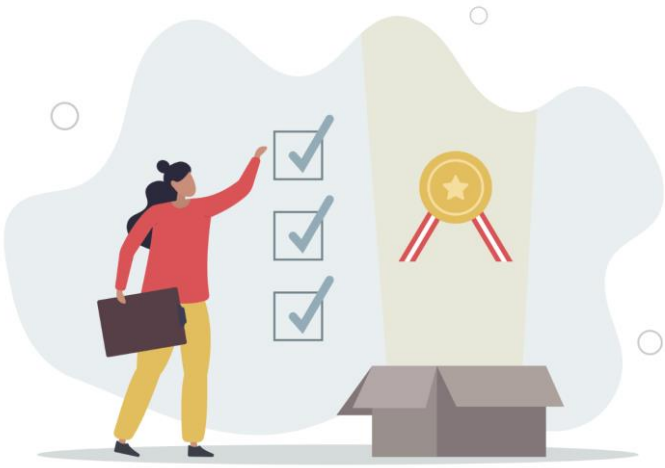
CHECK

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.

Activity Abstract Guidelines



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.

Activity Abstract Strategy to identify CCPs

Activity Abstracts

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	1. Inspect incoming biowaste and reject unsuitable loads 2. Remove impurities during pre-treatment 3. 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?	
Feedback on experience from LLs or people participating	Living Labs highlighted the need for clearer practical examples and process-specific QA/QC checklists.
Feedback on experience from partners leading the activity	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.	• Composting plants • Anaerobic digestion facilities

on site (which site?), in person, online, …)	• 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?	
Feedback on experience from Living Labs or people participating	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.
Feedback on experience from partners leading the activity	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.

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