm-to-soil loops). Conduct interviews or light surveys with initiative leaders to evaluate operational strengths, citizen participation, and key bottlenecks. Consolidate findings into a local initiatives database and map them geographically to identify synergies and opportunities for scaling.
- **Timeline:** 1 to 2 months.



MAPPING THE PRESENT: BIO-WASTE COLLECTION & PROCESSING DATA

One cannot effectively plan for the future without a crystal-clear picture of one's present operations. Launching new bio-waste initiatives based on assumptions rather than concrete facts is a recipe for inefficiencies. This activity is designed to establish a comprehensive baseline of your city's current bio-waste management, to be implemented in parallel of the previous steps. By systematically gathering economic and ecological data, it acts as a diagnostic tool to pinpoint operational bottlenecks, justify necessary process modifications, prepare transparent reports for city councils, and benchmark your performance against other municipalities.

- **Who leads it:** Your city's Waste Management Department must take the helm. However, success relies on a coordinated project group involving internal departments (Finance, Legal, Environment) alongside any private waste management companies contracted by the city.
- **What needs to be done:** Start by reviewing the ready-to-use data collection tables provided by Bin2Bean to ensure they fit your local context. Define a specific reference timeframe (such as the previous calendar year). Next, clearly assign data-gathering duties to all participating partners and launch the collection. Once gathered, meticulously evaluate the data to spot gaps or inconsistencies, and bring all stakeholders together in person to validate the findings and turn this new knowledge into a springboard for future decisions.
- **Timeline:** 2 to 3 months of total planning. Announce the data call two weeks in advance, provide a 4-to-6-week collection window, and issue a reminder two weeks before the deadline.



MAPPING URBAN BIO-WASTE: MATERIAL FLOW ANALYSIS

Establishing a circular bioeconomy requires a clear, data-driven understanding of how bio-waste moves through your city. Today, urban organic waste remains the largest component of residual waste, with origin, destination, and flow sizes often lacking transparency. This activity delivers a comprehensive Material Flow Analysis (MFA) and Sankey diagram of your urban Bio-waste Management System (BMS). By tracing organic streams and converting mass flows into key nutrients (C, N, and P), this method allows cities to pinpoint hotspots, establish baseline circularity indicators, and set realistic targets for local soil health and bio-based recovery.

- **Who leads it:** The city's statistical department or the circular bioeconomy policy advisor (or an appointed consultant/trainee) should lead the process. Key stakeholders across the entire value chain must be involved, including urban waste and green management departments, social housing corporations, restaurant sector representatives, recycling companies, landfill/incinerator operators, and neighbourhood composting networks.
- **What needs to be done:** Start by identifying all relevant bio-waste actors and hosting an initial in-person meeting to define the spatial boundaries and governance scope of your BMS. Gather data using a hybrid approach: collect empirical data from registration desks, processing plants, and waste sorting analyses, while estimating food waste generation using surveys and national statistics. Model the collected flows across separation, collection, processing, and emission stages using MFA software (such as STAN). Convert these mass flows into soil nutrient contents (carbon, nitrogen, phosphorus). Finally, hold dedicated follow-up workshops with stakeholders to validate the diagram, define circularity performance indicators, and adjust local circularity targets accordingly.
- **Timeline:** Depending on the size of the city, the complexity of its actor networks, and local statistical capacities, the process takes between 3 months (for small cities) and 9 months (for capital cities) to yield a validated MFA.

Activity Abstract

Public consultation



TUNING IN: CITIZENS' NEEDS AND SORTING HABITS SURVEY

Bio-waste management cannot succeed without the people who generate and sort the waste every day. Once you have a clear grasp of your city's current framework (usually around month two of your groundwork), it is time to capture the human element. This activity uses a streamlined online survey to dive into your community's daily habits, uncovering what motivates them, what obstacles they face, and why some residents still choose not to sort. By bridging the gap between municipal infrastructure and citizen reality, this data allows you to design collection systems that people will actually use.

- **Who leads it:** The city administration. However, you might need an experienced advisor to effectively interpret the results.
- **What needs to be done:** Start with the ready-made Google Forms survey templates provided by Bin2Bean (available in English, French, Greek, and Italian). Translate or adapt the questions to match your city's specific context or previous local studies. Share the link widely across your municipal networks to secure at least 50 high-quality answers (aiming for a response rate above 50%). Finally, analyse the results to build a clear behavioural map, identifying your percentage of active sorters and highlighting the exact bottlenecks you need to solve.
- **Timeline:** The active setup and analysis take only about 8 hours of dedicated work, but you should leave the online survey open for 1 month, making sure to avoid summer or winter holiday slumps.



CITIZEN INSIGHTS: INTERVIEW GUIDE ON RESIDENT BEHAVIOURS AND EXPECTATIONS

To design an effective bio-waste collection strategy, municipal plans must be grounded in the daily realities, motivations, and habits of local residents. Rolling out new collection schemes without understanding household habits often leads to low participation or high contamination rates. This activity utilizes a semi-structured, in-person interview guide to evaluate citizens' perception of bio-waste separation across three key dimensions: social meaning and motivation, physical infrastructure (bins, bags, distance, and ease of access), and practical knowledge regarding correct sorting rules. By gathering direct qualitative feedback, cities can pinpoint exact drivers and barriers to refine their collection systems before committing to large-scale operational changes.

- **Who leads it:** The City Waste Management Department should lead the activity, involving local citizens, relevant municipal departments, and private waste management contractors.
- **What needs to be done:** Start by gathering any existing local citizen studies or data on current waste collection challenges. Translate the standardized interview guide and adapt its questions to reflect your city's specific neighbourhood context and information needs. Recruit a diverse sample of 15 to 20 residents and conduct face-to-face, semi-structured interviews. Transcribe the audio recordings and analyse the responses to map out the key motivational, material, and knowledge-based factors that support or hinder correct sorting behaviour.
- **Timeline:** Conducting each interview takes 30 to 45 minutes, with data saturation typically reached within 15 interviews. The entire process spans a few weeks: allow 1 hour for translation, 2 to 3 hours for local adaptation, 5 to 8 hours for recruitment, 12 to 16 hours for conducting 15 interviews, 15 to 20 hours for transcription, and 8 to 10 hours for final data analysis.



Strategic alignment



CREATE A COMMON UNDERSTANDING – PARTICIPATORY MODELLING WORKSHOPS

Building an effective bio-waste-to-soil-health system requires a shared understanding of how different factors across the value chain interact. This participatory activity brings stakeholders together to collectively map system barriers and enablers, constructing a visual Causal Loop Diagram (CLD). By illustrating cause-and-effect relationships across separation, collection, processing, and end-use stages, municipalities can identify critical leverage points and co-design targeted, high-impact interventions.

- **Who leads it:** The Municipality leads the activity. Participants should represent all Living Lab stakeholders across the full bio-waste value chain (separation, collection, processing, and end-use). A facilitator familiar with systems thinking/CLD methodology is required.
- **What needs to be done:** Prepare by recruiting key stakeholders and optional predefined starter factors. Choose one of two formats:
 1. *In-person workshop (~3h):* Run a World Café brainstorm on barriers/enablers, cluster and vote on priority factors, then build a collective CLD using sticky notes and causal arrows before brainstorming interventions.
 2. *Interviews + online workshop:* Conduct individual mental-modelling interviews (~1h each) using starter factors, digitise and merge the models into a joint CLD, and validate it during an online consolidation workshop (e.g., via MIRO) before co-designing interventions.
- **Timeline:** Depending on the approach, the timeline requires:
 1. In-person group workshop option: 3–5 hours for recruitment, 3–4 hours for design, 1–2 hours for facilitator briefing, ~3 hours for the session itself, 4–6 hours to digitise the CLD, and 4–6 hours for synthesis.
 2. Interviews + consolidation workshop option: 3–4 hours for recruitment, 2–3 hours to predefine candidate factors, ~5–6 hours total for 4 individual interviews (~1–1.5 hours each), 5–8 hours to digitise/merge models, 1.5–2 hours for an online consolidation workshop, and 3–5 hours for synthesis.

[Activity Abstract](#)

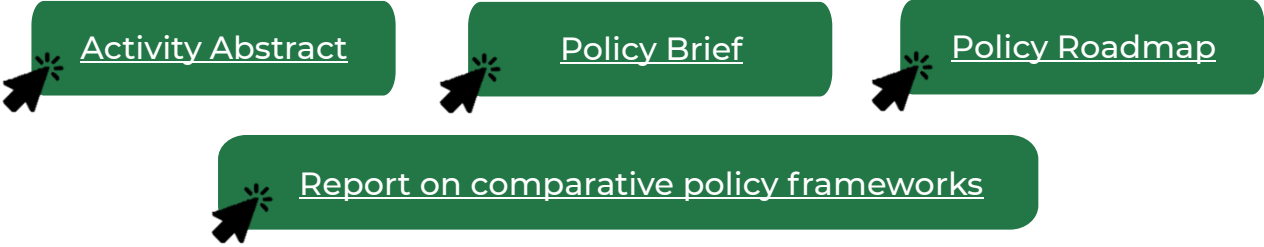
[Article](#)



DRIVING SYSTEMIC CHANGE: POLICY ROADMAP AND GUIDELINES

Before designing or refining your local bio-waste strategy, it is important to understand the regulatory and governance frameworks that dictate long-term compliance and circularity. Even the most technically sound business plans can be hindered by fragmented policies or hidden legislative barriers. This activity leverages the [Bin2Bean Policy Roadmap and Guidelines](#), a ready-to-use result built directly upon evidence from multiple Living Labs, extensive stakeholder interviews, and comparative cross-country analyses already carried out by the BIN2BEAN project partners. Mapping out six critical regulatory gaps across the entire bio-waste-to-soil value chain, this resource equips your city with six structured policy recommendations to bridge the gap between ambitious EU policy goals and local implementation realities, so you do not need to repeat analysis from scratch.

- **Who leads it:** A policy-oriented organisation with expertise in bio-waste regulation and circular economy governance must lead the process of applying these recommendations locally, such as a city sustainability department, a regional waste management authority, or a national agency. The process should actively involve EU, national, and local policymakers, municipal waste officers, processing facility managers, farmers, agricultural associations, legal experts, and local advisory bodies.
- **What needs to be done:** Gain online access to the Bin2Bean policy materials. Read the summary brief for an accessible overview of the core gaps, and then dive into the full deliverable to review the complete evidence base and country-specific case studies. Identify which of the six documented regulatory gaps directly impact your local or national context. Rather than developing a new roadmap from scratch, use the corresponding policy recommendations as a concrete foundation to better implement your local policy objectives and bio-waste management (BWM) strategies, for example by drafting updated local policy proposals, preparing response frameworks for legislative consultations, or hosting focused policy dialogue sessions, either in person or online, to align local waste operations with regional and European standards.
- **When to use it:** Deploy this result early in the planning process, when your city, region, or national authority is reviewing or redesigning its bio-waste collection and valorisation strategy, preparing inputs for legislative consultations, or establishing multi-stakeholder policy dialogues.
- **Timeline:** Reviewing the quick Policy Brief takes 30 to 45 minutes, while studying the full report takes 3 to 5 hours. Organising an internal or external policy dialogue session based on the findings requires 1 to 2 days of preparation and a half-day event.



[Activity Abstract](#)

[Policy Brief](#)

[Policy Roadmap](#)

[Report on comparative policy frameworks](#)



POLICY FORUM: NAVIGATING COMPLEX BIO-WASTE DECISIONS

Introducing structural changes to local bio-waste management, such as new waste charging systems, bio-bin rollouts, or quality standards, involves complex technical, legal, and political considerations. The Policy Forum (PF) is a structured, strictly in-person discussion format designed to evaluate policy alternatives on a rational basis, assess impacts across the value chain, and resolve divergent public or political opinions. By gathering relevant stakeholders in the initial planning

phase before key decisions are taken, the PF generates well-supported recommendations to guide municipal choices. Follow-up forums can subsequently be held to review implementation results and discuss new approaches.

- **Who leads it:** The city administration (problem owner) leads and organises the activity. Participants include administrative departments, municipal council members, political parties, external experts, and key value-chain stakeholders, moderated by a dedicated facilitator.
- **What needs to be done:** Define clear objectives for the forum, compile a curated participant list, and share essential briefing information in advance to ensure full transparency. Host the 1.5- to 4-hour session in a quiet room, utilizing interactive co-creation methods and real-time visual projections of key theses. Finally, produce comprehensive documentation recording all contributions and administrative conclusions (applying Chatham House Rules if necessary).
- **When to run it:** Organise a Policy Forum during the early planning phase when facing sensitive political questions, public ambiguities, or complex decisions requiring in-depth technical evaluation. Additional sessions can be scheduled later if necessary.
- **Timeline:** Plan for a total timeline of 2 to 3 months: allow 3 weeks for internal preparation, 2 to 4 weeks for participant preparation, 1.5 to 4 hours for the forum itself, and 2 weeks for documentation and sharing results.



ESTABLISHING A COMMON VISION, SMART OBJECTIVES & TRANSITION PATHWAYS

Moving from baseline diagnostics to action requires defining a shared long-term ambition for the urban bio-waste system and setting concrete steps to achieve it. Bringing together key stakeholders, this activity develops a collective, desirable future vision (e.g., for at least five years³) for local bio-waste recycling and soil health. This qualitative vision is then translated into time-bound, quantifiable SMART objectives and strategic transition pathways, bridging the gap between future goals and current urban realities.

- **Who leads it:** The city administration or Living Lab facilitator, in close co-creation with multi-stakeholder representatives (e.g. local authorities, waste operators, researchers, farmers, civil society organisations, and citizens).
- **What needs to be done:** Host participatory envisioning workshops using creative backcasting techniques to articulate a shared vision for urban circularity and soil health. Break down the overarching vision into specific, measurable, achievable, relevant, and time-bound (SMART) mid-term objectives (e.g., target biowaste capture rates, soil improver purity levels, CO2 reduction targets). Define parallel transition pathways (e.g., policy, infrastructure, community engagement) that chart the practical steps, milestones, and governance needed to transition from the current baseline to the desired future state.
- **Timeline:** Plan for 2 to 4 months, incorporating 1 to 3 collaborative visioning and backcasting workshops.



³ Be careful of the side-effect that having a too long-term time horizon can lead the stakeholders to postpone the solution of current problems. Better to keep the vision short & medium term (e.g. 5 to 10 years in the future).

Solutions exploration



POSSIBLE « FUTURE STATE » IDEATION, CO-CREATION OF IDEAS AND OPTIONS

Drawing from open innovation and Living Lab co-creation methodologies⁴, this activity brings together diverse stakeholders to brainstorm, design, and explore potential "future state" scenarios for local bio-waste collection, sorting, and valorisation. By fostering collaborative ideation without immediate technical or regulatory constraints, cities can unlock creative human-centric solutions, explore innovative logistical or behavioral approaches, and build a rich repository of potential options before applying technical and economic filters.

- **Who leads it:** The Living Lab facilitator or municipal innovation manager leads the activity. Participants must gather a multi-stakeholder group representing the entire value chain: municipal waste managers, local residents, housing associations, waste collection/processing operators, civil society organisations, and end-users (e.g., urban gardeners or local farmers).
- **What needs to be done:** Prepare interactive, human-centered co-creation workshops using design-thinking and ideation techniques (such as persona mapping, storyboarding, or world café discussions). Guide participants through exploring current pain points and co-designing potential "future state" options, ranging from community-led composting schemes and gamified sorting incentives to novel collection logistics. Capture all raw concepts, structure them into coherent solution packages, and document their qualitative pros and cons to feed directly into the subsequent pre-selection and feasibility filtering steps.
- **Timeline:** Allow 1 to 2 months for preparation, workshop design, and post-session synthesis, with the actual co-creation sessions taking 1 to 2 half-day workshops.

[Living Lab Methodology Handbook](#)

⁴ [Katariina Malmberg, Ines Vaitinen, Penny Evans, Dimitri Schuurman, Anna Ståhlbröst & Koen Vervoort. \(2017\). Living Lab Methodology Handbook.](#)



LISTING OF INDICATORS

To effectively evaluate and compare different urban bio-waste management solutions, municipalities need a clear, standardized framework before gathering data. This activity provides a ready-to-use, comprehensive set of predefined indicators across five core domains: agronomic performance, safety, environmental impact, circularity, and socio-economic performance. By tailoring and weighting these criteria to local priorities, data availability, and regulatory context, cities establish an objective foundation for scoring, ranking, and selecting the optimal bio-waste strategies.

- **Who leads it:** The city administration leads the process, specifically a representative from the waste management department or an external project coordinator acting on the city's behalf. Key stakeholders, including waste operators, municipal representatives, and environmental/soil experts, must be involved to ensure local relevance.
- **What needs to be done:** Review the BIN2BEAN indicator list and definitions⁵, then outline the local system and solutions to be scored. Work with stakeholders to verify indicator relevance and evaluate measurement feasibility against available local data and resources. Adapt the indicator set only if necessary for local policy or regulatory needs (providing clear justifications for any deviations). Finally, assign weights to each indicator based on local priorities, assigning a weight of zero to any non-measurable or irrelevant metrics to yield a finalized evaluation framework.
- **Timeline:** The exercise is iterative and typically takes 1 to 2 working days in total, with approximately 50% of that time (0.5 to 1 day) dedicated to evaluating local data availability.

Activity Abstract



Check that the indicators selected do measure the achievement of the SMART objectives defined during the stakeholder alignment phase.



SOLUTIONS PRE-SELECTION: FILTERING OPTIONS FOR LOCAL CONTEXT

Before launching full-scale pilots or operational changes, municipalities need a structured way to identify, screen, and pre-select the most suitable bio-waste solutions. Across different urban environments, whether focusing on residential bin systems in Hamburg, community initiatives in Egaleo, or advanced valorisation technologies in Amsterdam, the core goal remains the same: combining research and multi-stakeholder dialogue to narrow down options based on local feasibility, performance, and social acceptance. By systematically evaluating potential interventions against clear criteria and stakeholder needs, cities avoid misallocating resources and ensure chosen solutions fit their specific context.

- **Who leads it:** A central local authority leads the process, such as the City Administration or Public Waste Management Company (as in Hamburg and Egaleo), or an independent societal/academic institute acting on the city's behalf (as in Amsterdam). Key participants must represent the broader bio-waste ecosystem, including municipal departments, waste operators, housing companies, school networks, NGOs, and local citizens or residents.

⁵ The indicator list and methodology will be publicly available through the BIN2BEAN Scoring System Deliverable after completion of the project (expected early 2027)

- **What needs to be done:** Start by gathering performance data, preliminary lists of technologies, or local waste collection insights. Convene multi-stakeholder discussions to assess local needs and generate candidate solutions. Evaluate these options using structured exercises (such as SWOT analysis or cost-benefit assessments) to score interventions against key criteria like cost, feasibility, user accessibility, and expected impact. Finally, run prioritisation and consensus-building exercises to select a refined shortlist of 3 to 5 high-priority solutions ready for implementation or pilot testing.
- **When to use it:** Implement this process after initial local assessments are complete (typically around 6 to 12 months into project planning), ensuring key stakeholders have already established a basic working relationship.
- **Timeline:** Depending on the complexity and local scope:
 - Preparation and evaluation phase: Plan for 1 to 4 weeks to conduct initial research, gather preliminary data, and prepare engagement materials.
 - Stakeholder engagement window: Schedule 1 to 2 dedicated discussion or workshop sessions (spanning 1 to 3 hours each), allowing time between sessions for validation or working group reviews. Overall, the full pre-selection process spans from a few months up to 1–1.5 years for long-term multi-site planning.



ASSESSING THE LANDSCAPE: PRELIMINARY MARKET ANALYSES

Running hand-in-hand with your Preliminary Feasibility Studies, this activity ensures that a technically viable solution also makes perfect economic and commercial sense in your local context. There is no use in selecting a high-performing bio-waste transformation system if there is no local demand for the soil improvers it generates, or if the local waste supply chain cannot support it. This entirely desk-based activity maps out the local bio-waste supply and thoroughly analyses the commercial market for bio-waste-derived products. By combining a macro-environmental PESTEL analysis with solution-specific SWOT evaluations, it provides a solid economic filter to pre-select the most sustainable solutions for your city.

- **Who leads it:** This research requires expertise in market research and economic analysis. It can be led by an internal municipal research unit, a university, or an external consultant, working closely with city departments, local bio-waste operators, environmental agencies, and potential agricultural end-users.
- **What needs to be done:** Define your geographical perimeter and list the specific solutions you wish to assess. Next, collect market data via Eurostat, national statistics, or local operator datasets to map out your current bio-waste supply chain and potential soil improver demand. Complete your PESTEL and solution-specific SWOT analyses, compile your final report, and finish with a structured validation step alongside local stakeholders to confirm your recommendations.
- **When to run it:** Implement this toward the second half or end of your planning phase, directly in parallel with the Preliminary Feasibility Studies.
- **Timeline:** approximately 2 to 4 months: starting with scope definition in Month 1, moving to market mapping in Months 2–3, performing the SWOT/PESTEL analyses in Months 3–4, and wrapping up with stakeholder reviews by the end of Month 4.





VERIFYING VIABILITY: PRELIMINARY FEASIBILITY STUDIES

Before committing significant public funds or changing your infrastructure, you need evaluate whether a proposed bio-waste solution realistically takes place within the operational possibilities, at technical and economic level, of the municipality. This activity uses a data-driven "prefeasibility matrix" to assess potential solutions across three vital pillars: technical feasibility, economic viability, and impact on your current waste treatment setups.

- **Who leads it:** The municipality should be supported by a team of data analyst and technical operators. If this expertise is not available within the municipality, this should be done in collaboration with external specialised companies.
- **What needs to be done:** Gather technical data (such as Technology Readiness Levels and scalability), economic data (CAPEX and OPEX), and operational data regarding the impact on your current waste logistics and volumes. Being a preliminary assessment, data don't need to be precise and can be only rough estimation or semi-quantitative information. Next, compile the matrix by assigning a score from 1 to 5 to each parameter organised across three categories: technical feasibility, impact on current waste treatment solutions, economics. The final aggregated score supports the municipality in collecting preliminary information on whether a solution is feasible at economic and technical level, considering the current operational possibilities of the municipality and in identifying potential hotspots and implementation steps.
- **Timeline:** depends on your data availability, collecting the data can take from a few days to several weeks, while compiling the matrix takes 1 to 2 days, and the final data interpretation process can extend over a few weeks due to its strategic impact on your overall implementation plan.



DEFINING THE PILOT PHASE

Before launching active field operations, municipalities must formally define, design, and structure their pilot interventions. Whether preparing targeted behavioural campaigns for multi-story residential bins in Hamburg, co-designing educational school seminars and material kits in Egaleo, or establishing performance indicators and scenarios in Amsterdam, this crucial final planning step ensures all stakeholders agree on clear objectives, inputs, and methodologies. By translating concepts into actionable pilot frameworks, cities ensure smooth execution and valid evaluation during the implementation phase.

- **Who leads it:** A municipal administration or public waste department leads operational planning (as in Hamburg and Egaleo), while an independent academic or societal institute leads technical scenario design (as in Amsterdam). Essential participants include housing industry representatives, school leaders and staff, waste processing partners, and Living Lab members acting as local ambassadors.
- **What needs to be done:** Clearly define the scope, target locations, and evaluation metrics. Co-design required inputs, such as drafting educational flyers, preparing survey

questionnaires, creating presentation materials, or establishing bio-waste performance indicators. Build multi-stakeholder consensus on operational workflows and schedule booking logistics (e.g., establishing school visit timetables or site selection criteria) to ensure all teams are fully prepared before on-site implementation begins.

- **Timeline:** 1 to 12 months of preparation depending on the local scope.
 - *Preparation timeline:* Allow 4 to 8 weeks for baseline research, literature reviews, or content design.
 - *Stakeholder co-design window:* Schedule dedicated preparatory workshops or working sessions (spanning 1 to 2 hours each) over 2 to 3 months to finalize methodologies, materials, and participant schedules prior to launching field activities.



FINALISING THE TRANSITION AGENDA

The Transition Agenda acts as the operational master plan that connects long-term vision and strategic pathways with short-term, concrete actions. This activity consolidates the shared vision, SMART objectives, transition pathways, and pre-selected pilot experiments into a single, publicly endorsed policy document. By formalizing commitments, assigning responsibilities, and establishing continuous monitoring routines, the transition agenda anchors strategic goals into municipal governance and empowers local actors to drive systemic change.⁶

- **Who leads it:** The municipal lead steering committee or Living Lab core team, with active sign-off and commitment from public decision-makers, waste management entities, and key stakeholder representatives.
- **What needs to be done:** Synthesize the co-created vision, transition pathways, short-term pilot actions, and monitoring indicators into a comprehensive Transition Agenda document. Conduct a final review and validation round with all participating Living Lab / Transition Arena stakeholders to ensure joint ownership and alignment with municipal budgets and policy agendas. Formally publish and disseminate the agenda to the public and city council to secure long-term institutional backing and kickstart implementation.
- **Timeline:** 1 to 2 months.



⁶ [Roorda, C., Wittmayer, J., Henneman, P., Steenbergen, F. van, Frantzeskaki, N., Loorbach, D., Transition management in the urban context: guidance manual. DRIFT, Erasmus University Rotterdam, Rotterdam, 2014.](#)



DO

The plan is set; now it's time for action! This phase brings choices to life on the ground, tests solutions at a local scale, and mobilises the community.

Operational & Policy Readiness



OPTIMISING BIO-WASTE COLLECTION & PROCESSING

Once the municipal council or supervisory boards make formal decisions on structural waste revisions, cities must execute, deploy, and monitor optimized bio-waste collection and processing frameworks on a day-to-day basis. This activity operationalises comprehensive guidelines to run a continuous bio-waste valorisation process, producing high-quality end-products (such as soil improvers) suitable for commercial market distribution or local agricultural use. By carefully rolling out logistics, monitoring processing facilities, and tracking interim operational results, municipalities establish a functional, sustainable bio-waste system.

- **Who leads it:** The city administration leads the implementation process. Essential technical and community partners include experts in collection, processing, and soil application, municipal council members, agricultural customers (e.g. farmers), and local stakeholder groups (house owner/tenant associations and environmentalists).
- **What needs to be done:** Execute and refine system operations based on baseline waste data (mass flows, technical aspects, operational costs). Establish operational logistics, run processing facilities, track interim performance metrics, and iteratively review financial operational expenses against revenue outputs. Facilitate ongoing engagement with local stakeholders and farmers to ensure the final soil products meet local quality standards and market requirements.
- **Timeline:** 6 to 12 months, depending on local targets, existing infrastructure, and system maturity.

[Activity Abstract](#)

[Guidelines](#)



WASTE CHARGING POLICY & INCENTIVE SYSTEM DESIGN

Implementing a targeted waste charging scheme, such as a Pay-As-You-Throw (PAYT) or differentiated fee structure, incentivises residents to separate bio-waste at the source, directly supporting municipal circularity and waste reduction targets. By aligning local fee structures with environmental goals, cities create financial incentives for households and businesses while generating the revenue needed to cover collection and processing operations. Carefully testing and executing these charging models ensures the policy fits the local urban context without triggering unintended consequences or misuse.

- **Who leads it:** The city administration and city council lead the activity. Key internal and external partners include municipal waste management, budget offices, facility managers, house owner and tenant associations, engaged citizens, and the chamber of commerce (if commercial waste is included).
- **What needs to be done:** Analyse EU and national waste legislation, document existing system costs and revenues, and calculate total value chain economics from bio-waste collection to soil improver production. Develop charging models (e.g., card-reader PAYT systems), exchange best practices with experienced cities, and run small-scale pilot tests to measure impacts on bio-waste quality and residual waste streams. Evaluate pilot findings, draft final statutes, secure city council approval, and roll out the adjusted fee policy city-wide.
- **Timeline:** plan for approximately 1 year in total across all operational steps:
 - Preparation & data mining: 3 months
 - Full cost calculation & review: 1–2 months
 - Model discussions & expert review: 2–3 months
 - Small-area field testing: 3–6 months
 - Evaluation, council decision & final deployment: 1 month for evaluation/decision, followed by 3 months for full rollout

Activity Abstract

Bin2Bean Report: Charging Systems for Bio-Waste Collection and Valorisation



PUTTING STRATEGY INTO ACTION: COMMUNICATION AND AWARENESS RAISING

Once your technical and market foundations are set, it is time to launch targeted awareness campaigns to engage citizens and secure a clean, abundant bio-waste stream. Instead of reinventing the wheel, this activity focuses on deploying the project's proven tool, the [Bin2Bean Guidelines for communication and awareness raising](#). By reusing these ready-made strategies, your city can design targeted campaigns that effectively shift citizen behaviour, boosting both the volume and the purity of separately collected organic waste so it easily meets strict European standards for soil improvers.

- **Who leads it:** The responsible department of your city administration must take the lead. However, successful rollout requires building a strong network with municipal public relations and city planning departments, citizen associations, housing companies, and local environmental NGOs.
- **What needs to be done:** Start by checking the quantity and quality of your current bio-waste collection and processing outputs (see «Mapping the Present: Bio-Waste Collection & Processing DATA»). Next, dive into the Bin2Bean Guidelines alongside previous city campaigns to define your target groups and specific districts. Gather your internal

departments and external allies for in-person preparatory meetings, ideally hosted on-site at a bio-waste processing facility to build shared understanding. Following the true spirit of the Do phase, do not launch a massive campaign immediately; instead, plan and test your most promising communication activities in a small test area first. Evaluate the results of this pilot period with your stakeholders, refine your approach based on real-world feedback, and roll out the finalized campaign to the wider community.

- **Timeline:** The entire process takes between 6 to 12 months.



Field experimentation & Citizen Adoption



ON-SITE SOLUTIONS IMPLEMENTATION & PILOT ROLLOUT

Translating strategic plans into tangible, on-the-ground change requires launching tailored operational pilots that engage local communities directly in bio-waste collection and processing. This phase tests practical interventions in real-world urban settings to assess feasibility, operational challenges, and community acceptance before scaling up across the municipality.

Example of Egaleo

In the Living Lab of Egaleo, local authorities mobilized the educational community by introducing a municipal-wide school composting initiative. Led by the City Council in collaboration with its Waste Management and Green Spaces Departments, the municipality procured specialized composting units and distributed them to participating schools across all education levels. To ensure smooth operations and prevent pest issues, the units were carefully installed in open, shaded yard areas directly on the soil over protective netting.

Dedicated teams of school staff, teachers, and enthusiastic students were trained through educational seminars to manage the waste inputs, maintain the correct balance of organic material, and regularly mix the compost over a 3- to 4-month operational cycle (carefully scheduled outside the scorching Greek summer months). The resulting compost was sent to testing laboratories for

quality verification and subsequently used to nourish school garden soils. Beyond producing organic soil improvers, the pilot sparked immense motivation among young students and their families, successfully instilling long-term bio-waste recycling habits and environmental awareness across the broader local community.



END-USER ACCEPTANCE AND WILLINGNESS-TO-ADOPT

Understanding public acceptance and financial trade-offs is essential when testing and implementing new bio-waste schemes. This activity deploys an online Discrete Choice Experiment (DCE) to evaluate resident preferences for key system features, such as collection locations, monthly costs, biowaste end-uses, and information feedback, alongside sorting habits and socio-demographic factors. By gathering empirical preference data from citizens, municipalities ensure that newly rolled-out bio-waste systems align with user expectations, boosting adoption rates and correct sorting behaviour.

- **Who leads it:** The municipal waste management department leads the initiative in close collaboration with a research institution (e.g., a university) to design and model the experiment. Additional partners include market research or survey panel providers to administer the tool, alongside target residents across the municipality.
- **What needs to be done:** Define realistic, context-specific collection attributes (such as collection frequency or bin proximity) and design the online questionnaire. Run a brief pilot test to check for length and clarity before fielding the survey via an online panel or local public networks. Apply discrete choice modelling (e.g., mixed logit) to quantify preference weights, providing clear data on consumer willingness to pay and system preferences.
- **When to use it:** Execute this survey once local collection options and cost ranges are established.
- **Timeline:**
 - Preparation & setup: Dedicate 4 to 6 hours to define scenario attributes and cost levels, 3 to 4 hours for translation, 3 to 4 hours for pilot testing, and 5 to 8 hours for panel setup.
 - Fielding & analysis: Allow 2 to 4 weeks for online data collection across target demographics, followed by 15 to 20 hours of choice modelling and statistical analysis. The survey takes participants around 10 minutes to complete.





CHECK

Long-term success cannot be improvised: here, we evaluate technical performance, health safety, and the environmental impacts of the pilot phase.

Quality assurance & Risk control



SAFEGUARDING EXCELLENCE: QA/QC PROTOCOLS FOR COLLECTION AND PROCESSING

Moving into the Check phase means establishing a rigorous system of metrics and controls to verify that your operational outcomes match your initial standards. Instead of treating quality monitoring as an afterthought, this activity introduces a practical quality management guideline designed to control quality across the entire bio-waste treatment chain. From inspecting incoming waste to process monitoring and final laboratory testing, this framework ensures your composting or anaerobic digestion facility produces safe, high-quality soil improvers that comply with EU regulations, minimises process failures, and builds absolute confidence among regulators and end-users.

- **Who leads it:** A bio-waste treatment plant operator, municipality, or the organisation responsible for composting or anaerobic digestion must lead the implementation, actively involving plant managers, process operators, waste collection teams, sampling personnel, and accredited analytical laboratories.
- **What needs to be done:** Start by defining your treatment process, setting up quality management responsibilities, and establishing an on-site documentation system. Follow the protocol's core steps: inspect incoming bio-waste to reject unsuitable loads, remove impurities during pre-treatment, and monitor active process parameters like temperature, moisture, and pH. Next, execute a rigorous sampling programme and send representative samples to accredited laboratories for analysis. Evaluate the final compost or digestate quality against established standards, document the results, and implement swift corrective actions whenever anomalies are detected.
- **When to use it:** Deploy this result during the planning of treatment facilities, during routine operations, during internal quality audits, or whenever process changes are introduced.

- **Timeline:** Initial implementation takes approximately 1 to 3 months, alongside several days for staff training, while sampling, quality evaluation, and routine monitoring remain continuous during daily plant operation.



RISK-BASED CONTROL: CRITICAL CONTROL POINTS (CCPS) AND CRITICAL LIMITS GUIDELINE

To complement your general QA/QC protocols, your Check phase requires a surgical tool to handle process risks and prevent failures before they occur. Instead of treating all operational steps with equal weight, this activity introduces a practical guideline and Decision Tree designed for identifying Critical Control Points (CCPs) across the bio-waste treatment chain. This result delivers a highly structured, risk-based approach to quality management by helping you map hazards, establish precise monitoring procedures, set strict critical limits, and prepare immediate corrective actions, ensuring maximum process safety and unwavering product quality.

- **Who leads it:** A composting or anaerobic digestion plant operator, municipality, or organisation responsible for soil improver manufacturing must lead this activity, supported by a quality manager or environmental authority. Key participants include plant managers, process operators, technical experts, environmental authorities, waste collection operators, and accredited laboratories.
- **What needs to be done:** Start by mapping your entire production process into a clear process flow diagram. Follow the guideline's sequential steps: identify biological, chemical, and physical hazards, and evaluate their potential risk at each process stage. Next, apply the Bin2Bean Decision Tree to distinguish critical control points from regular control points. Define clear monitoring practices and critical limits for each CCP and establish pre-defined corrective actions to handle any deviations. Document all monitoring results, verify the overall effectiveness of your CCP system, and review it continuously whenever significant process changes occur.
- **When to use it:** Deploy this harmonised tool when setting up a new composting or digestion process, implementing a quality management system, conducting internal audits, or introducing new feedstocks and technologies.
- **Timeline:** approximately 1 to 2 weeks for the initial hazard assessment, several days to identify CCPs, and another 1 to 2 weeks to develop specific monitoring procedures. Staff training requires several days, followed by continuous monitoring during routine plant operation.



Agronomic & Scientific validation



ANALYTICAL CONSISTENCY: TESTING METHODS FOR SOIL IMPROVERS

Ensuring that urban bio-waste is safely transformed into high-quality organic soil improvers requires rigorous scientific validation before products reach the market or local agricultural soils. This activity provides a critical laboratory assessment to evaluate compost and digestate quality and safety. Determining product impurity (glass, metal, plastics) content, and biological stability by measuring microbial Oxygen Uptake Rate (OUR) under controlled conditions, cities and processing facilities can scientifically demonstrate product safety, monitor composting process efficiency, and guarantee full compliance with strict European and national quality standards.

- **Who leads it:** Certified analytical laboratories, research organizations, or quality control bodies equipped with respirometric testing infrastructure should lead the execution. They must work in close coordination with compost producers, scientific researchers, and regional certification authorities to ensure reliable data interpretation.
- **What needs to be done:** Begin by collecting and preparing a representative compost sample, paying strict attention to storage and transport since biologically active materials degrade quickly. Next, incubate the sample under controlled laboratory conditions to continuously measure oxygen uptake over the designated timeframe. Finally, calculate the OUR value to certify biological stability, generate compliance documentation for market distribution, and share insights across lab networks to continuously refine regional testing procedures.
- **When to run it:** Execute this activity during the pilot or operational phase (DO/CHECK) whenever validating compost stability/maturity, assessing treatment process performance, or verifying batches for regulatory compliance.
- **Timeline:** Plan for approximately one week per testing cycle, covering 1–2 days for sample preparation, 4–7 days for incubation, and 1 day for final calculations and reporting.

[Activity Abstract](#)

[Testing methods](#)

[Report](#)



LABORATORY ASSESSMENT & INDICATOR MEASUREMENT OF SOIL IMPROVERS

This activity evaluates and quantifies the agronomic performance and safety properties of soil improvers (e.g., compost, digestate) produced by bio-waste management schemes. By conducting standardized laboratory testing on representative samples, it measures key quality indicators, such as organic matter, nutrient content, and absence of contaminants, to feed into local multi-criteria evaluation systems or performance scoring tools.

- **Who leads it:** A soil scientist, environmental analyst, or qualified laboratory specialist, working in close collaboration with bio-waste facility operators (for sampling) and municipal waste management representatives.
- **What needs to be done:** Establish a rigorous sampling protocol to collect representative samples across tested bio-waste treatment solutions. Send samples to accredited analytical laboratories to measure core agronomic properties (e.g., organic matter content, nitrogen mineralization potential, phosphorus) and critical safety parameters (e.g., microplastics, heavy metals, glass, *Salmonella* presence). Compile and format the analytical laboratory dataset into standard indicator values for use in scoring systems, decision support tools, or comparative policy assessments.
- **When to run it:** Execute this evaluation after bio-waste processing yields tangible soil improvers and prior to final multi-criteria scoring or policy decisions.
- **Timeline:** Plan for a 2- to 8-week timeframe to cover sample collection, laboratory processing, and analytical reporting.

Activity Abstract

Environmental Impact Assessment





SCREENING LIFE CYCLE ASSESSMENT (LCA)

Conducting a screening-level Life Cycle Assessment (LCA) allows cities to quantify and compare the environmental performance of baseline and proposed bio-waste management solutions. By focusing on core environmental indicators, specifically climate change and terrestrial species biodiversity, this activity provides robust, science-based values to populate the municipal scoring system. This assessment ensures that strategic waste management decisions are guided by clear environmental data across the entire value chain.

- **Who leads it:** An LCA practitioner or environmental assessment expert with specific experience in waste management systems or bio-based products leads the activity. Key operational partners include municipal representatives (who provide primary system data) and bio-waste processing operators (who share operational data).
- **What needs to be done:** Define the goal, scope, functional unit, and system boundaries in close consultation with city representatives. Collect primary operational data on waste collection, transport, processing, energy usage, emissions, and product application, supplementing missing values with life cycle inventory databases (e.g., ecoinvent). Model life cycle inventories using specialized software (such as SimaPro, LCA for Experts, or Brightway) and calculate environmental impacts at midpoint and damage levels (e.g., using ReCiPe 2016 or LC-Impact methods). Present preliminary iteration results to city stakeholders for feedback, perform required LCA iterations, and extract final climate change and biodiversity indicator values to populate the scoring system.
- **Timeline:** Plan for 1 to 3 months, depending on data availability and the number of waste management scenarios evaluated. Most of the time is typically spent on primary data acquisition rather than system modeling.



Entering the Act phase means ensuring that your validated bio-waste solutions can be scaled up and sustained by a thriving local economy.

Solution Selection & Scoring



IMPLEMENTATION OF THE SCORING SYSTEM: SELECTION OF SOLUTIONS

To complete the PDCA cycle and convert technical, environmental, and financial assessments into strategic municipal decisions, BIN2BEAN has created a scoring system. This comparative ranking framework evaluates and contrasts several bio-waste management scenarios across five core performance dimensions: agronomic performance, safety, environmental performance, circularity, and socio-economic impact. By synthesizing empirical data and weighting locally prioritized indicators, municipal decision-makers can select and scale the bio-waste strategy that best fits their specific regional context.

- **Who leads it:** The city administration (or specifically the municipal Waste Management Department), or an external project coordinator delegated by the city. Essential operational partners include municipal representatives, local waste processing operators, and domain experts in soil science, economics, and Life Cycle Assessment (LCA).
- **What needs to be done:** Compile all measured and calculated indicator values collected during previous testing (e.g., laboratory soil indicator measurements and screening LCA results). Enter the datasets and indicator weights into the scoring tool, run the ranking procedure, and review the comparative outcomes with local stakeholders in dedicated interpretation workshops. Deliver evidence-based recommendations to city leadership to guide policy adoption and long-term waste management planning.
- **When to use it:** Execute this activity right before taking final decisions regarding the full-scale implementation or policy adoption of bio-waste solutions.
- **Timeline:** Plan for 1 to 3 working days to execute the analysis and review meetings, provided all required indicator values have already been gathered.





According to the results of the scoring system, users can refer back to the [Optimising Bio-Waste Collection & Processing guidelines](#). This activity provides targeted levers to adjust operational processes, refine collection streams, or improve output quality before re-evaluating or scaling up.

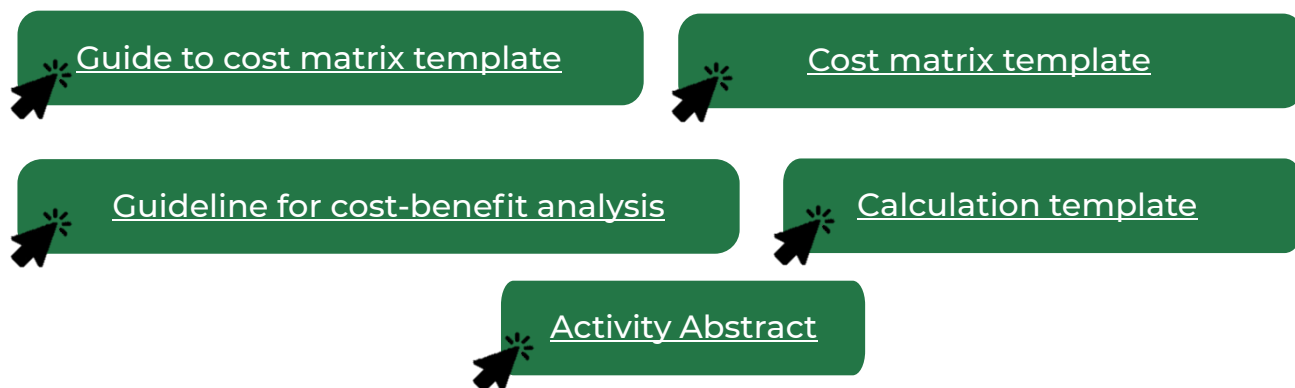
Business Model & Financial Blueprint



TECHNO-ECONOMIC ASSESSMENT (TEA): SECURING THE INVESTMENT

Before a city builds a final business plan or invests substantial public money, it must prove that its chosen bio-waste solution can survive financially in the real world. This activity delivers a comprehensive economic analysis that models long-term financial performance over several years and across multiple operational scenarios. Through the utilisation of rigorous sensitivity analyses, this study evaluates how changes in key variables, such as shifting waste volumes or fluctuating city fees, affect your budget, allowing you to select the safest and most profitable path forward.

- **Who leads it:** This desk-based study must be led by a team or individual with specialised expertise in economic analysis, process engineering, and the agricultural or waste management sectors. They will closely engage city administration staff, local or regional bio-waste operators, treatment facility managers, and environmental agencies.
- **What needs to be done:** Gather precise local data covering waste quantities, processing yields, variable and fixed costs, city taxes or fees, and any potential revenues. Next, compile these values into the Bin2Bean cost matrix template to trigger the automated calculation of vital financial health metrics, including Net Present Value (NPV), Benefit-Cost Ratio (BCR), and Internal Rate of Return (IRR). Finally, analyse these financial values to make a data-driven decision on the ultimate economic sustainability of your upscaled solution.
- **When to run it:** Implement this assessment after gathering initial field data and implementing preliminary market analyses, but strictly before drafting a formal business plan or investing capital. It can be run in parallel with the preparation of business models.
- **Timeline:** depends heavily on data availability, but overall allow at least 2-4 months for the activity to allow enough time for data validation and reiteration, if needed. Compiling the cost matrix can take 2-6 weeks, while checking data takes around 1 week, running the automated calculations takes minutes, but analysing those results can take at least 1 additional week. The subsequent strategic decision-making can span up to a few weeks.



FULL MARKET ANALYSIS

Conducting a full market analysis expands initial context (such as PESTEL or SWOT reviews) into a quantitative assessment of bio-waste potential and logistical viability. This activity details target areas, models real-world bio-waste collection potential, and compares logistical schemes (such as door-to-door vs. bring-point collection). By establishing exact supply and demand projections, municipalities and waste operators generate the concrete evidence base required to build robust business plans and Business Model Canvases for selected bio-waste solutions.

- **Who leads it:** A team or specialist with expertise in market data research, business modeling, and sector knowledge in waste management and agriculture. Key partners include municipal waste departments, local bio-waste collection operators, prospective end-users of soil improvers, and regional/national environmental or statistical agencies.
- **What needs to be done:** Define target service areas for shortlisted solutions and gather detailed demographic data (population, housing typology, density) alongside local waste generation metrics. Calculate realistic bio-waste collection volumes using capture rate estimates, and compare collection logistics (door-to-door vs. bring-point) across cost, citizen convenience, and urban density factors. Translate these demand and supply figures into concrete inputs for the Business Model Canvas (identifying value propositions, revenue streams, cost structures, and key resources) to identify the most viable operational setup.
- **When to use it:** in parallel with the Business Model Canvas phase.
- **Timeline:** Plan for approximately 2 months in total. Months 1–2 focus on data collection and supply/demand modeling, while Month 2 integrates findings into business plans.



SUSTAINING THE VISION: THE SUSTAINABLE BUSINESS MODEL CANVAS

Moving away from a traditional focus on profit alone, this activity introduces a new Sustainable Business Model Canvas (BMCs) specifically designed to model multi-scenario bio-waste management across municipalities. By expanding the standard value proposition to explicitly incorporate "resource loops" and "social loops," this framework allows decision-makers to map material flows alongside community value creation. It acts as an evidence-based roadmap that helps your city select the best valorisation scenario for its local context, balancing economic performance with environmental and social impacts.

- **Who leads it:** The municipality and its financial team. Success relies on a broad coalition, including municipal policymakers, urban planners, waste operators, downstream facility

managers, innovation support teams, citizen groups, local businesses and the catering sector (as biowaste producers).

- **What needs to be done:** Start by gathering local inputs, including annual bio-waste generation data, applicable regulatory frameworks, local landfill gate fees, and cost estimates for treatment technologies, as collected in the previous phases, and complement them where needed. Follow the core steps: characterise your local bio-waste streams, select your ideal valorisation scenarios, and map your stakeholders. Populate the Bin2Bean Sustainable Business Model Canvas blocks according to the methodological guidelines and attach preliminary cost and revenue figures to the cost structure. Finally, review and validate the canvas to produce a finished report ready for stakeholder communication and exploitation.
- **When to use it:** Deploy this tool when consolidating biowaste valorisation solutions for replication and scale-up or when evaluating alternative valorisation pathways.
- **Timeline:** The canvas design process takes up to 6 months. The overall initiative modeled is typically set for implementation within a 1-to-3-year timeframe.



STRESS-TESTING THE VISION: TEST OF BUSINESS MODELS OBTAINED

Once your Sustainable Business Model Canvases are fully populated, you must transition from theoretical design to real-world validation before committing to a final, binding Business Plan. This activity acts as the crucial testing ground for your drafted models, systematically evaluating their viability, attractiveness, and scalability against harsh market realities, regulatory conditions, and financial projections. By filtering your options through an objective evaluation grid, this step verifies which bio-waste models are genuinely market-ready, helps you select the absolute best scenario for your city, and refines your economic assumptions using direct feedback from experts and investors.

- **Who leads it:** The Innovation Manager or project coordinator of the municipality or waste authority must lead this activity, actively involving local entrepreneurs, waste management operators, municipal officers, and sectoral experts.
- **What needs to be done:** Start by defining your testing protocol, adapting the project's evaluation questionnaire template to establish clear scoring criteria and weights. Key macro-categories of criteria include: Technical, Operational and Economic Feasibility; Social Impact; and Environmental Impact. Next, present your business models in a clear, accessible format to your recruited testers and collect their structured feedback via online questionnaires or interviews. Finally, analyse the data with internal municipal stakeholders to generate a comprehensive report for each model.
- **Timeline:** takes between 2 weeks to 2 months, depending heavily on how quickly you can recruit your external experts. Your timeline should span about 8 weeks.





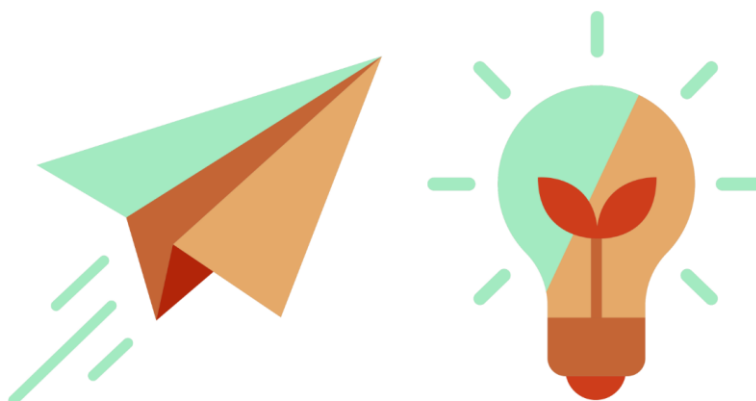
FINALISING THE BLUEPRINT: DEFINITION OF A BUSINESS PLAN PER SOLUTION

The next milestone of your Act phase is translating conceptual ideas and validated canvases into an actionable, rigorous blueprint for real-world execution. This activity focuses on developing a structured business plan for each selected bio-waste valorisation solution. Serving as the final exploitation output of the entire Bin2Bean process, this highly detailed operational and financial document moves beyond theory to map out your value chain, multi-year financial projections, investment needs, and risk assessments. It acts as your primary municipal tool for securing public or private investment, engaging key partners, and guiding long-term service implementation.

- **Who leads it:** The Innovation Manager or project coordinator of the municipality or waste authority must lead this work, collaborating with potential bio-waste valorisation businesses, contracted waste management operators, sectoral experts, and interested citizen groups.
- **What needs to be done:** Bring together your validated Business Model Canvas, market data, regulatory baselines, socio-economic insights and business model testing results. Confirm which model to advance, then deepen your market analysis regarding pricing and customer segments. Define your precise operational model (infrastructure, staffing, and partnerships) and build a multi-year financial model covering revenues, cash flows, and break-even points. Conclude by quantifying your CAPEX and OPEX, based on the TEA results, mapping operational risks, and submitting the full draft for internal review before finalising it for public dissemination and exploitation.
- **When to run it:** The plan must be completed before any public launch and before the conclusion of your broader PDCA approach. You should have completed the TEA, the full market analysis and the business model testing phases before working on a full Business Plan.
- **Timeline:** Expect the design process to take up to 6 months. The resulting initiative is typically set for deployment within a 1-to-3-year timeframe.

Activity Abstract

Scaling





UPSCALING THE ECOSYSTEM: TRAINING GUIDELINES FOR ENTREPRENEURS

Excellent infrastructure and pure waste streams are only half the battle; long-term success requires a skilled network of small and medium enterprises (SMEs) and entrepreneurs capable of commercialising these systems. This activity introduces a modular training programme designed specifically for businesses operating in the bio-waste valorisation sector. Combining short online video modules with practical support materials and hands-on workshops, this tool empowers local innovators on different innovation management topics, including how to navigate public funding mechanisms, leverage business models for accessing private funding mechanism, and how to engage the community on the biowaste topic.

- **Who leads it:** An organisation with explicit expertise in EU funding, innovation support, and the circular economy must lead this initiative. Ideal leads include regional innovation agencies, university research institutes, business support organisations, or a municipality's dedicated economic development unit. They will bring together local entrepreneurs, specialised trainers, communication staff, funding advisors, and municipal representatives.
- **What needs to be done:** Gain access to the Bin2Bean online training platform and review the existing materials, such as slide decks, glossaries, and checklists. If needed, translate the scripts into your local language for subtitles and update the material to accurately reflect your regional landscape. Share the platform link widely with your local network of entrepreneurs and SMEs to allow them to complete the self-study modules and final quiz. However, do not forget to collect feedback and inputs from your entrepreneurs and use these inputs to readapt and extend training content when needed. To maximise the impact of the training, consider organising 1-to-4-hour in-person workshops once participants finish the online modules to provide hands-on experience, foster collaboration, and spark new project consortia.
- **When to use it:** The online training is designed for flexible, asynchronous learning and can be made available to participants at any time.
- **Timeline:** For the organising team, expect a setup and adaptation timeline of 2 to 4 weeks.



[Activity Abstract](#)



[Training](#)



CLOSING THE LOOP: FARMMAPS - ECOBIN NUTRIENT PREDICTION

To achieve a truly successful final rollout in your Act phase, you must demonstrate the direct tangible value of your bio-waste soil improvers to the agricultural end-users who will consume them. High-quality urban compost and digestate only become sustainable if local farmers trust and use them on their crops. This activity introduces the [FarmMaps - ECOBIN](#) web application, a prediction model that calculates nitrogen mineralisation from different types of organic waste. By accurately simulating nutrient release based on localized soil and climate profiles, this digital result allows users to evaluate the exact effectiveness of a recycled bio-waste fertiliser, bridging the gap between urban waste processing and regional agricultural demand.

- **Who leads it:** A farmer, an agricultural consultant, or a bio-waste processing facility manager must lead the utilisation of this tool, collaborating closely with local farmers and agronomic advisors.
- **What needs to be done:** Access the FarmMaps platform online. To configure the tool, the user simply inputs the specific type of organic amendment being considered (such as

compost or manure) and enters the precise geographical coordinates of the field where it will be applied. The integrated *Snomin model* automatically runs in the background to predict the trend of nitrogen mineralisation over time. Finally, the user visualises the predicted nutrient trend to accurately estimate how much available nitrogen will be supplied by that specific amendment under local soil and climate conditions.

- **When to use it:** Deploy this application after you have fully defined the characteristics of the products delivered by your various municipal bio-waste management solutions.
- **Timeline:** The tool is highly efficient and requires only a couple of hours in total.



Conclusion

The [BIN2BEAN](#) project was designed not to deliver a one-size-fits-all solution, but to expose and navigate the complex realities of urban bio-waste management. Through the systematic implementation of the **Plan-Do-Check-Act (PDCA)** framework across our Living Labs, our work revealed that the primary hurdle in biowaste valorization is rarely technical capacity alone. Rather, it lies in the ongoing challenge of aligning diverse stakeholder expectations, local political objectives and EU-level policy frameworks, operational capabilities, household participation and economic constraints.

A key insight gained from our living lab scenarios is that circular biowaste management is inherently defined by systemic trade-offs. No single valorization pathway offers flawless performance across all metrics simultaneously. Instead, local administrations and societies are faced with fundamental choices: deciding which system performances, whether environmental impact, cost efficiency, or biowaste purity, to prioritize, and determining which negative trade-offs are politically and socially acceptable.

To help municipalities navigate these complex decisions, this report provides a structured, adaptable **PDCA Toolbox**. Designed to accommodate any municipality regardless of its population size or current stage of waste infrastructure maturity, the toolbox provides data-driven tools to assess baseline operations, test targeted interventions, scientifically validate safety and agronomic performance, and refine operational models.

Ultimately, advancing biowaste valorization requires sustained political willingness and continuous stakeholder engagement alongside technical deployment. By utilizing the methodology and decision-support mechanisms detailed in this roadmap, city-regions can move past unexamined assumptions, systematically evaluate their local realities, and execute tailored biowaste strategies grounded in empirical evidence and local governance priorities.

Credits: all images were extracted from [Canva](#).

Annexes

Activity abstracts

TEMPLATE ON LOCAL AND NATIONAL REGULATORY FRAMEWORKS

WHO	
Who should lead the activity?	The activity on regulatory and policy screening should be led by an internal legal/policy unit of the city or regional administration. The lead partner should have expertise in EU and national environmental legislation, biowaste regulation, and policy analysis.
Who should be involved?	Key participants include: (1) city/regional administration staff; (2) policy officers from the relevant national ministry or regional environmental authority; (3) representatives of biowaste processors and soil improver producers; (4) farmer organisations or end-user groups.
WHAT	
Short description of the activity	This activity consists of a systematic screening and mapping of the regulatory and policy frameworks governing biowaste collection, processing, and soil improver valorisation at European, national, and regional/local levels. The city collects, and where needed translates, the binding legislation, plans, and quality standards relevant to its context, and organises them in a structured policy framework database.
Purpose/Goal	To provide the city with a comprehensive, evidence-based map of the legislative and policy landscape at EU, national, and regional levels, so it can: (1) understand which regulations apply to its planned biowaste activities; (2) identify regulatory gaps, barriers, and inconsistencies; (3) anticipate compliance issues before investing in collection, treatment, or valorisation infrastructure.
Inputs needed to prepare the activity	- Access to EU directives and national legislation (Waste Framework Directive 2018/851, Fertilising Products Regulation EU 2019/1009, Landfill Directive 2018/850, Nitrates Directive, national biowaste ordinances). - For the 7 countries already covered by BIN2BEAN (Germany, Denmark, Finland, France, Italy, Greece, Netherlands), the publicly available BIN2BEAN IR2 report can be reused directly as a starting point, reducing the screening effort to a verification and update exercise. - For other countries, a new screening is needed: a structured template should be used to organise the legislative mapping by governance level and value chain stage; knowledge of local regulations and regional plans; support from legal or regulatory experts (internal or external consultants) for translation and interpretation of national laws.
Main steps	1. Define the scope: agree on which governance levels (EU, national, regional/local) and value chain stages (collection, treatment, soil improver market) to cover. 2. Collect and screen relevant legislation and policy documents per country, with translation support as needed. An external legal

	consultant or a university research team should be commissioned if in-house legal expertise is not available. - Analyse documents against the biowaste management flow (collection, transport, processing, end-of-waste status, product use) to determine how it applies to the city's planned activities. - Identify gaps, barriers, and inconsistencies (e.g. fragmented end-of-waste rules, contradictions between waste and fertiliser legislation). Input from policy officers at the relevant national ministry or regional environmental authority is recommended at this stage. - Present findings to the relevant local decision-makers and stakeholders (administration, waste operators, end-users) and discuss implications for the planned activities.
Outputs of the activity	A structured policy framework database (or updated version of the BIN2BEAN report, if applicable) covering the relevant governance levels (EU, national, regional/local); a summary of key EU directives and national laws applicable to the city; an identification of regulatory gaps and inconsistencies affecting the planned biowaste activities. This activity also informs the SWOT and PESTEL analyses in the <i>Preliminary market analyses</i>
Links to more information	BIN2BEAN report on comparative policy frameworks Excel template for data collection
WHEN	
When should the activity be implemented?	The regulatory screening should be launched at the very start of the replication process, before any biowaste activity is designed or piloted. Updates should be made whenever significant legislative changes occur at EU or national level.
How much time should be planned to do this activity?	Approximately 1–2 months if the city is in one of the 7 countries already covered by BIN2BEAN (verification and update of the existing findings); approximately 3–6 months for a full screening in a country not yet covered.
Timeline	Month 1: Define scope; if applicable, retrieve and review the BIN2BEAN findings for the relevant country. Months 2–4 (new countries) or Month 2 (covered countries): Collection and screening/verification of EU and national legislation. Month 5 (or Month 2–3 for covered countries): Translation support and gap analysis. Month 6: Findings presented to local stakeholders and decision-makers.
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Primarily desk-based (online): the screening can be conducted remotely using the policy framework template. Consultations with local administration, regulatory authorities, or other stakeholders can be organised as short meetings or interviews, in person or online, depending on availability.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from partners leading the activity</i>	(1) start the screening early and involve a broad range of legal experts from the outset, rather than relying on a single internal source; (2) establish a shared glossary of key biowaste terms before screening, to avoid confusion from inconsistent definitions across directives and national laws; (3) identify in advance a fast channel to seek regulatory clarification from competent authorities; (4) link the regulatory screening directly to any planned stakeholder consultation, so that identified regulatory gaps are validated by value chain actors; (5) produce a short, non-technical summary alongside the full legislative mapping, to make findings accessible to non-legal stakeholders and decision-makers.

TABLE ON CURRENT BIO-WASTE COLLECTION & PROCESSING SYSTEMS

WHO	
Who should lead the activity?	City Waste Management (WM) dept.
Who should be involved?	City depts.: Finance (incl. asset management), Legal, Environment;; private companies contracted by the city to provide WM services; other parties (e.g. housing industry) if special data are needed.
WHAT	
Short description of the activity	Complete data collection on the current status of activities related to bio-waste including the legal frame.
Purpose/Goal	Data collections of this type are needed for - Detection of potential shortcomings (maybe followed by): - Decisions on necessary modifications of the process - Comparison of economic and ecological status w there is no suitable data collection this should be implemented at once with other cities, e.g. benchmarks - Preparation of a report for the council - Preparation of detailed information for the citizens
Inputs needed to prepare the activity	Checking the tables in the annex.: Are they sufficient for your purpose / WM activities?
Main steps	1) Inform the potential data providers about your needs. In the case of major changes to logistics, processing, usage etc. Make up a project group. 2) Ensure that all participants (see above) in the data collection know their duties. 3) Set a reference date for the data collection, e.g. the last year 4) Evaluate the data, check for inconsistencies, prepare necessary decisions on this database.
Outputs of the activity	A detailed overview of the bio-waste management covering all economic and ecological data
Links to more information	Table to complete
WHEN	
When should the activity be implemented?	If there is no suitable data collection available within the administration, it should be implemented at once.
How much time should be planned to do this activity?	2 - 3 months
Timeline	Announce the activity two weeks before it starts. Set an appropriate time window for data collection, e.g. 4-6 weeks. Remind all participants two weeks before the deadline expires. Bring all participants together after the evaluation for information and discussion, focusing on the validity and meaning of the data.
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	In person.

HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?

<i>Feedback on experience from Living Labs (LLs)</i>	LL1: Super clear guide! Most of the work for this kind of activities is developing the network for persona to include in the activity LL2: Good Guideline. LL3: We use the view for a city, that starts to introduce the biowaste collection completely new (in contrast to SRH, that collected experience over 30 years).
<i>Feedback on experience from partners leading the activity</i>	This Excel file was used to collect the necessary data for working with the LLs. It proved useful for the SPG leader, who was not on site. However, it was difficult to insert special data with respect to the processing facilities. Therefore, a simple graphic of the facility and a mass flow diagram were added to avoid potential misunderstandings.

MATERIAL FLOW ANALYSIS (MFA) OF URBAN BIOWASTE MANAGEMENT SYSTEM(S)

By Liesbeth de Schutter – Wageningen University, Urban Economics Group

WHO	
Who should lead the activity?	Statistical department of the city or the policy adviser for circular (bio)economy at the urban or regional level (or e.g. consultant/trainee).
Who should be involved?	Urban waste management department, Urban green management department, waste managers city districts, waste managers social housing corporations, representative for restaurant sector, (Bio)waste recycling companies in the city region, manager of incineration/landfill activities, local/neighborhood composting networks.
WHAT	
Short description of the activity	Urban biowaste flows (including food waste from households, restaurants and firms) and green waste (from public & private green areas) at the urban level are (1) still the main component in urban residual waste, (2) intransparent in terms of origin (o), destination (d) and size of o-d mass flows and (3) potential contribution to mitigating environmental challenges in the city-region. As any circularity approach starts with an assessment of the hotspots and course of biowaste flows through urban actor networks - in order to monitor progress towards circularity - there is a need for a participative approach in constructing a Sankey diagram of urban biowaste actors, flows and process steps within jointly defined system boundaries.
Purpose/Goal	Tracing of urban biowaste flows produced, collected, processed and valorized by an actor network (i.e. "Biowaste Management System" (BMS)) in a jointly defined spatial context (e.g. city district, city or wider city-region), in order to assess, and monitor progress towards, circularity of each BMS.
Inputs needed to prepare the activity	There are two approaches to construct an MFA for urban biowaste: (1) empirical (robust in terms of biowaste mass flows, gaps in linking flows to spatial explicit actor networks), (2) estimated with surveys & food waste assumptions, validated by each BMS (robust in terms of biowaste mass flows, sources of biowaste, spatially explicit at the level of distinct BMSs (e.g. green waste & food waste hotspots and actor networks at city district/ neighborhood level, city-region, macro-region). Ad 1. Biowaste data for (i) collected source-separated biowaste, (ii) waste sorting analyses of collected residual waste (non-source

	separated biowaste), (iii) industrial waste flows above the level that can be disposed of as residual waste (registered and retrieved from national or regional waste flow registration desks), biowaste processing data from waste companies and urban composting networks, incinerators, landfills. Ad 2. The above + (regular) Food consumption surveys (at home (AH) and out of home (OOH)), National food waste rates per consumed food item AH & OOH (from literature/ national reports), Food waste rates in food retail (from literature or national reports), Scale and type of urban food manufacturing activity at urban level (urban statistics office), scale and type of food manufacturing of national food manufacturing activity (national statistics office), national material flow monitor per economic activity (national statistics office).
Main steps	1. Identification of relevant actors (stakeholders) in urban biowaste management (M1-3) 2. Organise a stakeholder meeting where the value, goals and approach to construct an urban-level biowaste MFA are explained, and define the Biowaste Management System(s) in terms of actors and spatial boundaries. Make appointments for interviews and data collection with each stakeholder (M3). 3. Collect empirical biowaste data (M4) 4. In the case of BMS oriented MFA (option 2 above), conduct surveys, estimate biowaste flows (households, restaurants, food retail, food manufacturing) (M5-6) 5. Connect biowaste flows to actor groups along the different BMS stages (separation, collection, processing and emission stage) with MFA software (in Bin2Bean: STAN of TU Wien) for each BMS (M7) 6. Convert biowaste mass flows to relevant substances (nutrients) contained in the BMS valorisation channel (in Bin2Bean: C,N&P) (M7) 7. Participative validation of biowaste MFA, definition of performance indicators (M7) 8. Correcting assumptions/estimations, end-product flows, emissions (M8) 9. Evaluation of performance indicators, setting/ adjusting feasible circularity targets and related activities (M9)
Outputs of the activity	• Concise and structured overview of urban biowaste flows, hotspots, key actors/ actor groups related to spatially distinct Biowaste Management Systems (actor networks involved in separation, collection, processing and valorisation of biowaste based on mass-balance principles). • Circularity performance of urban BMS • Relevance of circular BMS for soil nutrients in the city-region
WHEN	
When should the activity be implemented?	The urban biowaste MFA generally is one of the first steps in a designing a circular urban bioeconomy oriented at renewable energy, soil health/renewable farm inputs and/or other biobased valorisation strategies in the city-region.
How much time should be planned to do this activity?	Depending on the size, the number of distinct BMSs (actor networks) and the statistical capacities of the city, we reckon 3 (small city/ few actors) to 9 months (capital city) for a validated MFA & performance indicators
Timeline	See above
WHERE	
Where should the activity take place?	1 st meeting (M3): in person, all stakeholders (identification actor networks and their BMS elements/boundaries)

(e.g. online, in person, on site)	Interviews/data collection (M4-6): in person with/from individual BMS stakeholders 2nd meeting (M7): in person, all stakeholders (validation of MFA, definition of performance indicators) 3rd meeting (M9): in person, all stakeholders (evaluation of performance indicators, adaptation circularity and valorisation targets)
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from partners leading the activity</i>	In Bin2Bean we worked on the MFA with all living lab participants. In the grant agreement, we envisioned distinct spatial levels of biowaste management, with cities oriented at one or multiple valorisation channels: 1. The neighbourhood (or micro-regional) level with circularity initiatives/networks oriented at renewable energy and soil enhancers from food waste of restaurants and households 2. The city-region (or meso-regional level) oriented at the collection of biowaste from the majority of urban residents and to turn that mass flow into compost via anaerobic digestion. 3. The macro-regional level with more homogenous food waste flows (no green waste) collected from food retailers, (large) restaurants and food manufacturers. These flows are generally collected from larger distances and the products (mainly digestate) are either used directly on the land, exported to countries where farmers are allowed to apply digestate or further composted with green waste. As the aim of the MFA is to map the complete biowaste system for a city in terms of hotspots and size of food waste and green waste flows, we started off with approaching all (potential) actors that we considered relevant for the separation, collection and processing of biowaste, as well as for the valorisation/end-use of biowaste-based soil improvers. Furthermore, assuming different spatial levels of urban BMSs (see above), we aimed at collecting/ estimating information and constructing the MFA at the level of city districts. Only for the LL Amsterdam, involving all relevant BMS actors and close cooperation with the statistical department of the city, a spatially detailed MFA of food- and green waste flows has been produced. In Hamburg, where the Living Lab involved household biowaste only (no commercial biowaste) and was oriented at the quality of collected biowaste in the underground system, the LL participants have not been able to provide us with biowaste relevant data at the district level or by type of collection system. Based on public sources, we were able to estimate an MFA for residential food and green waste flows at the city level, complemented with data and information from the city's compost plant, i.e. a complete MFA for a partial system. The Living Lab in the relatively small city of Egaleo provides limited/no statistical data at the level of the city/city districts, preventing robust estimations of biowaste flows from main producers/ hot spots in the city (households, restaurants, food retail). Moreover, we were not able to collect empirical data on food waste production by source (no response to biowaste production surveys by restaurants). As a result, estimations have been based on national food waste statistics and published research on biowaste in the City of Athens (which is comparable in terms of population density, type of housing and cultural background). Finally, as the biowaste processing and valorisation stages of biowaste were not represented in the Living Lab, the resulting city-level biowaste MFA is uncertain and partial. Hence, it has limited empirical and managerial

	value but can be used as a template for future data collection and monitoring. Lessons learned: - It is important to be able to collect data at all stages of the urban BMS. Hence, BMS stakeholders need to represent the full biowaste valorisation channel from origin to end-use in order to produce a validated MFA for a city or city-region; - We recommend a hybrid approach to construct an urban biowaste MFA, i.e. based on empirical waste collection and processing flows, and estimated biowaste production flows – as the latter are generally not readily available/ difficult to collect in a survey-based approach. - A participative approach with the city's statistical department is recommended. When statistical data cannot be provided by the city, the MFA can be estimated at higher aggregation levels, thereby becoming less robust and less suitable for analytical purposes. - An MFA is based on mass balance principles. When the system includes biowaste valorisation stages (e.g. digestion, composting), the number of assumptions on products and environmental emissions increase substantially and/or need intensive cooperation and data sharing with BMS stakeholders. The latter adds significantly to the time and efforts needed to produce a robust MFA. - In general, we learned that the more BMS stages are in public hands, the more difficult it becomes to collect relevant data for a full system biowaste MFA. This may be related to the fact that, in that case, the managerial value of the MFA is limited (the city has strict data collection, reporting and publishing procedures); - Finally, despite the general acknowledgement that an MFA approach is an important methodology to provide insights in the biophysical dimension of urban food and biowaste system, the large number of actors – both public, private and collective – make it difficult to construct full system MFA's for biowaste flows at the urban or city-region level. In those cases, we recommend to take a participative, open science approach with stakeholders in a dedicated BMS, in order to produce robust results of partial biowaste flows rather than low quality MFAs of aggregated biowaste flows.
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SURVEY ON NEEDS AND CURRENT INITIATIVES

WHO	
Who should lead the activity?	The city
Who should be involved?	Citizens, a Data Analyst
WHAT	
Short description of the activity	Share a survey to citizens
Purpose/Goal	To assess their needs and current approaches to sorting bio-waste
Inputs needed to prepare the activity	Previous citizen studies (if any)

Main steps	- Translate the survey (if your language is different from English, Greek, French, Italian) - If necessary, adjust it based on the context of your city, on your needs in terms of information to gather, on previous citizen studies - Share the survey to as many citizens as possible (ideally response rate > 50% and at least 50 answers)
Outputs of the activity	A clear vision on citizens' status and awareness on bio-waste sorting and collection (e.g. % of sorters and of non-sorters, obstacles in sorting bio-waste)
Links to more information	Here are some google forms that you can duplicate: Make sure to review everything before sending. • Survey in English • Survey in Greek • Survey in French • Survey in Italian
WHEN	
When should the activity be implemented?	At the beginning of the Plan phase
How much time should be planned to do this activity?	Approximately 8 hours
Timeline	Translation: 1h Adjustment: 1h Sharing: depends on whether you already have the network of citizens, if not, count about 3h. Then, you can give people 1 month to complete the survey. Avoid summer or winter holidays. Results analysis: 3h
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Online
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from Living Labs or people participating</i>	It would be better to do an additional branching on the questionnaire according to whether the citizen surveyed has a garden or not
<i>Feedback on experience from partners leading the activity</i>	Analysing the results of multiple-choice questions also is tricky when you export excel documents from google forms.

INTERVIEW GUIDE ON INCLINATIONS, BEHAVIOURS AND EXPECTATIONS OF THE HABITANTS

WHO	
Who should lead the activity?	City Waste Management (WM) dept.
Who should be involved?	Citizens, City depts., private companies contracted by the city to provide WM services.
WHAT	
Short description of the activity	A semi-structured, in-person interview guide exploring residents' perception of biowaste separation across three areas: (1) the social meaning they attach to separating biowaste (motivation, social norms), (2) the infrastructure involved (collection bins, bags, distance and ease of access), and (3) the knowledge and skills residents feel they have or lack regarding correct separation practices (e.g. which items belong in biowaste).
Purpose/Goal	To develop a clear, citizen-grounded understanding of what drives or hinders biowaste separation behaviour in order to identify concrete, evidence-based improvements to the city's biowaste collection system before rolling out new measures.
Inputs needed to prepare the activity	Previous citizen studies (if any), current biowaste collection challenges
Main steps	- Translate the interview guide - If necessary, adjust it based on the context of your city, on your needs in terms of information to gather, on previous citizen studies - Conduct interviews with citizens - Analyse the results
Outputs of the activity	A clear understanding on citizens' perception of current bio-waste sorting and collection challenges, including which motivational, material, and knowledge-based factors most strongly support or hinder correct separation behaviour
WHEN	
When should the activity be implemented?	At the beginning of the Plan phase
How much time should be planned to do this activity?	Approximately 45–60 minutes per interview, plus preparation time for recruitment, translation/adaptation of the guide, and transcription/analysis afterward. Total effort depends on sample size (e.g. a sample of 15–20 residents typically requires several weeks).
Timeline	- Translation: 1h - Adjustment to local context: 2–3h - Recruitment/sharing: depends on existing citizen network; if not ~ 5–8h. - Conducting interviews: ~30–45 min each, ~12–16h total for 15 interviews - Transcription: ~15–20h for 15 interviews - Results analysis: ~8–10h
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	In-person

HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?

<i>Feedback on experience from Living Labs or people participating</i>	- Semi-structured format allowed participants to elaborate on personal experiences and motivations without being biased by pre-set answer options ---> new insights were gathered - Recruitment via Google Forms was a barrier for some (no Google account) - Some topics (e.g. admitting to not separating) may have affected openness.
<i>Feedback on experience from partners leading the activity</i>	- Data saturation was reached within 15 interviews, making the activity efficient to implement within a short timeframe - Convenience/snowball sampling likely introduced selection bias toward already-engaged citizens - Recommend pairing this interview approach with a larger survey to test findings across the full population

PARTICIPATORY MODELLING WORKSHOPS

WHO	
Who should lead the activity?	Municipality
Who should be involved?	All Living Lab stakeholders spanning the full biowaste value chain where possible
WHAT	
Short description of the activity	A participatory workshop in which stakeholders collectively identify barriers and enablers across the biowaste system stages (separation, collection, processing, end-use), and then construct a causal loop diagram (CLD) visualizing how these factors relate to and influence each other and to shared system goals.
Purpose/Goal	To create a shared, visual model of stakeholders' understanding of the local biowaste-to-soil-health system, identify the most critical barriers/enablers and intervention points, and use these insights to design targeted, actionable interventions.
Inputs needed to prepare the activity	Identified stakeholders (ideally spanning all system stages), a facilitator familiar with systems thinking/CLD methodology, and potentially a set of predefined factors drawn from prior workshops or literature to give participants a starting point.
Main steps	Two approaches emerged, adaptable based on group size, and stakeholder availability: Approach A — In-person group workshop (~3h): Icebreaker → small-group brainstorm of barriers/enablers per system stage (World Café format) → clustering → dot-voting to prioritize → brief systems thinking input → joint CLD construction with sticky notes and causal arrows → intervention brainstorming → wrap-up. Approach B — Interviews + consolidation workshop: Individual mental-modelling interviews (~4 participants) using predefined focal factors as anchors → Team merges into one joint CLD → follow-up online workshop (via MIRO) to validate and refine the model with a subset of

	interviewees plus other key actors, followed by intervention brainstorming and introduction of a planned follow-up study.
Outputs of the activity	One or more CLDs per living lab visualizing the perceived biowaste system and its critical intervention points; a prioritized list of barriers and enablers per system stage; a set of concrete, stakeholder-generated intervention ideas
Links to more information	Article: https://thesystemsthinker.com/causal-loop-construction-the-basics/
WHEN	
When should the activity be implemented?	At the beginning of the Plan phase, to establish a shared baseline understanding of the local system before designing specific interventions.
How much time should be planned to do this activity?	In-person group workshop: ~3 hours Individual interviews (1 hour per interview): allow enough time per participant for a full mental-model walkthrough Additional time afterward for the team to digitize, merge, and refine models
Timeline	In-person workshop • Stakeholder identification and recruitment: 3–5h (aim to include all system stages — separation, collection, processing, end-use) • Workshop design: 3–4h • Facilitator briefing/translation: 1–2h • Running the workshop: ~3h • Digitizing and refining the CLD: 4–6h • Analysis of results and intervention synthesis: 4–6h Interviews + consolidation workshop • Stakeholder identification and recruitment: 3–4h • Predefining starter factors: 2–3h • Conducting individual interviews (~4 participants): 1–1.5h each, ~5–6h total • Digitizing and merging into a joint CLD: 5–8h • Follow-up consolidation workshop (online): 1.5–2h • Analysis and intervention synthesis: 3–5h
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	In-person for a full group workshop or a hybrid approach , e.g. in-person one-on-one interviews followed by an online consolidation workshop
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
Feedback on experience from Living Labs or people participating	• Workshop-based barrier-identification phase was well received and engaging; the CLD-construction phase was more difficult for participants • Interviewees enjoyed the mental-modelling process, but were self-selected and highly motivated, which may bias how representative their models are

Feedback on experience from partners leading the activity	- Individual interviews lead to more nuanced factors when participants already know the system well - Predefining a starter list of candidate factors helps participants engage faster without overly constraining them
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POLICY ROADMAP AND GUIDELINES

WHO	
Who should be the “lead” when using the result?	A policy-oriented organisation with expertise in bio-waste regulation and circular economy governance, like a research institution, a municipal or regional authority, or a national agency working on waste and soil policy. Also, a regional waste management authority, or a city sustainability department seeking to design or update its bio-waste policy framework.
Who should be involved?	• Policymakers at EU, national, regional, and local level • Municipal waste management officers and operators • Representatives of bio-waste processing facilities • Farmers and agricultural associations • Environmental and legal experts familiar with WFD, FPR, and soil legislation • Stakeholder and Policy Group (SPG) members or equivalent local advisory bodies
WHAT	
Short description of the result	A policy roadmap and set of practical guidelines for policymakers, grounded in evidence from BIN2BEAN's three Living Labs (Amsterdam, Hamburg, Egaleo), stakeholder interviews, policy forum discussions, and comparative analysis with sister projects (bioSOILUTIONS, FENIX). It covers the full bio-waste-to-soil improvers value chain, identifies six key regulatory gaps, and provides six structured policy recommendations addressed to EU, national, and local levels.
Purpose/Goal	To support policymakers in designing, updating, or strengthening regulatory and governance frameworks for bio-waste valorisation, with the goal of closing the gap between EU policy ambitions and local implementation.
Inputs needed to use the result	• Understand your regulatory context based on the Template on local and national regulatory frameworks • Identify your policy priorities at local level based on the Policy Forum work. • Use the BIN2BEAN policy material
Main steps of the result	1. Read the Policy Brief for an accessible overview of the key gaps and recommendations 2. Consult the full Policy Roadmap for the full evidence base, detailed recommendations by governance level, and Living Lab case studies 3. Identify which of the six regulatory gaps are most relevant to your local or national context 4. Use the corresponding policy recommendations as a basis for dialogue with relevant authorities, stakeholders, or policy processes
Outputs of using this result	• Improved understanding of regulatory barriers in the bio-waste-to-soil improvers value chain • Policy proposals at local, national, or EU level • Stronger dialogue between municipalities, national authorities, and EU institutions

Links to more information	BIN2BEAN policy brief BIN2BEAN report on comparative policy frameworks BIN2BEAN policy roadmap
WHEN	
When should the result be used?	When a city, region, or national authority is reviewing or redesigning its bio-waste collection and valorisation strategy, preparing input to legislative consultations, or setting up multi-stakeholder policy dialogue processes. It is also relevant for organisations applying for EU funding in the bio-waste or circular economy domain, as it provides a consolidated evidence base.
How much time should be planned to use this result?	• Reading the Policy Brief: approximately 30-45 minutes • Reading the full Policy Roadmap: 3-5 hours • Organising a policy dialogue session based on the recommendations: 1-2 days of preparation plus a half-day event
Timeline	Day 1: read the Policy Brief and identify the most relevant regulatory gaps for your context Days 2-5: consult Deliverable 6.2 and IR2 for the detailed evidence and country-specific regulatory information Weeks 2-4: use the recommendations as a basis for internal discussion or stakeholder consultation
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	The Policy Brief and the full Policy Roadmap are available online and can be consulted remotely Policy dialogue and stakeholder consultations based on the recommendations should take place in person (as a preference), but can be held online as well if in person meetings are not possible. The results are designed for applicability at European level

POLICY FORUM (FOR LLS/CITIES LAUNCHING THEIR BW STRATEGY)

WHO	
Who should lead the activity?	Problem owner, e.g. the city administration
Who should be involved?	Stakeholders (to be recruited by the organiser, e.g. the guiding municipality), responsible departments of the administration, experts, maybe also council members, political parties
WHAT	
Short description of the activity	A PF serves as a discussion forum for political questions with regard to complex issues of (bio-) waste management including charging systems.
Purpose/Goal	The PF should yield results based on the in-depth discussion of different alternatives, which can be used as basis for further considerations in the administration and potentially as a preparation of council decisions.
Inputs needed to prepare the activity	Description of options for the introduction or changes of certain steps in (bio-) waste management (e.g. quality issues, new waste charging system, introduction of bio bins in new areas, awareness raising for compost and soil issues). Inclusion of potential impacts on the value chain.
Main steps	- The administration defines the subject and the target of the PF as precisely as possible. - The administration structures the PF and compiles a list of potential participants (stakeholders, experts, maybe members of the city council etc.)

	- The responsible department completes the agenda and the “house rules”, invites the participants, nominates a facilitator (maybe an external consultant) - All information, which is necessary to discuss the subject in question, should be available for the participants before or during the PF – transparency is key for trust in the process. - The PF (1.5 – 4 hours) should take place in a quiet room (without disruptions by phone calls etc.). - The documentation of the PF must include all contributions, at best also conclusions drawn by the administration. - The documentation might follow the Chatham House Rules if necessary - The list of participants should make it clear who is speaking on behalf of an institution and who is expressing their personal opinion
Outputs of the activity	An overview of opinions and recommendations from stakeholders with regard to the defined. Stakeholder and expert judgement of potential alternatives and their implementation
Links to more information	Evaluation of the PFs of the LLs are documented in the Bin2Bean report “Charging Systems for Bio-Waste Collection and Valorisation”
WHEN	
When should the activity be implemented?	In case of political questions / decisions that require in-depth technical, legal,... information and discussion, particularly if there are divergent opinions on the subject in question, maybe also in case of sensitive issues and ambiguities in the public discussion
How much time should be planned to do this activity?	2-3 months
Timeline	Internal preparation: 3 weeks; final agenda, invitation (1 week), time slot for preparatory work of the invited persons: 2-4 weeks, PF, minutes and evaluation: 2 weeks; information of all participants about the results
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Strictly in person
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from Living Labs or people participating</i>	LL1: The PF was initiated by the LL leader, rather than the administration. The facilitator recommends establishing a visual representation of the discussion in real time, for example by projecting notes or theses onto a screen. Furthermore, co-creation methods are useful for encouraging interaction and participation from all stakeholders. Curating the participants list also proved to be crucial. LL2: In this case, the PF was organised as a review and evaluation of project activities, i.e. measures that had already been implemented. The PDCA abstract accurately describes the process. LL3: The LL performed three PFs. The process turned out to be suitable. It is recommended that the first PF is organised within the administration, with the aim of achieving a good structure and preparing for the next PFs, which will involve numerous stakeholders and/or political leaders. External experts can be very helpful in providing evidence and sharing experiences from other cities.

<i>Feedback on experience from partners leading the activity</i>	If the recommended format for the PF does not fit in the case in question, it can easily be customized with respect to the local situation. It is most important to identify the relevant stakeholders and ensure they have all necessary information for a fair and fruitful discussion.
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LISTING OF INDICATORS

WHO	
Who should be the “lead” when using the result?	Strictly speaking, the city. However, this could be an actor responsible for evaluating urban biowaste management solutions, such as someone from the city’s waste management department, or external project coordinator working for the city
Who should be involved?	City representatives and other stakeholders with knowledge of the local biowaste management system (e.g. waste operators) should be involved. Soil and environmental experts could be relevant
WHAT	
Short description of the result	A predefined set of indicators for assessing and comparing biowaste management solutions with respect to agronomic performance, safety, environmental performance, circularity, and socio-economic performance.
Purpose/Goal	To provide a ready-to-use set of indicators for assessing biowaste management solutions while allowing limited adaptation to local priorities, data availability, and regulatory conditions.
Inputs needed to use the result	3) Basic information about local policy objectives and priorities 4) Overview of data availability for the proposed indicators
Main steps of the result	1) Review the BIN2BEAN suggested list of indicators and their definitions. 2) Describe the local biowaste management system and the solution(s) to be scored and ranked 3) Involve City representatives and other stakeholders with knowledge of the local biowaste management system to verify that the indicators are relevant for the local context. 4) Identify which indicators can be measured with available data, resources and expertise. 5) Only if deemed necessary, adapt the indicator set to local regulatory, environmental or policy conditions, providing justification for deviations from the original BIN2BEAN indicator set 6) Assign weights to the indicators according to local priorities. Indicators that cannot reasonably be measured or are not relevant to the local context may be assigned a weight of zero. 7) Use the resulting indicator set as the basis for measuring performance and evaluating biowaste management solutions.
Outputs of using this result	A selected and weighted indicator set to be used for subsequent scoring and ranking of biowaste management solutions
Links to more information	The indicator list and methodology will be publicly available through the BIN2BEAN Scoring System Deliverable after completion of the project (expected early 2027)
WHEN	
When should the result be used?	At the beginning of the assessment process, before collecting data and before evaluating or selecting biowaste management solutions.

How much time should be planned to use this result?	Approximately 1-2 working days
Timeline	This is expected to be an iterative exercise, so detailed timeline is case dependent. It is expected that assessment of data availability will take about 50% of total time, so approx. 0.5-1 working day
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	During planning and assessment activities, either online or in stakeholder workshops, technical meetings, and decision-support exercises

SOLUTIONS PRE-SELECTION

LL HAMBURG

WHO	
Who should lead the activity?	The city or the public waste management company
Who should be involved?	Housing industry, compost marketing firm or authority
WHAT	
Short description of the activity	To find measures at bio-waste collection bins at the housing industry to change the behaviour of the habitants
Purpose/Goal	The quality biowaste including bins from housing industry of the compost leaving the biowaste composting is good following the regular framework
Inputs needed to prepare the activity	Stakeholder meeting including the housing industry
Main steps	Recherche, preparation, selecting fitting sites, concentration on biowaste- underground bins, being placed at the multi-story-houses of the housing industry buildings
Outputs of the activity	Posters, information letters, flyers
WHEN	
When should the activity be implemented?	Spring to autumn
How much time should be planned to do this activity?	1 or 1,5 years of well prepared measures.
Timeline	M1 Kick-off, M7 selection of measures, M 13 starting activities, M18 end of activities
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Selected sites of multi-story-houses with bad biowaste quality

HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?

<i>Your feedback on experience or from people participating</i>	Housing industry has got no time for determinations in person. The communication should run in other lines.
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LL EGALEO

WHO	
Who should lead the activity?	The city administration
Who should be involved?	The activity brings together municipal staff (Waste Management Department, Green Spaces Department, Planning and Development department), the driver and the crew of the BW collection truck, local stakeholders, schools and teaching staff, and citizens (we invited the people from the 1000 pilot households that have a kitchen bin) through a series of Living Lab meetings and participatory discussions.
WHAT	
Purpose/Goal	To identify and prioritize solutions for the city of Egaleo
Inputs needed to prepare the activity	Some useful input was already obtained during the LL MFA workshop that had been held by Liesbeth de Schutter (WU) during October 2024. It is good to build on that workshop.
Main steps	1. assessment of the local situation 2. discussion of local needs and generate ideas for improving bio-waste management 3. Through facilitated discussions, brainstorming exercises (SWOT analysis is a key exercise that is used in this phase as well as a discussion based on costs-and-benefits), and the exchange of viewpoints, a range of potential solutions can be identified 4. solutions are subsequently evaluated according to their feasibility, expected impact, implementation cost, and social acceptance 5. Through a prioritisation exercise involving stakeholder feedback and consensus-building methods, three solutions emerged as the most promising for the local context of each city 6. Additional pilot demonstrations of proposed solutions could also help participants make more informed decisions during the prioritisation process.
Outputs of the activity	Three solutions emerged as the most promising for the local context of Egaleo: a) school composting initiatives, b) awareness-raising strategy targeting the wider public, c) and door-to-door bio-waste collection as a future complement to the existing bring-system.
WHEN	
When should the activity be implemented?	About a year after the project starts. The brown bin must have been established.

How much time should be planned to do this activity?	About 2-3 hours for an open discussion. For cities wishing to replicate this activity, it is recommended to invest sufficient time in stakeholder engagement, create an open and inclusive environment for discussion, use hands-on examples from other cities that are more advanced in all these solutions (e.g. we consulted the Municipality of Athens and the Vari-Voula-Vouliagmeni – the 3V- Municipality later in the project), and use transparent criteria for evaluating and prioritising them.
Timeline	The overall process should be planned over approximately 4-6 months, so it can be implemented after the pilot phase of the brown bin has reached already 4-6 months, and there is a clear image of how the brings system (in the case of Egaleo) works. Stakeholder mapping and initial contacts should start at least 1 month before this LL gathering.
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	In person, we decided to have the LL meetings in the Aigaleo Entrepreneurship Acceleration Hub, an open space for seminars, workshops, lectures and EU project activities. Ethics approval is not required since there are no surveys, interviews, or data collection. Translation and adaptation of materials should be planned at least 2–4 weeks before each engagement activity (if this is the case). The evaluation and prioritisation of solutions can be completed within 3–4 weeks, while validation meetings and final adjustments generally require an additional month.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Your feedback on experience or from people participating</i>	The experience in Egaleo demonstrated that co-creation processes can effectively identify practical and locally accepted solutions while strengthening community awareness and commitment to circular bio-waste management. Although very useful, yet, the solutions mainly target the social rather than the technical parts of the BW collection and management system. The activity should be implemented after a year of work within the project, so that LL members have already bonded, have enough knowledge of the procedures and processes of the project and its main targets have already started being identified for each partner country.

LL AMSTERDAM

WHO	
Who should lead the activity?	A independent institute with a societal/academic/policy role
Who should be involved?	As many departments from the municipality, waste/resource departments from other governmental layers, NGO's, industrial (waste collecting and processing) partners
WHAT	
Short description of the activity	Determining what technologies should be included in the B2B methodology by interactive discussions with as many stakeholders. Although not formally a co-creation session, discussing the preliminary results from the LL meetings/activities in a co-creating fashion
Purpose/Goal	Selecting technologies

Inputs needed to prepare the activity	A pre-selection of (novel) technologies and a rough understanding of their performance related to the key performance indicators for the stakeholders
Main steps	Collecting (novel) technologies, gathering data related to their performance (energy consumption, I:O, user accessibility, waste flow composition), presenting the insights to the LL stakeholders, discussing the insights. Offering a methodology to express their performance with minimal different performance indicators. Selecting the technologies that are relevant and discussing the selection.
Outputs of the activity	A list of (novel) technologies that are deemed relevant by the LL.
WHEN	
When should the activity be implemented?	After the initial pre-selection of technologies and +2 LL meetings. This way the pre-selection and performance indicators are discussed and understood by the stakeholders.
How much time should be planned to do this activity?	The actual selection can be done in a 1-2 hour LL meeting.
Timeline	Continues networking with stakeholders to learn about novel valorization technologies. 2 weeks for literature study for contemporary valorization technologies. 1 week organization time for LL meetings. Two times 2 hours for LL meetings, spread 2-3 months apart.
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	In person on a for the stakeholders neutral ground.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Your feedback on experience or from people participating</i>	The more informing LL meetings should have been online webinar like activities. Afterwards, small working groups should have been formed in the period before the selection to work out the technologies more close to the corresponding stakeholders. The LL format on it self is not so suitable for this project on it self, there is no formal dedication of time our resources by the LL members, this makes the participation in the LL a transactional participations in which the LL leader needs to continuously ensure the LL participators feel compensated for their contribution. Organizing physical pilots without a formal relationship is attractive and in practice impossible.

PRELIMINARY MARKET ANALYSES

WHO	
Who should lead the activity?	A team or individual with expertise in market research, economic analysis, and the agricultural/waste management sectors. This could be: an internal research unit of the city administration or a municipal agency; a university or research institute commissioned by the city; or an external consultant.
Who should be involved?	(1) City administration staff (e.g. waste management, environment, or agriculture departments); (2) local or regional bio-waste operators and composting/anaerobic digestion facilities; (3) potential end-users of soil improvers; (4) regional or national environmental agencies

WHAT	
Short description of the activity	A desk-based analysis of the market for bio-waste-derived soil improvers in the city's geographic context, combined with an assessment of the local bio-waste supply landscape
Purpose/Goal	To assess the economic and market viability of the bio-waste solutions the city plans to implement. It feeds into and complements the " <i>Preliminary feasibility studies</i> " step, supporting evidence-based pre-selection of solutions at city level.
Inputs needed to prepare the activity	1) A list of the bio-waste solutions the city is considering; (2) access to market data sources e.g. publicly available Eurostat data, national statistics, and EU policy documents; ideally, access to commercial market database for quantitative market size and forecast data; (3) local data on bio-waste generation and collection rates, from the city or regional waste authority; (4) access to the relevant regulatory framework (in combination with the " <i>Template on local and national regulatory frameworks</i> ")
Main steps	1 – Define the scope: identify the geographic perimeter (city, region, country), the market segments to analyse and the bio-waste solutions to assess. 2 – Collect market data on the soil improvers market (size, growth, segmentation) for the relevant geography. If the city does not have in-house analytical capacity, an external market research consultant or a university research team should be commissioned at this stage. 3 – Map the local bio-waste supply landscape: collection models, volumes, treatment infrastructure, and derived products (compost, digestate, biochar). This step may require direct input from local bio-waste operators and composting/anaerobic digestion facilities if this information is not available in existing datasets. 4 – Conduct a PESTEL analysis of the bio-waste and soil improvers sector in the geographic perimeter identified. 5 – Conduct a SWOT analysis for each solution under consideration. 6 – Synthesise findings and compare them to other outputs in the "Plan" phase, including the <i>Preliminary feasibility studies</i> 7 – Validate the report relevant local stakeholders.
Outputs of the activity	A written market analysis report covering: (1) quantitative data on the soil improvers market in the city's geographic context; (2) an overview of the local bio-waste supply chain; (3) a PESTEL analysis; (4) a SWOT analysis for each bio-waste solution under consideration; (5) conclusions and recommendations on the most viable solutions.
Links to more information	Guide to preliminary market analysis
WHEN	
When should the activity be implemented?	Towards the second half/end of the Plan phase; in parallel with the <i>Preliminary feasibility studies</i>
How much time should be planned to do this activity?	Approximately 2 to 4 months, depending on the geographic scope, the number of solutions to assess, and the availability of local data.
Timeline	Month 1: Scope definition, data source identification, and initial data collection. Months 2–3: Market analysis and bio-waste supply mapping. Month 3–4: PESTEL and SWOT analyses, report drafting. Month 4: Stakeholder review and finalisation
WHERE	
Where should the activity take place?	Entirely desk-based (online research and document review). No in-person fieldwork is required. Consultations with local stakeholders (waste

(e.g. online, in person, on site)	operators, city departments, end-users) can be conducted remotely via short interviews or video calls.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from partners leading the activity</i>	The analysis is most useful when it directly addresses the specific solutions the city is considering, rather than providing only general market context. Replicating cities should involve local stakeholders (waste operators, farmers, city staff) early in the scoping phase to ensure the market segments and geographies analysed are directly relevant to the solutions under consideration. Two recommendations for future replications: (1) include budget for at least one commercial market database, as open data sources may not provide sufficient geographic granularity; (2) plan a structured validation step with local stakeholders before finalising the report.

PRELIMINARY FEASIBILITY STUDIES

WHO	
Who should lead the activity?	The municipality, supported by a team of data analysts and technical operators
Who should be involved?	(1) City administration staff (e.g. waste management, environment, or agriculture departments); (2) local or regional bio-waste operators and composting/anaerobic digestion facilities; (3) if expertise are not in house, an external consultancy agency with experience in feasibility studies.
WHAT	
Short description of the activity	Compilation of a feasibility matrix designed to evaluate the solutions across three key dimensions: technical feasibility, impact on current waste treatment solutions, and economics.
Purpose/Goal	Define if the solution is technically and economically feasible according to a score system: solutions with a score between 30-40 would be considered as “non feasible” according to the provided information, the ones between 40-50 need more information to be correctly evaluated and more criteria need to be investigated, while solutions between 50-60 are defined as feasible.
Inputs needed to prepare the activity	- Data on technical feasibility (TRL, scalability, utility demand ...) - Data on impact on current waste treatment solution (volume, quality, homogeneity, logistics) - Economics data (CAPEX and OPEX)
Main steps	- Data collection - Matrix compilation giving a score to each parameter according to the legenda - Score calculation and decision making
Outputs of the activity	A data-driven decision on the pre-feasibility of a proposed solution
Links to more information	- Guidelines matrix compilation - Pre-feasibility matrix
WHEN	

When should the activity be implemented?	Towards the second half/end of the Plan phase; in parallel with the <i>Preliminary market analyses</i>
How much time should be planned to do this activity?	From few days to weeks, depending on data availability.
Timeline	- Data collection: from 2 days to weeks, depending on availability. - Matrix compilation giving a score to each parameter according to the legenda: 1-2 days - Score calculation and decision making: it can take even few weeks, since the taken decision can potentially influence the overall strategy of implementation
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	In person by the municipality
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
Feedback on experience from Living Labs or people participating	Having a communication channel with solutions operators is crucial to have real data from the very beginning to guide the scoring system.
Feedback on experience from partners leading the activity	Assigning scores at a preliminary stage can be challenging, and there may be a tendency to assign intermediate scores, resulting in all technologies receiving similar mid-range ratings.

DEFINITION OF THE PILOT PHASE

LL HAMBURG

WHO	
Who should lead the activity?	The city or the public waste management company
Who should be involved?	Housing industry, compost marketing firm or authority
WHAT	
Short description of the activity	Defined measures at bio-waste collection bins at the housing industry to change the behaviour of the habitants
Purpose/Goal	The quality biowaste including biowaste-bins from housing industry of the compost leaving the biowaste composting is good following the regular framework
Inputs needed to prepare the activity	Define housing industry to be involved, different communication activities by letters. Preparation of the habitants surveys , mailings, talks, posters

Main steps	Recherche, planning, preparation, communication, determinations in person on the place, realisation, evaluation
Outputs of the activity	Testing the results by answering the question, if the quality of biowaste from underground biowaste collection bins have the quality to be handled in the composting plant and not to be rejected to be handles as residual waste
WHEN	
When should the activity be implemented?	Summer after 1 year of preparation
How much time should be planned to do this activity?	1 year
Timeline	M1 Kick-off, M5 selection of measures, M 10 starting activities, M13 end of activities
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Selected sites of multi-story-houses with bad biowaste quality
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Your feedback on experience or from people participating</i>	Housing industry must be involved

LL EGALEO

WHO	
Who should lead the activity?	The City Department (Waste management and Planning & Development Departments)
Who should be involved?	Municipal Employees from the Waste Management Department, the planning and development department, schools (staff and students), Living Lab members that act as agents of good practices regarding BW. One or two members from the Green Spaces Department of the city should be in charge of the material that will be communicated to the students.
WHAT	
Short description of the activity	School seminars (pilot phase) were offered by the Municipality to schools (high schools, junior high schools, primary schools, kindergartens) around Egaleo.
Purpose/Goal	The main goal was to raise awareness in the school community (teachers, students – adolescents and children) involving all levels of the educational system. The goal of the seminars is to administer printed material on what goes in the brown bin and what does not to students and teachers. Also to provide students with brown small kitchen bins that they can use at home, and educate the classes on what is biowaste and how it can be either recycled or used as compost.
Inputs needed to prepare the activity	A written email-invitation to let the schools the activity is going to be held so it is possible to book appointments with all the schools interested Brown bins that can be used in the kitchen Flyers created especially for education in schools (a lot of graphics in terms of what we can and cannot throw in the brown bins)

	A powerpoint presentation is useful as a visual stimulus during the seminar (plastic fruit and vegetables can be used in kindergartens, kindergarten children and primary school children can use large pieces of cardboard and colourful markers to draw what goes in the brown bin or in the composter, and work in groups). <i>Note. Different input should be used for different levels of education.</i> The schools that receive the composting device set it up on spot after the seminar in the school yard/garden, so a composter is also one material used.
Main steps	First of all, all experts have discussions on how to design the activity. Participatory methods are used to design the school seminars. The seminars revolve around the following steps: 1. A written invitation to join the activity is sent out centrally to all schools in the city 2. The schools that wish to educate their student have to respond and book an appointment with the Green Spaces Department 3. After the schedule is set up for school visits the team that will visit the schools needs to be set up (municipal employees and experts, LL members) 4. The seminars are either held in the auditorium of the school if there is one, or the experts visit one classroom per time (not more than 30 students in a classroom, so not a good idea to merge classes) 5. The experts show the PPT presentation and hold a discussion with students, then in the basic educational levels there is an interactive activity in groups where pupils are asked to form groups of 4-5 and draw, then they present their poster to the class. 6. After the seminar the students and the experts set up the composting device in one particular correct spot in the school premises and are given precise instructions on how to use it. Some students already throw their first BW brought from home.
Outputs of the activity	Students should take the message of what BW is, how it can be recycled, why it is good for the soil to use compost. One more output of this activity is that
WHEN	
When should the activity be implemented?	After the brown bin has been established in the neighbourhoods and citizens are already to some extent familiarized with it. In Egaleo the school seminars started one year after the establishment of the brown bin (April - May 2025). 1.5 months are needed to cover for around 12 schools
How much time should be planned to do this activity?	The educational seminars last two school schedule hours (around 90-100 minutes). If the school engages in setting up the composting device this might take around 30 more minutes to set it up and explain the process.
Timeline	Any time is ok. In Egaleo the seminars started in M20. But we plan to also deliver seminars again every year.
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	On site only, at each school on a pre-fixed date and time.

WHO	
Who should lead the activity?	A independent institute with a societal/academic/policy role
Who should be involved?	As many departments from the municipality, waste/resource departments from other governmental layers, NGO's, industrial (waste collecting and processing) partners
WHAT	
Short description of the activity	Determining what biowaste management system(BMS) scenarios should be included in the B2B methodology by interactive discussions with as many stakeholders as possible. Although not formally a co-creation session, discussing the pre-liminary results from the LL meetings/activities in a co-creating fashion
Purpose/Goal	Developing and selecting promising biowaste managements strategies for further analyses in the BIN2BEAN scoring system.
Inputs needed to prepare the activity	A methodology to define the scenario's, pre-liminary data to screen for promising scenario's, performance indicators.
Main steps	Developing a methodology to articulate BMS scenario's, articulating BMS scenario's based on the selection of promising technologies. Selecting performance indicators for the scenario's. Gathering enough pre-liminary data to be able to calculate BMS performances to the degree that they are somewhat representative and valid to select the most promising scenarios.
Outputs of the activity	Articulate and selected BMS scenarios.
WHEN	
When should the activity be implemented?	The activity should be taken place after 1) the selection of valorization technologies has taken place, 2) performance indicators for BMS are selected and accepted by the LL participators, 3) a methodology has been developed and accepted by LL participators to articulate BMS scenarios 4) a pre-liminary list of BMS scenario's.
How much time should be planned to do this activity?	The actual selection can be done in a 1-2 hour LL meeting.
Timeline	Continues data gathering with stakeholders to describe and model the novel technologies included in BMS scenarios. 4-8 weeks for literature study to gather data for contemporary technologies included in BMS scenarios. 1 week organization time for LL meetings. Two times 2 hours for LL meetings, spread 2-3 months apart.
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	In person on a for the stakeholders neutral ground.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	

<i>Your feedback on experience or from people participating</i>	The BMS performance is rather complex, it includes a lot of (abstract) performance indicators making it difficult for stakeholders to understand and discuss them independently and in relation to each other. To facilitate this understanding, advice could be sought from people specializing in science communication. Making the content more approachable for a LL containing stakeholders from different background will improve the process.
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GUIDELINES TO OPTIMISE THE PERFORMANCE OF BIO-WASTE COLLECTION AND PROCESSING

WHO	
Who should be the "lead" when using the result?	City administration or waste collection company
Who should be involved?	Experts in the field of collection, processing, and application of soil improvers from bio-waste, customers, members of the city council, stakeholders (e.g. associations of house owners, tenants, environmentalists) – i.e. stakeholders from the whole value chain.
WHAT	
Short description of the result	Bio-waste valorisation process, which is working on a day-to-day basis yielding products, which can be sold on the market as soil improver.
Purpose/Goal	Introduction or optimisation of bio-waste collection. Planning or renewal of processing facilities. Support for farmers who are not satisfied with the product. Local, national, and EU regulations must be observed.
Inputs needed to use the result	Collection of data on the current waste management system including the processing facilities (mass flows, technical details, costs...) - see PCDA abstract "Table on current bio-waste collection & processing systems (SPG5)"
Main steps of the result	Define the targets Collect data on the current system Gather information on suitable facilities Collect opinions from experts in the field Draft a plan (logistics, processing, marketing, costs, revenues, charges...) Organise a stakeholder forum to discuss the planning (see PCDA abstract "Policy Forum") Evaluate the results from the policy forum Re-evaluate the calculations on investments and operational expenses (The last steps might be repeated in an iterative process) Prepare a draft resolution for the council regarding the proposed change to the system
Outputs of using this result	A complete planning for the introduction or optimisation of bio-waste valorisation
Links to more information	Bin2Bean "Bio-waste Collection and Processing Guidelines" Further information on policy forums: See activity abstract Policy Forum (for LLs/cities launching their BW strategy)
WHEN	
When should the result be used?	For the final decision on considerable revisions of the waste management system.

How much time should be planned to use this result?	9-18 months
Timeline	This depends on the targets and the current status. Example: M1-4 months planning and order, M 5-7 preparation, M8-12 realisation, M13-18 follow up and valorisation.
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	When the necessary decisions were taken by the city council, supervisory boards etc. the results must be carefully implemented. The implementation process should give space for checking interim results.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from Living Labs or people participating</i>	LL1: This is how this process ideally would take place. In Amsterdam the (bio)waste valorisation strategy is developed and executed parallel with the political cadence of elections and terms. The political willingness and taste are determinative for the strategies. SRH: Despite the fact, that our pilot only touched a small part of the whole biowaste-collection system of Hamburg after more than 30 years of experience I added a few comments from the view of the city introducing the system as a complete new task. LL2: The regional authority must collaborate more closely with the Municipality. The Municipality of Egaleo does not collaborate with private companies for BW management, hence it is important to have more information regarding the details of its own quality and quantity of BW. Egaleo is still in its first steps of BW collection and management. From September 2026, the open grocery markets will be part of the BW collection as big producers. For the time that EGL has been engaged in the BW recycling it has done quite well.
<i>Feedback on experience from partners leading the activity</i>	The experiences gained in Hamburg with the amendments to the bio-waste collection and processing system, as well as my own experience from the perspective of municipalities and waste management companies, were used to optimise the process described here. LL leaders unanimously recommend this iterative approach.

WASTE CHARGING POLICY

WHO	
Who should be the "lead" when using the result?	City administration, city council
Who should be involved?	Depts. within the administration: waste management, budget office, managers of waste recycling and disposal facilities, associations of house owners and tenants, citizens engaged in bio-waste issues, the chamber of commerce (if the regulation is also binding for companies)
WHAT	
Short description of the result	A waste charging system aiming at motivations for waste separation at source reflecting the performance, environmental, economic and circularity goals set out in the (bio-)waste valorization strategy, either starting with the introduction of the bio bin or (if bio-waste is already collected) from a conventional fee system

Purpose/Goal	Increasing the quality and/or quantity of separately collected bio-waste (i.e. kitchen waste, green waste, food residues from HoReCa)
Inputs needed to use the result	Basic data including an inventory of technologies that are suitable for the pre-selected charging systems (e.g. card readers with PAYT) (see PDCA "Survey on needs and current initiatives"), detailed economic data and ecological assessments for all steps of the value chain. Tests of drafted charging statutes. Discussion in the council (maybe after discussions in technical committees with council members) and a final decision, which must be implemented by the administration.
Main steps of the result	- Analysis of EU and national legislation with regard to bio-waste and waste charging - Documentation of costs and revenues of the existing waste management system - Calculation of the costs and revenues along the value chain from bio-waste to soil improvers - Check for potential funding - Calculation of money saved for residual waste collection and disposal - Balancing costs and revenues for the whole system; calculating the amount of charges needed to finance the system - Development of models for the charging system. Exchange of experiences with cities, which already introduced differentiated waste charges. Discussion of promising models with experts and stakeholders. - Testing the impacts of the chosen model on the quantity and quality of separately collected bio-waste and the development of residual waste flows in a small area. Evaluation of the test, second testing (if necessary) and decision-making
Outputs of using this result	Differentiated charging systems support the citizens' motivation for separating waste at source, particularly bio-waste. It is very important to balance this instrument to avoid misuse
Links to more information	Bin2Bean "Charging Systems for Bio-Waste Collection and Valorisation" Agència de Residus de Catalunya: Guide for the Implementation of Pay-As-You-Throw Systems for Municipal Waste GIZ (ed.): Economic Instruments to Improve Waste Management in Greece J. Morlok et al.: The Impact of Pay-As-You-Throw Schemes on Municipal Solid Waste Management: The Exemplar Case of the County of Aschaffenburg, Germany, https://doi.org/10.3390/resources6010008 H. Friege & M. Hentschel: Using Differentiated Waste Fees to Encourage the Sustainable Recycling of Organic Waste, https://doi.org/10.3390/su18010052
WHEN	
When should the result be used?	After a thorough development, testing, and discussion of alternatives.
How much time should be planned to use this result?	Take about a year for all steps to be done.
Timeline	Preparation, data mining: 3 months; full cost calculation and review: 1-2 months; discussion of suitable charging models: 2-3 months; testing: 3-6 months; evaluation and decision making: 1 month; implementation 3 months.
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	In the whole city.

HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?

<i>Feedback on experience from Living Labs or people participating</i>	LL1: Great guide, this is roughly what we experienced in Amsterdam. Comment to the “outputs”: To keep it more generic an alternative could be as I described in the comment on short description of the results. IMHO differentiated charging system is not a goal on itself but a means. I can imagine that a fully rolled out PAYT system in Amsterdam will not work, therefore our desired result is a fitting charging policy rather than a 100% PAYT one. LL2: Despite of the fact, that our pilot only touched a small part of the whole biowaste-collection system of Hamburg after more than 30 years of experience I added a few comments from the view of city introducing the system as a complete new task.
<i>Feedback on experience from SPG leaders</i>	There is no one-size-fits-all solution! However, the experiences form the LLs prove that the approach described here can be used by other cities to find suitable solutions.

COMMUNICATION AND AWARENESS RAISING ISSUES

WHO	
Who should lead the activity?	The responsible department of the city administration
Who should be involved?	Associations of citizens, housing companies, public relation dept. of the city, environmentalists
WHAT	
Short description of the activity	Communication and awareness raising for the valorisation of bio-waste to soil improvers
Purpose/Goal	To collect bio-waste of good quality, which can be processed to soil improvers meeting the European standards
Inputs needed to prepare the activity	Experiences from former campaigns, experiences of other cities, scientific work on the collection of bio-waste
Main steps	- Check the quantity and quality of the current bio-waste collection. - Check the quality of products from processing. - Define the campaign/measure targets and the area/target groups (e.g. certain districts). - Look for allies, e.g. citizen groups, housing companies and NGOs. - Install the project and integrate all the necessary city administration departments (e.g. public relations and city planning) and stakeholders willing to support the campaign. - Discuss potential steps/activities for raising awareness. - Plan the most promising activities and test these in small areas. - Discuss the results of the testing period and make decisions on the final campaign.
Outputs of the activity	More and /or better bio-waste collected separately. Experiences from the campaign to be used for upcoming activities.
Links to more information	Bin2Bean “ Guidelines for communication and awareness raising and information ” (see links therein).

WHEN	
When should the activity be implemented?	In case of insufficient results from separate bio-waste collection
How much time should be planned to do this activity?	6 – 12 months
Timeline	- Data collection (1 month) - Discussion of targets and activities (1 month) - Preparation of a campaign in a test area (1 month) - Preliminary campaign and evaluation (2 months) - Preparation of the final campaign (1 month) - Campaigning and feedback (3 months)
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Preparatory meetings should be organised in person and – if possible on site (e.g. bio-waste processing facility). Informal meetings during the campaign can also be organised in an online format.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from Living Labs or people participating</i>	LL1: All the facts for this guideline are good and helpful. In Hamburg at SRH the communication and awareness guideline is fixed and concerning the introduction of the bio-waste collection realized step by step. So, from our side there is nothing to be changed in this document.
<i>Feedback on experience from partners leading the activity</i>	As SPG22 is based on numerous reports from practitioners in the field, as well as scientific evidence, a wide range of potential activities is provided. The LLs either selected some of these (EGL) or contributed their own examples (SRH).

IMPLEMENTATION OF SOLUTIONS

LL HAMBURG

WHO	
Who should lead the activity?	The city or the public waste management company
Who should be involved?	Housing industry, compost marketing firm or authority
WHAT	
Short description of the activity	Defined measures at bio-waste collection bins at the housing industry to change the behaviour of the habitants
Purpose/Goal	The quality biowaste including biowaste-bins from housing industry of the compost leaving the biowaste composting is good following the regular framework
Inputs needed to prepare the activity	Define housing industry to be involved, different communication activities by letters. Preparation of the habitants surveys. Mailings, talks, posters.
Main steps	Recherche, planning, preparation, communication, determinations in person on the place, realisation, evaluation

Outputs of the activity	Testing the results by answering the question, if the quality of biowaste from underground biowaste collection bins have the quality to be handled in the composting plant and not to be rejected to be handles as residual waste
WHEN	
When should the activity be implemented?	Summer after 1 year of preparation
How much time should be planned to do this activity?	1 year
Timeline	M1 Kick-off, M5 selection of measures, M 10 starting activities, M13 end of activities
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Selected sites of multi-story-houses with bad biowaste quality
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Your feedback on experience or from people participating</i>	After realized all these measures the quality of biowaste from biowaste-underground bins I as a whole is still that bad, that this material is still that bad, that it cannot be handles in a biogas and composting plant. But to mention is, that the biowaste-regulation set stricter rules. So the challenge will be follow after the end of the bin2bean-project anyway.

LL EGALEO

WHO	
Who should lead the activity?	The City Council and some specific Departments (Waste Management Department, Green Spaces Department)
Who should be involved?	Local authorities, schools and teaching staff, compost testing labs
WHAT	
Short description of the activity	The city should invite all schools from all school levels to engage in school composting. Those schools who either have their own composting device or that have obtained a composting device from the Municipality can join the activity.
Purpose/Goal	To raise awareness in school teachers, students and their families on how to collect biowaste at home and/or school and use the composting device to produce good quality compost. To obtain good quality compost from schools. To test the compost in the lab to check for contamination or impurities.
Inputs needed to prepare the activity	Define schools that will eventually be involved, make sure the composting device has some key requirements, monitoring of the process at least twice per month since there needs to be a team of people per school to mix up the content,
Main steps	1. Find a company that can provide the Municipality with composting devices. 2. Offer the composting devices to schools that interested in joining the procedure.

	3. Make sure the device is correctly established in the schools (open and shaded space, kept away from animals if it is in a yard as much as possible, set up on the soil since underneath there is a plastic net to hinder animals and rats from entering). 4. Identify some key school staff that will be in charge and responsible for the content of the device. 5. Identify some people to mix and monitor during the summer months (depending on the climate and the country, Greece is too hot for compost to be able to survive during the summer months). 6. Spend 3-4 months monitoring the content and throwing also the correct analogy of green waste. 7. Send the compost to the adequate lab to test for its quality. 8. OPTIONAL: have schools engage in a competition for the best composting product and have them rewarded by the Municipality.
Outputs of the activity	Awareness of the school community (school teaching staff, students and their families) in terms of BW recycling and management at home/school level. Educate the school community on BW. Testing of the compost. Use of compost in school garden soils.
WHEN	
When should the activity be implemented?	Any time, avoiding summer months if too hot and too dry.
How much time should be planned to do this activity?	Three to four months to be able to have a good amount of compost.
Timeline	Depending on when the project starts. For Egaleo M18 and on was ideal.
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	In person because there is no other way of engaging in this activity. On site (school yards and gardens)
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Your feedback on experience or from people participating</i>	Some more educational seminars should be delivered to the school teachers and students before they engage in this activity. We offered one per school. Students were thrilled to know about the BW recycling procedure and how much the compost can offer to the soil. All students whose school agreed to work the composting device had excellent motivation even if the compost product was not the best every time. The message was delivered and the younger people have already started being familiarized with BW recycling.

WHO	
Who should lead the activity?	City/Municipal Waste Management (WM) dept., in collaboration with a research institution (e.g. university) to design and analyze the discrete choice experiment.
Who should be involved?	Citizens (residents of the target region), a market research/survey panel provider to administer the survey, City WM dept., researchers to design the DCE and information treatments.
WHAT	
Short description of the activity	An online discrete choice experiment (DCE) survey administered to residents, testing preferences for different biowaste collection system designs. Depending on local context, the DCE can vary either the type of collection system, monthly cost, end-use of the biowaste, the location of collection points, access to information, and feedback on biowaste quality. The survey also captures current biowaste sorting behavior and socio-demographics.
Purpose/Goal	To identify which biowaste collection system attributes residents prefer in order to design biowaste collection systems that increase resident uptake and correct sorting behavior.
Inputs needed to prepare the activity	Previous citizen studies (if any), current biowaste collection challenges and infrastructure options in the target region, a defined set of realistic collection-system attributes and levels to test (informed by local policy options and feasibility)
Main steps	• Define the local context-specific attributes and levels for the DCE based on what is realistically implementable in the target region • Design the survey • Pilot test the survey for clarity and length • Distribute the survey via an online panel provider or through local recruitment channels • Analyze results using discrete choice modelling (e.g. mixed logit) to estimate preference weights for each attribute
Outputs of the activity	Quantified resident preferences for collection system design attributes
WHEN	
When should the activity be implemented?	At the beginning of the Plan phase, once local collection-system alternatives and cost ranges have been identified
How much time should be planned to do this activity?	Survey completion time for participants is approximately 10 minutes. Preparation typically requires several weeks; fielding through a panel provider to reach an adequately powered sample typically takes 2–4 weeks; analysis (choice modelling) requires specialized statistical expertise and typically several weeks additional.
Timeline	• Attribute/scenario design: 4–6h (defining collection systems, cost levels, locations) • Survey translation and adjustment: 3–4h • Piloting: 3–4h to test and refine before full launch • Fielding via own network or panel provider: depends on whether you already have access to a panel; if not 5–8h to set up. Then 2–4 weeks for data collection • Choice modelling and analysis: 15–20h (requires discrete choice/mixed logit expertise)
WHERE	

Where should the activity take place? (e.g. online, in person, on site)	Online
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from Living Labs or people participating</i>	- Novel systems like the kitchen sink grinder were hard to evaluate, since most residents had never encountered one — it's unclear whether low preference reflects genuine dislike or general aversion to unfamiliar technology - Cost is a tricky attribute: residents usually have no real sense of what they currently pay for waste collection, since it's bundled into general municipal taxes. Making cost explicit and salient in the experiment may inflate its apparent importance relative to how much it actually drives real-world decisions
<i>Feedback on experience from partners leading the activity</i>	- Overall, the DCE gives good indications of what residents want from an "ideal" collection system and which features matter most to them in principle - In an online survey format, there's no way to confirm whether participants actually understood the written description of a new collection system before making their choice

QA/QC PROTOCOLS FOR COLLECTION AND COMPOSTING / FERMENTATION OF BIO-WASTE

WHO	
Who should be the "lead" when using the result?	A biowaste treatment plant operator, municipality or other organisation responsible for composting or anaerobic digestion; quality manager or environmental authority.
Who should be involved?	- Plant manager / quality manager - Process operators - Waste collection operators - Sampling personnel - Accredited analytical laboratories
WHAT	
Short description of the result	A practical quality management guideline describing how to control quality throughout the entire biowaste treatment chain, from waste reception and process monitoring to sampling, laboratory analyses and quality assessment of compost and digestate.
Purpose/Goal	- Ensure production of safe and high-quality compost and digestate - Improve process monitoring and traceability - Support compliance with EU and national legislation - Minimise contamination and process failures - Increase confidence in recycled biowaste products
Inputs needed to use the result	- Description of the treatment process - Quality management responsibilities - Sampling plan - Laboratory for analyses - Process monitoring data (temperature, moisture, pH etc.) - Applicable legislation and standards - Documentation and record keeping system
Main steps of the result	- Inspect incoming biowaste and reject unsuitable loads - Remove impurities during pre-treatment - Monitor composting or digestion process parameters

	4. Apply hygiene and occupational safety measures 5. Prepare and implement a sampling plan 6. Collect and analyse representative samples 7. Evaluate compost/digestate quality 8. Document results and implement corrective actions where necessary 9. Continuously improve the quality management system
Outputs of using this result	• Consistent QA/QC procedures • Improved product quality • Better process control • Traceable documentation • Compliance with regulations • Safer compost and digestate products • Increased confidence among regulators and end-users
WHEN	
When should the result be used?	• During planning of composting or anaerobic digestion facilities • During routine operation • During internal quality audits • Before placing compost or digestate on the market • Whenever process changes are introduced
How much time should be planned to use this result?	• Initial implementation: approximately 1–3 months • Staff training: several days • Routine implementation: continuous during operation • Sampling and quality evaluation: according to the sampling plan
Timeline	The guideline supports continuous quality management throughout the entire biowaste treatment process
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	• Composting plants • Anaerobic digestion facilities • Biowaste reception areas • Sampling locations • Accredited laboratories • Offices where quality documentation is maintained The guidance is intended for on-site implementation, supported by laboratory analyses and documentation systems.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from LLs or people participating</i>	Living Labs highlighted the need for clearer practical examples and process-specific QA/QC checklists.
<i>Feedback on experience from partners leading the activity</i>	More quantitative acceptance criteria and recommended monitoring frequencies could improve harmonisation. Additional case studies from different European treatment plants would support implementation.

CCPS (CRITICAL CONTROL POINTS) GUIDELINE:

Harmonised and complete guideline, adjustable to each local context, on the creation of a tailored decision tree, the identification of CCPs and the specification of Critical Limits

WHO	
Who should be the "lead" when using the result?	A composting or anaerobic digestion plant operator, municipality, or organisation responsible for producing soil improvers, supported by a quality manager or environmental authority.
Who should be involved?	• Plant manager • Quality manager • Process operators • Environmental and competent authorities • Accredited laboratories • Waste collection operators • Technical experts responsible for process monitoring
WHAT	
Short description of the result	A practical guideline and Decision Tree for identifying Critical Control Points (CCPs) and Control Points (CPs) throughout the biowaste treatment chain. The approach supports risk-based quality management by helping operators identify hazards, establish monitoring procedures, define critical limits and implement corrective actions.
Purpose/Goal	• Support systematic identification of CCPs and CPs • Improve process safety and product quality • Harmonise risk management practices • Support compliance with EU and national legislation • Improve traceability and documentation • Increase confidence in recycled soil improvers
Inputs needed to use the result	• Description of the production process • Process flow diagram • Hazard identification • Existing monitoring data • Applicable legislation and quality standards • Documentation procedures • Personnel familiar with the production process
Main steps of the result	1. Describe the production process 2. Identify biological, chemical and physical hazards 3. Evaluate hazards at each process stage 4. Apply the Decision Tree to distinguish CCPs from CPs 5. Define monitoring procedures and critical limits 6. Establish corrective actions 7. Document monitoring results and deviations 8. Verify the effectiveness of the CCP system 9. Review and continuously improve the system
Outputs of using this result	• Clearly identified CCPs and CPs • Improved risk management • Better process control • Improved traceability • Harmonised monitoring practices • Higher product safety and quality • Support for regulatory compliance
Links to more information	Strategy to identify Critical Control Points (CCP) to monitor throughout the value chain

WHEN	
When should the result be used?	• When establishing a new composting or anaerobic digestion process • During implementation of a quality management system • During process reviews and internal audits • When introducing new feedstocks or technologies • When updating quality assurance procedures
How much time should be planned to use this result?	• Initial hazard assessment: 1–2 weeks • Identification of CCPs: several days • Development of monitoring procedures: 1–2 weeks • Staff training: several days • Continuous implementation during routine operation
Timeline	The guideline supports continuous risk management throughout the production process and should be reviewed whenever significant process changes occur.
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	• Composting plants • Anaerobic digestion facilities • Biowaste reception and pre-treatment areas • Quality management offices • Laboratories • Production sites where soil improvers are manufactured
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from Living Labs or people participating</i>	The Decision Tree was considered easy to use. Participants highlighted the importance of managing the quality of incoming biowaste, particularly during collection, sorting and reception. Participants requested clearer guidance on corrective actions, deviation management, monitoring practices and documentation.
<i>Feedback on experience from partners leading the activity</i>	Future versions could include process-specific Decision Trees for composting and anaerobic digestion separately. Additional examples of critical limits and monitoring frequencies would improve harmonisation. Digital documentation tools and example CCP records would facilitate practical implementation.

TESTING METHODS FOR SOIL IMPROVERS (SAFETY AND QUALITY)

WHO	
Who should be the “lead” when using the result?	Analytical laboratories, research organisations, and quality control bodies assessing composts and other organic soil improvers.
Who should be involved?	• Laboratories performing SI/compost quality and safety analyses • Compost producers • Researchers • Authorities or certification bodies, where relevant
WHAT	

Short description of the result	The Oxygen Uptake Rate (OUR) method is used to assess the biological stability of compost by measuring microbial oxygen consumption under controlled laboratory conditions. The method supports quality assurance and can be used to demonstrate compliance with stability requirements applicable to organic soil improvers.
Purpose/Goal	- Assess the biological stability of compost - Demonstrate compliance with regulatory stability requirements for organic soil improvers. - Support quality assurance and product certification. - Provide reliable laboratory data for placing products on the market. - Monitor composting and treatment processes
Inputs needed to use the result	- Representative compost sample - Laboratory equipment for respirometric measurements - Controlled incubation conditions - Trained laboratory personnel - A defined protocol for data processing and interpretation
Main steps of the result	- Collect and prepare a representative sample. - Incubate the sample under controlled laboratory conditions. - Measure oxygen consumption over a defined period. - Calculate the Oxygen Uptake Rate. - Interpret the results as an indicator of biological stability.
Outputs of using this result	- Oxygen Uptake Rate (OUR) value. - Assessment of biological stability. - Evidence supporting compliance with applicable regulatory requirements. - Data for quality control and product documentation.
Links to more information	Bin2Bean report – Testing methods Analyses of biowaste compost quality parameters - Interlaboratory comparison - Report Interlaboratory comparison - abstract
WHEN	
When should the result be used?	- During quality control of compost - When assessing compost maturity and biological stability - When monitoring treatment process performance - When evaluating compliance with stability criteria
How much time should be planned to use this result?	Typically about one week, including sample preparation, measurement period, and data evaluation.
Timeline	1-2 days for sample preparation and dry matter determination 4-7 days for incubation (OUR measurement) 1 day for result calculation and reporting
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	The method is intended for use in analytical and research laboratories equipped for biological stability testing of organic materials.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
Feedback on experience from partners leading the activity	Biologically active materials can change during storage and transport, making sample handling an important factor for reliable results. Wider application of the method to different organic materials and increased exchange of experiences between laboratories could support broader uptake and improve comparability of results.

MEASUREMENT OF INDICATORS (PERFORMANCE ON SOIL QUALITY/FUNCTION)

WHO	
Who should lead the activity?	A soil scientist or laboratory specialist responsible for assessing the quality and safety of soil improvers + the City council in charge of comparing the biowaste management systems
Who should be involved?	Biowaste processing operators providing samples, laboratory personnel performing the analyses, and city representatives interested in the performance of the assessed solutions
WHAT	
Short description of the activity	Measurement of agronomic and safety indicators describing the quality and safety of soil improvers produced from biowaste
Purpose/Goal	To generate agronomic and safety indicator values that can be used in the BIN2BEAN scoring system when comparing alternative biowaste management solutions
Inputs needed to prepare the activity	1) Selected indicator set from the " Listing of indicators " activity. 2) Samples of soil improvers (e.g. compost). 3) Relevant laboratory protocols and analytical methods 4) Access to laboratory facilities and qualified personnel
Main steps	1) Develop a sampling plan and collect representative samples of soil improvers. Exchange the plan with the sample providers 2) Conduct laboratory analyses according to defined, relevant methods. 3) Measure or calculate relevant agronomic indicators, such as potential nitrogen mineralisation, stability, phosphorus content, organic matter content. 4) Measure relevant safety indicators, such as: content of impurities (e.g. plastics, metals and glass), presence or absence of <i>Salmonella</i> spp. 5) Compile the indicator values use them in the scoring system
Outputs of the activity	Measured agronomic and safety indicator values for the assessed solutions, ready for use in the BIN2BEAN scoring system
Links to more information	Indicator definitions, measurement approaches and value ranges are described in the BIN2BEAN Scoring System Deliverable which will be publicly available after completion of the project (early 2027)
WHEN	
When should the activity be implemented?	Before implementation of the scoring system and decision-support activities, Year 2 and Year 3 of the project
How much time should be planned to do this activity?	Typically 2-8 weeks, depending on laboratory capacity and the number of measurements to be performed, provided that sampling plan is ready and laboratories are available. The measurements by the lab typically take a month to come in.
Timeline	Experience shows that the vast majority of time is used for laboratory analyses (provided that laboratories are available). In Bin2Bean it took 1,5 year.
WHERE	

Where should the activity take place? (e.g. online, in person, on site)	Primarily at laboratory facilities and at the biowaste management site (to collect the samples)
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
Feedback on experience from Living Labs or people participating	LL1: - More clarity on the methodology used for the measurements - Only one sample is not representative LL2: The results were useful to give confidence that the newly establish biowaste management solution through the school produces a decent product already at the firsts iterations.
Feedback on experience from partners leading the activity	The comparison of different soil improvers is most useful to characterize different biowaste management solutions only if the soil improvers differ substantially in their processing (e.g. digestate versus compost). Rely more where possible on measurements given in the label by the producers of the product

SCREENING LCA

WHO	
Who should lead the activity?	An LCA practitioner or environmental assessment expert with experience in LCA applied to waste management systems and/or biobased products
Who should be involved?	City representatives providing primary data, biowaste processing operators who may share the data, and LCA practitioners responsible for LCA modelling and interpretation
WHAT	
Short description of the activity	A screening-level LCA comparing the environmental performance of identified solutions. The assessment focuses on the environmental indicators selected through the BIN2BEAN scoring system (see List of indicators), notably climate change and terrestrial species biodiversity.
Purpose/Goal	To quantify and compare the environmental impacts of selected solutions and provide environmental indicator values for use in the scoring system
Inputs needed to prepare the activity	1) Definition of baseline and alternative biowaste management solutions to be assessed and compared 2) Data on collection, transportation, processing and application of biowaste-derived products. 3) Data on energy use and relevant emissions 4) Access to life cycle inventory databases (such as ecoinvent) and LCA modelling software (e.g. SimaPro, LCA for experts, or Brightway)
Main steps	1) Define the goal, scope and functional unit of the assessment. Consult with the city to ensure that the goal and scope are consistent with expectations. Clarify all doubts early. 2) Define system boundaries for the baseline system and the alternative solutions to be compared. 3) Collect primary data from local stakeholders (e.g. waste processing companies) and supplement missing information with literature or database values. 4) Build life cycle inventories for the baseline each compared solution.

	5) Calculate environmental impacts for climate change and terrestrial biodiversity using selected life cycle impact assessment methods at midpoint and damage levels (e.g. ReCiPe 2016 or LC-Impact). Present first iteration results to the city representatives to give opportunity to ask questions and explain. 6) Calculate environmental impacts for subsequent LCA iterations 7) Extract the environmental indicator values selected during the "Listing of indicators" activity and use them to populate the scoring system
Outputs of the activity	Environmental indicator values (climate change and terrestrial species biodiversity) for the baseline and each assessed solution, ready for use in the scoring system
Links to more information	Example illustrative report of the BIN2BEAN Screening LCA, applied to solutions in Amsterdam, will be publicly available through project deliverables after completion of the project
WHEN	
When should the activity be implemented?	After the biowaste management solutions have been defined and after the required system data have been collected, but before implementation of the scoring system and decision-support activities
How much time should be planned to do this activity?	Typically 1-3 months, depending on data availability and number of solutions
Timeline	LCA is by nature an iterative process making it not so easy to indicate timeline. Experience shows, however, that more time is spent on data acquisition than on actual system modelling (provide that the activity is carried out by an LCA practitioner with some experience).
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Primarily office-based using LCA software and databases, supported by online meetings with city representatives providing the primary data.

IMPLEMENTATION OF THE SCORING SYSTEM

WHO	
Who should be the "lead" when using the result?	Strictly speaking, the city. However, this could be an actor responsible for evaluating urban biowaste management solutions, such as someone from the city's waste management department, or external project coordinator working for the city
Who should be involved?	City representatives and other stakeholders with knowledge of the local biowaste management system (e.g. waste operators) should be involved. Use of the scoring system also requires soil experts, economic and LCA experts to be involved, most likely external
WHAT	
Short description of the result	A scoring and ranking framework for assessing and comparing biowaste management solutions, taking into account agronomic performance, safety, environmental performance, circularity, and socio-economic performance
Purpose/Goal	To support decisions by identifying which biowaste management solutions perform best under the priorities and conditions of a specific city or region

Inputs needed to use the result	1) Description of the local biowaste management system 2) Description of the solution(s) to be assessed 3) Selected indicator set and associated weights (obtained from the "Listing of indicators" activity) 4) Measured or computed indicator values or each assessed solution
Main steps of the result	1) Compile measured and calculated indicator values generated in the other assessment activities (i.e., indicator measurements and Screening LCA) 2) Enter indicator values into the scoring system. 3) Run the scoring and ranking procedure. 4) Review and discuss results with relevant stakeholders. 5) Provide recommendations as basis for decision-support in the city
Outputs of using this result	Assessed and ranked list of biowaste management solutions for each of the indicator and aggregated results considering weights of each of the indicators
Links to more information	The scoring system methodology will be publicly available through the BIN2BEAN Scoring System Deliverable after completion of the project (expected early 2027)
WHEN	
When should the result be used?	Before making decisions regarding implementation of solutions
How much time should be planned to use this result?	Typically 1–3 working days once indicator values are available
Timeline	This is an iterative process.
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	The scoring analysis itself can be conducted off-line while interpretation of results is preferably performed in dedicated meetings within the involved city.

TECHNO-ECONOMIC ASSESSMENT (TEA) (UPSCALING FEASIBILITY AND ECONOMIC PROFIT)

WHO	
Who should lead the activity?	A team or individual with expertise in economic analysis, and the agricultural/waste management sectors (e.g. data analyst, process engineer, economist).
Who should be involved?	City administration staff; local or regional bio-waste operators and composting/anaerobic digestion facilities; regional or national environmental agencies
WHAT	
Short description of the activity	An economic analysis assessing the long-term financial viability of organic waste management solutions. The study models financial performance over several years, across multiple operational scenarios, utilizing sensitivity analyses to evaluate the impact of key variables.

Purpose/Goal	To find out if these waste projects are financially viable and if they can survive in the real world. The goal is to see how changes in key variables, like waste amounts or growth, affect the budget, helping in the choice of the safest and most profitable options.
Inputs needed to prepare the activity	- Data on waste quantities and type of processing and yield - Data on variable and fixed costs - Data on city taxes/fee - Data on revenues (if any)
Main steps	- Compilation of the cost matrix - Data refining and check (if needed) - Automated calculation of the financial values: Net Present Value (NPV), Benefit-Cost Ratio (BCR), and Internal Rate of Return (IRR) - Analysis of the results - Data-grounded decision making and investment decisions
Outputs of the activity	A data-driven decision on the economical sustainability of a proposed solution
Links to more information	• Guide to cost matrix template • Cost matrix template • Calculation template • Guideline for cost-benefit analysis
WHEN	
When should the activity be implemented?	After gathering field data and after the Preliminary Market Analyses, but before the business plan and before taking any investment decisions. Ideally, it should run in parallel with the Business Models.
How much time should be planned to do this activity?	The time required depends on data availability but overall consider at least 2-4 months for the activity to allow enough time for data validation and reiteration, if needed.
Timeline	- Compilation of the cost matrix: 2-6 weeks, depending on availability. - Data check: 1 week - Automated calculation: few minutes - Analysis of the results: 1 week - Decision makings: it can take even few weeks, since the taken decision can potentially influence the overall strategy of implementation
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Entirely desk-based (online research and document review). No in-person fieldwork is required.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from Living Labs or people participating</i>	Maintaining an open channel with LLs at the start is crucial because data gaps will delay the entire project. While we can pivot to assumptions, if necessary, it is far from ideal since this initial data defines the baseline and shapes the outcome value for each LL.
<i>Feedback on experience from partners leading the activity</i>	Future teams should avoid ambiguous scoping by setting firm system boundaries early, and ensure success by relying strictly on authentic, on-site data.

WHO	
Who should lead the activity?	A team or individual with expertise in market data research and business modelling, familiar with the agricultural and waste-management sectors.
Who should be involved?	(1) City administration (e.g. waste management dept); (2) local or regional biowaste operators, including those responsible for collection logistics; (3) potential end-users of soil improvers; (4) regional or national environmental and statistical agencies, in particular for population, housing and waste-generation data.
WHAT	
Short description of the activity	A deepening of the preliminary market analysis into a detailed assessment. Building on the market context already established (e.g. PESTEL, SWOT), it characterises the specific area to be served (e.g. number of citizens and households, housing typology and population density) estimates the volume of bio-waste that can realistically be collected, and compares collection models (door-to-door vs bring-point) and their effect on citizen participation and cost, in order to produce the evidence base for the business plans.
Purpose/Goal	To translate the market context established in the preliminary phase into concrete, quantitative inputs needed to build the business models and business plans for the selected solutions. It feeds into and complements the “Business Model Canvas” and business-plan step of the PDCA process, providing the demand- and supply-side figures on which the business case rests.
Inputs needed to prepare the activity	(1) The preliminary market analysis and the shortlist of solutions retained for business planning; (2) local population and housing data (number of inhabitants, number and type of households, density), from the city or statistical office; (3) local bio-waste generation and collection data (per-capita generation, collection model, participating households, captured tonnage); (4) where local data are missing, access to benchmarks from comparable municipalities; (5) access to the relevant regulatory framework.
Main steps	1 – Start from the preliminary market analysis: take the shortlisted solutions and the market context (PESTEL, SWOT) as the basis and define the specific area to be served by each solution. 2 – Characterise the demand and the area: collect the number of citizens and households, the housing typology (single-family houses, low-rise buildings, high-rise apartment blocks) and the population density of the target area. 3 – Estimate the bio-waste supply: combine population, average per-capita generation and capture rate to estimate the volume of bio-waste that can realistically be separated and collected. 4 – Compare the collection models: assess door-to-door versus bring-point collection along convenience for the citizen, operational cost, and fit with the local housing typology. 5 – Feed the results into the business models and business plans: use the demand, the captured volumes and the chosen collection model to inform the Business Model Canvas and the business plan (value proposition, revenue streams, key activities and resources, cost structure).
Outputs of the activity	An initiative-oriented market analysis feeding the business models and business plans, covering: (1) a quantitative characterisation of the area served (citizens, households, housing typology, density); (2) an estimate of the bio-waste supply and capture potential; (3) a comparison of collection models and their convenience/cost trade-offs; (4) the demand- and supply-side inputs required by the Business Model Canvas and the

	business plan; (5) conclusions on the most viable solutions and collection models for each area.
Links to more information	Guide to full market analysis
WHEN	
When should the activity be implemented?	After the preliminary market analysis and in the run-up to business-plan development; in parallel with, and feeding, the “Business Model Canvas” and “Business Plan” step.
How much time should be planned to do this activity?	Approximately 2 months
Timeline	Month 1-2: Definition of the areas to be served and collection of population, housing and bio-waste data, building on the preliminary analysis; demand and area characterisation, bio-waste supply and capture modelling, and comparison of collection models. Month 2: Integration of the results into the business models and business plans, and drafting.
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Mainly desk-based (analysis of local population, housing, waste and cost data). Coordination with waste operators and city departments is needed to obtain and validate local data; this can be done remotely via short interviews, video calls or emails.

BUSINESS MODEL CANVAS

WHO	
Who should be the “lead” when using the result?	Municipality and its financial team when available
Who should be involved?	Municipal policymakers and urban planners; waste management operators; local businesses and catering sector (as biowaste generators); downstream facilities operators; innovation/exploitation support teams; representatives of citizen or community groups.
WHAT	
Short description of the result	A new Sustainable Business Model Canvas (BMCs) supporting the design and assessment of multiple biowaste management scenarios across municipalities. The BMC maps value proposition, stakeholders, cost structure, and revenue/benefit streams for a specific biowaste valorisation model. The model extends the value proposition and explicitly incorporates elements such as the resource loop and the social loop, allowing a clear representation of both circular material flows and shared value creation for communities.
Purpose/Goal	To provide any city or waste authority with a structured, evidence-based framework for evaluating and designing sustainable biowaste management business models with soil health in mind as final output. The Sustainable BMCs help decision-makers understand which valorisation scenario best fits their local context, identify key partners and cost drivers, and properly communicate the model to stakeholders and funders through a model that consider economic performance together with environmental and social impacts. Integrating the three dimensions of sustainability within a single framework, the proposed models aim at overcoming the traditional focus on profit alone.

Inputs needed to use the result	Local biowaste generation data (tonnes/year by stream); existing waste collection infrastructure and contracts; applicable national/EU regulatory framework; local landfill or incineration gate fees; capital and operational cost estimates for treatment technologies; knowledge of local stakeholders; data on environmental impacts of the value chain; population served and PAYT fees.
Main steps of the result	1. Context mapping: characterise the local biowaste streams, regulatory obligations, and existing infrastructure. 2. Scenario selection: choose the valorisation model(s) most suited to local conditions. 3. Stakeholder mapping: identify key partners, customers, and beneficiaries for each scenario. 4. Canvas population: fill in all the BMC blocks of the BIN2BEAN Sustainable Business Model Canvas according to the methodological note (see below). 5. Economic assessment: attach preliminary cost and revenue figures to the cost structure and revenue blocks, using local data and project benchmarks. 6. Review and validation. 7. Documentation: produce the final BMC slide/report for communication and exploitation.
Outputs of using this result	One or more completed BMC slides/documents per scenario, including: a visual canvas with all blocks populated; a preliminary cost and revenue overview (annual figures); a stakeholder map; and a narrative explanation.
Links to more information	Guide to Business Model Canvas
WHEN	
When should the result be used?	When a city or waste authority needs to consolidate a biowaste valorisation solution into a structured business model for replication or scale-up or when evaluating alternative or complementary valorisation pathways for future investments. It should be used after collecting preliminary economic, environmental and social data on the system and before developing a full Business Plan.
How much time should be planned to use this result?	Business Model design takes approximately up to 6 months; the initiative described in the Business Model is set to be implemented within a 1-3 years timeframe
Timeline	M1-2: preliminary activities and mapping work M3-5: canvas population; economic assessment M6: review, validation and documentation
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	Primarily in-person, within the target city or municipality. Remote/online collaboration is feasible for the analytical and drafting phases.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from partners leading the activity</i>	It is important to involve external actors with financial and operational data as early as possible in the activity, including waste treatment facility operators, municipal finance officers, and where relevant, private investors or grant managers. Waiting until the canvas is fully populated before seeking economic data significantly delays the process and often requires going back to revise earlier steps. Indeed, it has been noted that local cost and revenue data were often unavailable, fragmented, or held by different actors, making early coordination across these stakeholders essential.

	Finally, for cities working across multiple scenarios, a comparative summary table across BMCs may be a strategic tool to support decision-making.
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TEST OF BUSINESS MODELS OBTAINED

WHO	
Who should lead the activity?	The Innovation Manager or project coordinator of the municipality or waste authority.
Who should be involved?	Local entrepreneurs; waste management operators; municipal officers; sectoral experts.
WHAT	
Short description of the activity	An evaluation of the business models developed to assess their viability, attractiveness, and scalability. Each model is tested against market feedback, regulatory conditions, and financial projections, producing a set of validated (or revised) models ready for the business planning phase.
Purpose/Goal	To verify whether the business models developed are technically feasible, economically viable, and attractive under the specific conditions of the city. In case multiple business models have been drafted, this step also support selection of the most market-ready and feasible business model.
Inputs needed to prepare the activity	Completed <i>Sustainable Business Model Canvases</i> for each scenario; preliminary market and feasibility data; a testing protocol or evaluation grid (criteria, scoring, weighting); optional access to local entrepreneurs and Living Lab participants willing to give structured feedback; and preliminary financial projections or TEA results to ground the economic assumptions.
Main steps	1. Define the testing protocol: agree on evaluation criteria and the method for collecting feedback (interviews, workshops, scoring grids; modify/improve the provided template (see below) based on your specific needs. 2. Recruit testers. It is recommended to involve both economic experts and investors as well as local entrepreneurs and stakeholders 3. Present business models: share each model in a clear, accessible format. 4. Collect and structure feedback through an online questionnaire or interviews with the testers/experts. 5. Analyse results and discuss them with relevant stakeholders within the municipality. 5. Document: produce report summarising results
Outputs of the activity	A testing report including: scored evaluation of each business model against agreed criteria belonging to three different macro categories (1) Technical, Operational and Economic Feasibility; 2) Social Impact; 3) Environmental Impact), allowing for efficient comparing; a synthesis of qualitative feedback and a ranked shortlist of models recommended for progression to the business plan phase.
Links to more information	Questionnaire to test business models
WHEN	

When should the activity be implemented?	After the <i>Business Model Canvas</i> phase and before starting the <i>Business Plan</i> phase.
How much time should be planned to do this activity?	2 weeks – 2 months, based on the length of the recruiting step
Timeline	Week 1: define the testing protocol and start recruiting testers. Note: recruiting is the most time-consuming step and should start as early as possible, ideally in parallel with the final stages of the BMC phase. Week 2-5: complete the recruiting step if not done already. Recruiters may need to sign an NDA since financial data, although aggregate and preliminary, are shared with the business models. Week 6-7: present business models to testers and collect feedback Week 8: analyse and consolidate results
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Primarily online; collective feedback sessions may be organised
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from partners leading the activity</i>	Recruit testers early and in parallel with the business model drafting phase, rather than waiting until the canvases are finalised as this is the step that can take the most time. Additionally, engaging economic experts, investors and local entrepreneurs from the start allows the testing criteria to be shaped around their perspective. Note that testers may need to sign a Non-Disclosure Agreement before accessing the business models, since financial data, although aggregate and preliminary, are shared as part of the testing material. Plan for this step in advance as it can add time to the recruiting phase.

DEFINITION OF A BUSINESS PLAN PER SOLUTION

WHO	
Who should lead the activity?	The Innovation Manager or project coordinator of the municipality or waste authority
Who should be involved?	Potential biowaste valorisation businesses; waste management operators as key partners; sectoral experts who can validate technical and market assumptions embedded in the plan; citizenship interested by the model
WHAT	
Short description of the activity	A structured business plan developed for each biowaste valorisation solution identified. The business plan translates the validated Business Model Canvas into a detailed operational and financial document, covering value proposition, market analysis, operating model, financial projections, investment needs, and risk assessment.
Purpose/Goal	To provide cities with a rigorous, actionable roadmap for implementing a biowaste valorisation business or service. The business plan serves as the primary tool for securing investment, engaging partners, and guiding implementation. It also functions as the final exploitation output of the BIN2BEAN process, demonstrating that the models developed are not just conceptually sound but operationally feasible.

Inputs needed to prepare the activity	A validated Business Model Canvas; market analysis data (quantitative data on biowaste volumes, customer segments, pricing, competition); preliminary or full TEA results; the results of the Business Model testing activity; regulatory baseline for the city; financial modelling tools. It is possible also to include socio-economic data when available to have a more comprehensive assessment and overview of the impact of the model (in line with the extended Sustainable Business Model Canva)
Main steps	1. Select the BM: confirm which validated business model will be developed into a full business plan by combining the results of the <i>Test of business models obtained</i> with the specific needs of the municipality and the involved actors. 2. Deepen the market analysis: collect or refine data on target customer segments, market size, competitive landscape, and pricing (<i>Survey Market Study</i>). 3. Define the operational model: specify the value chain, production/service delivery process, required infrastructure, staffing, and key partnerships. 4. Build the financial model: develop multi-year financial projections (revenue, costs, cash flow, break-even); include sensitivity analysis on key variables. Collaboration and alignment with the <i>TEA</i> work is recommended. 5. Assess investment needs and financing options: quantify CAPEX and OPEX, identify funding sources (public grants, private equity, bank loans, blended finance). 6. Map risks and mitigation measures: regulatory, market, operational, and financial risks. 7. Draft and review: produce the full business plan document and submit to internal review. 8. Finalise and present: incorporate feedback and produce the final version for exploitation and dissemination.
Outputs of the activity	A complete business plan document per solution.
WHEN	
When should the activity be implemented?	After the business model testing and validation phase, once a shortlist of prioritised models has been agreed. The business plan should be developed before any public launch, and before the end of the PCDA approach.
How much time should be planned to do this activity?	Business Plan design takes approximately up to 6 months; the initiative described in the Business Plan is set to be implemented within a 1-3 years timeframe
Timeline	M1: confirm the selected business model; define the structure and scope of the work M2-3: complete the market analysis; define the operational model; build the financial model M4: Assess investment needs; M5: draft the plan M6: incorporate feedback and produce the definitive version
WHERE	
Where should the activity take place? (e.g. online, in person, on site)	Primarily in-person, within the target city or municipality. Remote/online collaboration is feasible for the analytical and drafting phases.
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
Feedback on experience from partners leading the activity	The business plan should not be developed in close coordination with other steps within the PCDA approach. In particular, the TEA provides the quantitative backbone for the financial model (cost structure, energy balances, process efficiencies), and misalignments between the two documents are difficult to correct at a late stage. Ideally, the teams

	responsible for the business plan and the TEA should share a common data repository from the start. On the content side, it is recommended to include dedicated chapters on social and environmental impact, structured around the dimensions already mapped in the Sustainable BMC.
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TRAINING GUIDELINES FOR ENTREPRENEURS

WHO	
Who should be the “lead” when using the result?	An organisation with expertise in EU funding, innovation support and the biowaste/circular economy sector, like a research institute, university, business support organisation, or project coordinator. This could be a regional innovation agency, an Enterprise Europe Network hub, or a municipality with a dedicated economic development or circular economy unit.
Who should be involved?	• Entrepreneurs and SMEs active in the biowaste-to-soil improvers value chain • Trainers/facilitators (better with knowledge of EU funding programmes) • Communication/dissemination staff for outreach to target audiences If possible: • National Contact Points (NCPs) or regional funding advisors • Municipality representatives
WHAT	
Short description of the result	A modular training programme for entrepreneurs and SMEs operating in the biowaste valorisation sector. It consists of short online video modules (approximately 5 minutes each) on accessing and applying for EU and national public funding, on awareness raising campaigns and business models, accompanied by downloadable support materials (slide decks, glossaries, checklists, reference links), and a final quiz with certificate. The training can be used as it is or readapted at local level to fit the specific needs of the entrepreneurs.
Purpose/Goal	To give entrepreneurs and SMEs in the biowaste-to-soil improvers value chain the knowledge and practical tools to enhance the market readiness and scalability of biowaste-derived soil solutions through specific transversal topics on innovation management.
Inputs needed to use the result	• The recorded video modules (hosted on the BIN2BEAN platform) • The downloadable support materials for each module (slide decks, glossary, checklists, reference links) • The video scripts • Access to the online platform where the training is hosted, including the final quiz and certificate system
Main steps of the result	• Access the online training platform and share the link with the target audience (entrepreneurs and SMEs in the biowaste-to-soil improvers sector) • If needed, translate the scripts into the local language and add subtitles or dubbed versions to the videos • If needed, update Module 8 (National and Regional Funding) to reflect the local/national funding landscape • Optionally, starting from the material provided, organise dedicated workshops for participants who want hands-on practical experience to detail one or more topics of the training.

	- Optionally, extend the training material based on the needs of your target audience. - Collect participant feedback after the training
Outputs of using this result	- Entrepreneurs and SMEs with improved understanding of EU and national funding mechanisms - Certificates of participation (for those completing the quiz) - A local network of informed actors in the biowaste-to-soil improvers sector - Potential follow-up collaborations or consortia for EU project applications
Links to more information	https://www.bin2bean.eu/training/
WHEN	
When should the result be used?	The online training can be made available at any time and accessed asynchronously by participants on their own schedule. The in-person workshop is best organised after receiving specific feedback and inputs from a group of entrepreneurs that specifically request to learn more on a specific topic.
How much time should be planned to use this result?	Online training: approximately 3 hours of video content per training, plus time to review support materials (estimated 3–5 hours total self-study) In-person workshops: 1–4 hours Setup and adaptation of the training material: 2–4 weeks, depending on degree of localisation required
Timeline	Week 1: review the existing materials and identify any content that needs local adaptation. Weeks 1–2: carry out any necessary adaptations and organise the dissemination to the target audience Week 2 onwards: launch and share access to the online training Optional: organise in-person workshops once participants have had time to complete the online modules
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	Online modules: accessible remotely and asynchronously from any location across Europe, no specific venue required Workshops: best when organised in person.

FARMMAPS - ECOBIN

WHO	
Who should be the “lead” when using the result?	A farmer, farmer’s consultant, biowaste processing facility managers
Who should be involved?	Farmers, consultant,
WHAT	
Short description of the result	The result is a model that predict nitrogen mineralization from different types of organic waste
Purpose/Goal	Evaluate effectiveness of a fertilizer in delivering nutrients to a crop
Inputs needed to use the result	Type of organic amendment (e.g. compost, manure, etc.) and coordinates of the field where this will be applied

Main steps of the result	1. User defines input (amendment type, coordinates of the field) 2. The app runs the Snomin model to predict nitrogen mineralization 3. The user visualizes the trends of product mineralization
Outputs of using this result	The user can better estimate the amount of available nitrogen that come using a certain organic amendment based on the soil and climate of his field
Links to more information	https://www.farmmaps.net/nl/Apps/Apps/EcoBin (for now only in Dutch, will be translated in English)
WHEN	
When should the result be used?	The results should be used after having defined the characteristics of the product delivered by the different biowaste management solutions
How much time should be planned to use this result?	A couple of hours
Timeline	Identify field : 20 minutes Test different products 20 minutes Evaluate the results 20 minutes
WHERE	
Where should the result be used? (e.g. on site (which site?), in person, online, ...)	Online in Farmmaps
HOW WOULD YOU IMPROVE THIS ACTIVITY, COMPARED TO HOW YOU DID IT IN BIN2BEAN?	
<i>Feedback on experience from Living Labs or people participating</i>	LL1: the app is useful however the main concern of the biowaste management facility is increasing the amount of biowaste produced, the quality is already recognized by the users through the German certification system
<i>Feedback on experience from partners leading the activity</i>	The project focused more on the collection of biowaste (the main interest of cities thus it lacked feedback from users (e.g. farmers)).



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