Training 3: Awareness raising and community engagement

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Objectives of the training

Objective: The objective of this training is to support the work of entrepreneurs and SMEs who are engaged in the value chain from bio-waste to soil improvers with regard to awareness raising for waste and soil issues and how to communicate with potential partners, i.e. private households and municipalities as producers of bio-waste or farmers, and industry. Through short, targeted learning modules, the course focuses on the motivation of waste producers for waste sorting, provides advice on how to deal with impurities in bio-waste, and which target groups are of considerable interest. The legal frame for waste, soil improvers, and fertilizers is also presented because this is an indispensable part of the business.
Target audience: Entrepreneurs and SMEs operating in the bio-waste valorization sector, specifically those producing soil improvers.

Structure of the training

Online training session on theoretical background

- **Title:** Awareness raising and community engagement - a practical guide for entrepreneurs
- 8 short video modules (5 minutes each – 1.5 pages for the script)
- Each video is accompanied by optional downloadable support material (slide deck, glossary, checklist, reference links)
- Designed for asynchronous, pan-European access
- Possibility to do a final quiz to obtain a certificate of participation
- Possibility to add translations in the form of translated scripts.

In-person workshop with questions and answers (optional)

- **Title:** Awareness raising and community engagement – your questions put up for discussion
- **Duration:** 2 hours
- **Plenary discussion** based on questions of the participants submitted some days before

Content of the online training sessions

Module 1 – The value chain – from organic waste to valuables
Objective: Introduce the course and its relevance to the value chain from organic waste to soil improvers and other valuables

- Introduction to the value chain
- Steps of the value chain – who is engaged? What is the outcome?
- How the course is structured and how to use the materials

Support material: Terminology glossary

Module 2 – Legal frame I - introduction to EU regulation
Objective: Provide an overview of most important waste and soil protection directives

- Waste framework directive, landfill directive
- Fertilizer regulation: Definitions of fertilizers and soil improvers, quality requirements
- Soil protection

Support material: Table of relevant European legislation with links

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Module 3 – The (hidden) value of compost
Objective: Understand the role of organic waste and compost for hygiene, soil, and climate

- Waste wisely, keep waste fractions separate from each other!
- Soil is life – how compost supports the functions of soil: traditional and modern forms of use
- The role of organic waste and compost for the climate

Support material: Sources for more scientific information, regulation, status of the political discussion

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Module 4 – Motivations of your clients I
Objective: Understand the thinking of potential clients.

- Recycling behaviour of individuals – theoretical background
- Motivation of private households
- The mind-set of municipal administrators

Support material: Bin2Bean publication "Collection of Organic Waste: Guidelines for Communication and Awareness Raising"

Module 5 – Motivations of your clients II
Objective: Understand the thinking of potential clients.

- Motivation of commercial waste producers
- Motivation of industrial processors of organic waste
- The expectations of farmers: high quality, low price
- Carbon sequestration – a potential business case

Support material: Bin2Bean publication "Collection of Organic Waste: Guidelines for Communication and Awareness Raising"

Module 6 – Enhancing the quantity and quality of compost and other products
Objective: Focus on options for intervention along the value chain.

- Increasing quantity, decreasing quality – the big challenge in organic waste business
- How to ensure good quality in the value chain? View from the product
- How to manage the intervention points?

Support material: QA/QC guidelines from Bin2Bean, links to QA associations, Bin2Bean publication "Collection of Organic Waste: Guidelines for Communication and Awareness Raising"

Module 7 – Technical tools aiming at better quality along the value chain
Objective: Provide a short overview on instruments to ensure quality during collection and processing

- Separation at source: Empirical evidence from "traffic light" campaigns
- Controlling the tipping process: Automated detection of misthrows in bio bins
- Processing of organic waste: Pre- and post-sorting techniques

Support material: List of important associations for the valorisation of bio-waste, environmental agencies

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Module 8 – Legal frame II - EU regulation and national implementation - examples

Objective: Learn about potential problems for your business due to different national implementations

- Example #1: Quality requirements with respect to bio-waste
- Example #2: Prohibition of the application of liquid products from digestion
- Example #3: “Animal by-products” – a potential impediment for certain composting techniques

Support material: ./.

Teaser

When starting your own business, it is important to be well-informed about your product, the market and your clients' needs, as well as the regulatory framework. Ideally, you should understand the entire value chain, including your position within it and the processes and stakeholders upstream and downstream in the process. This is an excellent foundation for a successful future. But what about the value chain for compost? Although everyone has an idea about compost, this is not an easy task. Compost is used as a soil improver, but there are different ways to produce it and influence its properties, allowing you to create a tailor-made product for your customers. The framework for this business, the steps within the chain, and the role of the stakeholders will be explained in eight video clips, each of which is less than 10 minutes long.

Scripts

Module 1 – The value chain – from organic waste to valuables

Hello and welcome to the BIN2BEAN training series, designed especially for entrepreneurs and small businesses working in the biowaste-to-soil improvers value chain.
My name is Sara Daniotti, and together with Dr. Henning Friege, we’ll guide you through this new course focused on awareness raising and community engagement.
In this training, we’ll explore how to communicate effectively with different partners—from private households and municipalities as biowaste producers, to farmers and industry as potential users of your products.
When starting your business, it’s essential to be well-informed not only about your product and the market, but also about your customers’ needs and the regulatory framework.
Ideally, you should have a clear understanding of the entire value chain—where you fit, who the other stakeholders are, and how processes work both upstream and downstream.
This knowledge is a strong foundation for your business success.
Many people have a general idea of what compost is. But when it comes to running a business, it’s not that simple.
Compost is used as a soil improver, but there are different ways to produce it, and many factors influence its quality and properties. The business framework, the steps in the value chain, and the roles of the different stakeholders are more complex than they might first appear.

Although everyone has an idea about compost, this is not an easy task. Compost is used as a soil improver, but there are different ways to produce it and influence its properties.

Let's take a quick look at the process:
Organic waste comes from households and businesses and is collected by many people—most of whom you'll never meet.
This waste goes to specialised facilities, where it's pre-sorted to ensure consistent quality. Operators there create optimal conditions for either anaerobic or aerobic processes, depending on the desired outcome.
But even after composting, the output needs post-processing to become a soil improver that meets market standards and customer needs.
As you can see, there are many different steps, and each involves different stakeholders with their own interests.
This entire sector operates at the delicate interface between waste management and product creation—a space that requires careful coordination and communication.

The aim of this course is to support you as an entrepreneur. You'll learn how to add value to organic waste, identify your place in the value chain, and communicate effectively with other stakeholders.
Throughout the course, we'll cover:

- The value of compost when applied to soil
- How to ensure quality at various stages of the value chain
- The overall structure of the value chain and how it's managed
- The legislative framework and how it influences the valorisation of organic waste
- The different stakeholders involved, from citizens to farmers, and what motivates them

To make the most of this training:

- Watch each video module. They're concise and practical, so you can fit learning into your daily schedule.
- Download the support materials. Slides, glossaries, checklists, and helpful links are all provided to deepen your knowledge.
- Explore translations. Scripts are available in different languages if you prefer to study in your native language.
- Take the final quiz. Completing the quiz will earn you a certificate of participation—a valuable asset for your professional journey.

For this module, we've also prepared a terminology glossary. It explains key terms that you'll encounter during the training. I encourage you to download it and keep it handy as you progress.

Thank you for joining us in this journey! Let's begin.

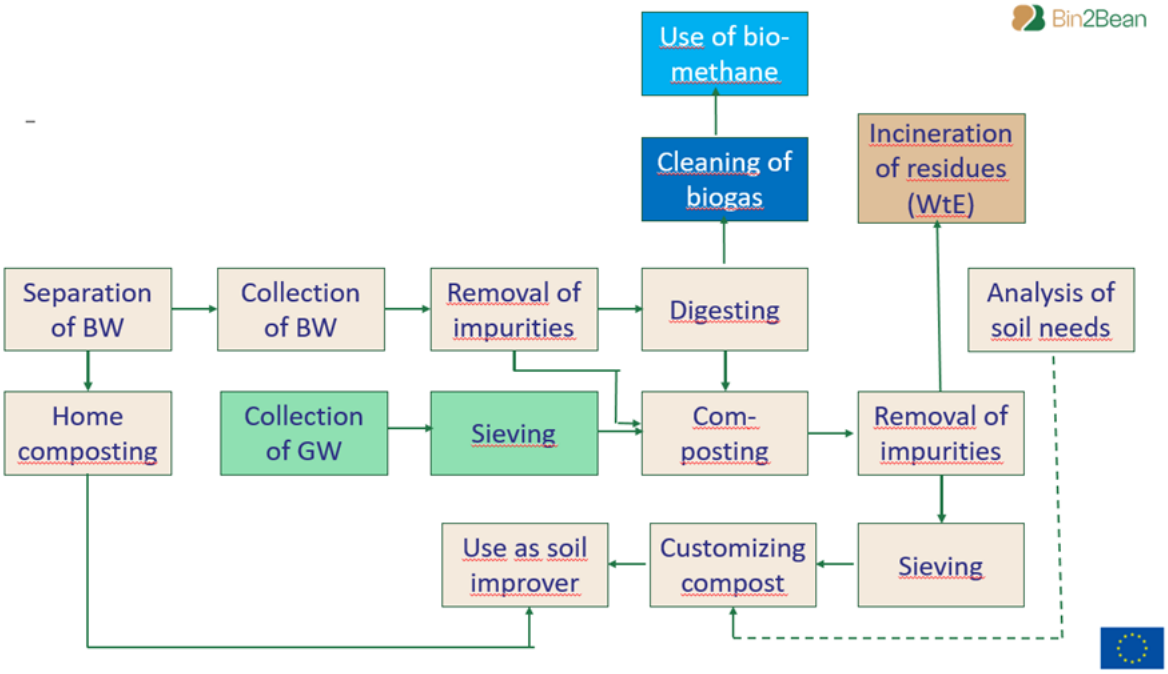


Table 1: Glossary and abbreviations

Animal by-product (APB)	Materials of animal origin that people do not (should not) consume. APB bear the risk of transmitting diseases to humans or animals and are therefore sorted into three risk categories (Ainmal By-product Regulation)
Bio-methane	Methane produced from biogas by cleaning
Bio-waste	Biodegradable garden and park waste, food and kitchen waste from households, offices, restaurants, wholesale, canteens, caterers and retail premises and comparable waste from food processing plants (legal definition according to the European Waste Framework Directive)
Carbon sequestration	Process of capturing and storing carbon dioxide or material which can decompose to carbon dioxide
CRCF	Carbon Removal certification Framework (EU)
Digestion	Anaerobic processing of organic waste
EUSO	European Soil Observatory
Fertilizer	Natural or artificial substance containing chemical elements e.g. Nitrogen, Phosphorus, Potassium that improve growth and productiveness of plants.
Food waste	Waste from all stages of the food chain including production (industry, bakeries etc.), retailers, food markets, restaurants, private households...
Green waste	Garden waste from private or commercial origin including e.g. residues from flowers, hedge-cut, branches, autumn leaves
Humic substance	Major components of the natural organic matter in soil and sediments (synonyms: humic material, humic matter) which consist of complex organic substances with high molecular weight
Hygienisation	All processes leading to germ reduction; in case of bio-waste: heat treatment aiming at the elimination of pathogens

Impurities	Mostly "physical impurities" = non-biodegradable materials (glass, metals, plastics) with a size > 2mm (according to ECN's Quality Manual – see below)
MBT	Mechanical and biological treatment (plant) for mixed waste
Organic matter	Carbon fraction which is analysed in a sample according to EN 15935 or EN 13039 (weight loss on ignition)
Organic waste	In this guide used as a synonym of "bio-waste"; in general, organic waste can also cover non-biodegradable fractions like plastics or waste from refineries
Perceived behavioural control (PBC)	Part of the theory of planned behaviour as a determinant of both behavioural intention and of the behaviour itself
Quality assurance (QA)	In general: Ensuring the quality of products and processes; here: QA of products made from organic waste, see e.g. European Quality Assurance Scheme for Compost and Digestate, 3rd edition (ed.: ECN, 2018) ISBN 978-3-00-047599-3
Quality control (QC)	All measures for checking and monitoring the conformance of a product or intermediate to the required standard
SOC	Soil Organic Content

Module 2: Legal frame (part 1) - introduction to EU regulation

Hello and welcome back to the BIN2BEAN training series on awareness raising and community engagement. In this module, we will explore European legislation along the entire value chain from bio-waste to soil improvers.
To understand it clearly, we need to consider four main types of legislation:

- Waste management
- Legal conditions for operating processing plants
- Requirements for the quality of products made from bio-waste
- And soil protection

Let's start with the first one: **waste management**.

The Waste Framework Directive, or WFD, is the EU's flagship waste regulation. It defines bio-waste as *"biodegradable garden and park waste, food and kitchen waste from households, offices, restaurants, wholesale, canteens, caterers and retail premises, and comparable waste from food processing plants."* In this training, we will focus on bio-waste from households and restaurants. But remember: there are also many other types of biodegradable waste from food production that could be relevant for certain business models. We'll look at some of those in Module 5.

Beyond simply defining bio-waste, EU legislation has clear goals:

- Preventing food waste – covered in the WFD .
- Diverting biodegradable waste from landfills – covered in the Landfill Directive.
- Promoting the utilisation of bio-waste – covered in the WFD.

There are also ambitious targets: by 2035, Member States must take the necessary measures to ensure that no more than 10% of municipal waste by weight can go to landfill. Also, it is important to remember that it is already illegal to landfill separately collected bio-waste. Furthermore, since December 2023, the separate collection and treatment of bio-waste has

been mandatory across the EU. According to Article 22 of WFD, bio-waste that cannot be prevented *(Art. 9 Par. 1 g)* must either be separated and recycled at source or collected separately and not mixed with other waste.
Composting and digestion are encouraged, but with two clear goals:

- Protect the environment at a high level
- Produce high-quality outputs

These materials must be safe to use and should promote the use of products derived from bio-waste waste (*Art. 22, Par. 2, WFD*).
Now, there are some possible **derogations** from separate collection (*cf. Art. 10, Par. 3*), but only if:

- It doesn't lead to the best environmental outcome (letter b)
- It's not technically feasible (letter c)
- Or it would result in disproportionate economic costs (letter d)

The details of how collection is organised, and how waste charges are applied, are left to each Member State.
And there's a strong incentive for separate collection in order to meet EU's recycling targets: organic waste makes up about 35% of municipal waste, while EU targets aims to reach 55% by 2025 and 60% by 2030. Incentives on the national and the municipal are therefore crucial to make this happen!
In some regions in South and Southeast Europe, mechanical and biological treatment of mixed waste is still used, but this produces poor-quality compost full of contaminants which is mostly landfilled or used to fill former quarries. From 2027, such compost will no longer count as *recycled bio-waste*. This highlights the potential for business models that focus on **kitchen and green waste from households or commercial premises**.

Let's move on to what happens after collection.
Bio-waste can be processed in two main ways:

- **Anaerobic digestion**, where air is excluded, producing biogas and digestate rich in nutrients
- **Aerobic composting**, where air is actively supplied to create compost

Soil improvers can only be made from compost. However, in many anaerobic digestion facilities, the solid residues from the biogas process are **composted afterwards** to produce soil improvers.
Though there are no definitive regulations, except for large digesters which are covered by the European Industrial Emissions Directive, 'Best Available Techniques' for biological processes are published by JRC and are available as supporting material of this module. One crucial aspect of processing is hygienisation, protecting both workers and end-users from health risks. EU Directive 2000/54/EC requires hygienisation during processing, which in practice means maintaining a temperature of 70°C for more than three days. Operators aim to keep temperatures at this level, without going much higher, to protect beneficial microorganisms essential for the process.

Once the material is ready to be marketed, we move into **product quality requirements**. Hygienisation is also a fundamental prerequisite for using products from biological processes.
In its "product function categories" (PFC), the EU Fertilising Products Regulation 2019/1009 (or FPR) sets out requirements for fertilisers (PFC 1(A)), soil improvers (PFC 3) and growing media (PFC 4). For bio-waste products, the most relevant component material categories are:

i) **CMC 3** – Compost from aerobic treatment; ii) **CMC 4 and CMC 5** – Products from anaerobic treatment. Furthermore, the regulation's annexes specify:

- Minimum nutrient concentrations with detailed tables that can be found within the supporting materials of this module
- Thresholds for contaminants, such as glass or tar derivatives
- And limits for plastic contamination: no more than 2.5 g/kg of dry matter for plastics above 2 mm, effective from 16 July 2026.

And what about the soil itself?
At EU level, there is currently no dedicated legislation for soil protection. The Soil Monitoring and Resilience Directive is still under discussion. Because soils vary so much, it's not considered practical to set EU-wide limits for contaminants or nutrient targets. If you plan to work with soil improvers, you must therefore check your **national legislation**.
Additionally, the **European Soil Observatory (EUSO)** provides information on the status of soils in each Member State.
If you want to follow upcoming developments in EU legislation on bio-waste and soil improvers, consult:

- The Circular Economy Action Plan
- The Bioeconomy Strategy – currently under revision, likely to emphasise material recovery from waste biomass
- And the European Soil Strategy – which sets a vision for 2050 and specific targets for 2030.

This concludes our initial overview of European legislation across the bio-waste to soil improvers value chain which will be deepened in the final module of this course. In the next video, we'll learn about the hidden value of compost. See you in the next module!

Module 3: The (hidden) value of compost

Hello and welcome back to the BIN2BEAN training series on awareness raising and community engagement. In this module, we'll learn about the properties of compost and why understanding them also means understanding soil itself.
Soil is not just a mixture of minerals such as clay and sand, or stones covered by a dark surface. The top layer of soil also contains **humus**, the result of the biochemical decomposition of plant residues by millions of organisms, of which less than ten percent are well known to science. Soil scientists define humus as the totality of organic substances in soil: remains of plants, animals, fungi, and bacteria that are broken down into molecular and mineral components by microorganisms in the upper soil layer. The humus content of a soil is best described by its **organic carbon content (SOC)**, since analysing single components would not be meaningful. Harvesting always removes carbon and nutrients, which is why fields often show a low SOC content. By contrast, grassland has around ten percent SOC, and swamps or marshes show the highest concentrations of organic matter. To maintain soil fertility, it is therefore necessary to add materials that compensate for these losses. Besides ploughing in plant residues, more material is needed that can be broken down into humus. Compost made from waste biomass is well suited because it contains a high proportion of organic carbon together with nutrients such as nitrogen and phosphorus. For this reason, compost from organic waste is considered a **soil improver**, as we already saw in the legal background in Module 2.

Humus can be characterised by how accessible it is to organisms and plants. Some humic substances are easily available, and microorganisms use them as nourishment. These disappear quickly. Others, known as refractory humus, remain in the soil for years.
This second fraction is responsible for many important soil properties. It increases water-holding capacity, stores nutrients, and immobilises heavy metals or other soluble compounds that could harm plants.
Compost contains humic substances and therefore acts as a true soil improver. A striking example can be seen in the comparison of two neighbouring fields after heavy rainfall. One field, managed conventionally without compost for several years, became almost flooded. The other, managed ecologically and enriched with compost, absorbed the water thanks to its higher humus content. This shows how a high SOC level increases the resilience of soils, protecting them from erosion and from drought.
Let's continue with the role of compost in climate protection. If organic waste is landfilled, it decomposes into methane and other gases over time. Methane is a very potent greenhouse gas, with a global warming potential around twenty-five times that of carbon dioxide. This is why the landfilling of biodegradable waste is to be completely prohibited in Europe.
Incineration of residual waste also produces carbon dioxide. In contrast, recovering organic matter through composting decreases greenhouse gas emissions. The refractory part of humus even stores carbon in soils, helping to mitigate climate change by slowing down emissions. This process of **carbon sequestration** is already recognised in European climate protection policy as one way of compensating for unavoidable emissions.
Maps from the **European Soil Observatory** highlight large areas of Europe suffering from a lack of organic carbon. For 6% of all soils, the loss of organic carbon is already considered critical. To prevent further losses, it is important to apply compost and other soil improvers (see supporting material [Pravalie et al. 2024]). According to the European Environment Agency, repeated applications of good-quality compost can improve the soil's ability to retain water and nutrients, to store carbon, and to increase fertility [EEA, 2020]. Findings from the LIFE SoilCom project confirm these benefits. The project showed that applying twenty percent more compost reduced the use of water, pesticides, and mineral fertilisers by seven percent per farm, while increasing productivity by ten percent [Kristensen 2023].
Despite the high demand for soil improvers across Europe, there is a shortage of good-quality compost. Increasing the collection and processing of bio-waste is therefore a major opportunity to improve soil resilience. Mixed waste can also be treated biologically, as in MBT facilities, but the result is compost that is contaminated and unusable on soils. It usually ends up in landfills or in quarries. For this reason, it is essential to separate bio-waste at source. Kitchen and green waste must be collected separately, and the input quality must be high. Separately collected bio-waste should not contain more than three percent impurities such as plastics, glass, or dust.
In summary, compost made from bio-waste is essential to maintain the fertility of European soils. It improves the soil's capacity to store and filter water, reduces the mobility of harmful substances, and contributes to climate protection through carbon sequestration.
But this is only possible if households, restaurants, hotels, markets, and the food industry carefully separate bio-waste at source so that it can be processed into safe and effective soil improvers.
In the next video, we will learn about how to motivate to separate and recycle biowaste. See you in the next module!

Module 4 – Motivations of your clients (part I)

Hello and welcome back to the BIN2BEAN training series on awareness raising and community engagement. In this module, we will explore how to understand and motivate different stakeholders along the value chain, starting with private households and local administrations.

When you design a new business model, it is natural to think first about your potential clients. But in the bio-waste sector, you must also consider all the other stakeholders.

Bio-waste is not a standardised material. Unlike raw materials in a factory, its composition varies depending on the source, whether it comes from households, supermarkets, or restaurants, and it also changes with cultural habits and the season.

Since soil improvers and fertilisers must meet strict quality requirements, such as minimum humus content, particle size, contaminant limits, and the absence of visible impurities, reaching these standards is only possible if both the organic waste and the processing methods are of high quality.

For this reason, the cooperation of households and businesses is essential. They must separate the organic fraction of their waste, or even pre-sort it. This means asking people to do extra work, so it is crucial to understand what motivates them.

Scientific studies have identified four main factors that shape waste-sorting behaviour: people's attitudes towards environmental protection, the influence of social norms, their perceived control over the behaviour, and their experiences with local waste management services [Stoeva & Alriksson 2017].

People who are already aware of environmental issues are often intrinsically motivated. They will be open to messages about how separating organic waste improves soil resilience. That is why it helps to develop a clear and simple narrative: explain the state of regional soils, show the benefits of compost, and connect their behaviour to local improvements. The European Soil Observatory maps, presented in Module 3, are useful for this purpose.

You can also appeal to common sense. Reducing the waste that needs to be disposed of makes sense for everyone and is also required by EU law. Remind people that methane from landfills is a climate killer, about twenty-five times stronger than carbon dioxide, and that incinerating food waste wastes valuable organic matter. Recycling is the better alternative. In fact, one tonne of bio-waste can yield about 350 kilograms of compost, saving carbon dioxide, or around 100 cubic metres of biogas with an energy content of 600 kilowatt hours.

Sorting waste is more likely to spread when it becomes a visible social norm. If many citizens already participate, others will follow. Campaigns can build on this by using messages such as *"We all separate our waste – why don't you?"*

Behaviour can also be encouraged through external motivation. Some municipalities offer financial rewards for bio-waste collection. In Module 6 we will look at examples of successful experiences from cities and companies.

Motivation, however, is only one part. Households also need clear and accessible information. They must know what belongs in the bio bin, what containers they can use, where the nearest bio bin is located, what the rules are, and what benefits they will gain from correct separation. This information should be available in simple forms such as flyers, posters, social media content, or websites. In areas with large migrant populations, translations are essential so that everyone can participate.

A business model based on home or community composting requires providing people with equipment and instructions. Composting can take place in gardens or parks and is often

supported by municipalities or associations. In these cases, you will work with highly motivated individuals, which allows for more technical communication and closer collaboration. In most cases, however, entrepreneurs will not interact directly with households. City administrations usually organise collection, sometimes through a contractor, and are also responsible for informing citizens. For your business, it is important to understand their motivations. Are they introducing the bio bin to improve soil? Are they aiming to reduce waste management costs? If composting reduces the volume of residual waste, municipalities can save money, which is a strong argument. But if administrations are not directly responsible for the quality or quantity of collected bio-waste, their motivation may be weaker. In these cases, entrepreneurs must invest time in convincing councils and administrations of the wider benefits of bio-waste valorisation, including job creation and improved soils. Municipalities also often underestimate the workload of introducing separate collection. That is why maintaining close contact with administrations and waste companies is essential. Work with them on strategies to motivate citizens. In addition, engaging NGOs or citizen groups committed to environmental issues can help. Farmers who already use soil improvers from bio-waste can also provide powerful testimonials.

Once citizens are motivated, they must also be supported in taking action. This means reliable and transparent waste services, fair charges, and trust in the system. When households are satisfied with local facilities, they are more likely to continue separating waste. Pre-sorting at home is extra work, so convenience is critical. Behavioural research shows that people are more likely to adopt behaviours that are easy, attractive, social, and timely [Behavioural Insights Team[1]]. This principle applies directly to bio-waste separation. Households should be equipped with small containers for kitchen waste and with suitable bags to avoid leakage and smell. An example comes from Hamburg, where the municipal company provides free biodegradable paper bags for food waste. These bags reduce odours in kitchens and can be collected from recycling centres or shops with a downloadable coupon. Waste bins or underground containers are then available close to homes for convenient disposal.
Of course, bio-waste can produce unpleasant odours because of bacteria and fungi that start decomposition quickly. To address this, several measures are recommended:

- Containers should be emptied more often in hot weather.
- Lids with charcoal filters can reduce smells.
- And specialised companies can provide cleaning services for bins, helping to keep the system pleasant for households.

Taking these steps makes waste separation easier, more attractive, and more reliable for households, which is the foundation for producing high-quality compost.
In the next video, we will build on this by exploring how commercial stakeholders, beyond households, can be engaged and motivated to contribute to the collection of clean bio-waste. See you in the next module!

Module 5 – Motivations of your clients (part 2)

Hello and welcome back to the BIN2BEAN training series on awareness raising and community engagement. In this module, you will gain an understanding of the motivations

[1] Behavioural Insights Team (2014) EAST. Four simple ways to apply behavioural insights. Revised edition, 2024

of commercial clients along the value chain. It is important to distinguish between waste producers, waste processors, and clients who use compost directly as a soil improver or as part of a specialised mixture for well-defined applications.

Let's begin with the major waste producers. The food industry, breweries, slaughterhouses, and fruit drink producers are among the most significant generators of organic waste.
When working with them, it is essential to know the **final destination of their waste**. This may include incineration, anaerobic digestion, or even its use as livestock fodder. Each option has its own costs and revenues, and because organic waste is a substantial part of their profit and loss accounts, financial aspects are often the key driver for these enterprises. If a more profitable and reliable option for valorising organic waste is presented, they will be ready to follow. However, strict compliance with legal restrictions is non-negotiable, especially for hygienic reasons. For instance, the EU Regulation on animal by-products forbids mixing residues from meat production with residues from the plant-based industry. Kitchen waste from restaurants is classified as Category III material and must be hygienised, but this does not apply to household waste.
Because investment in animal waste treatment facilities is so high, only a few large companies dominate this market, often developing innovative ways to valorise both animal waste and restaurant kitchen waste. Documentation and transparency are crucial: compliance with regulations is not only a legal obligation but also an important reassurance for industrial producers of organic waste.
A motivating message for clients could be as simple as: *"Don't worry about your waste – we have found an environmentally sound method for its valorisation, in full compliance with European law."* At the same time, collection and transport must also respect hygiene standards and occupational safety rules. Containers should be closed and locked when stored outside, which also prevents them from being misused for littering.

Let's now turn to the processors. Anaerobic digestion and composting facilities convert organic waste streams into useful materials, but their flexibility depends on the type of facility. This might be open compost piles, industrial composting, or anaerobic digestion in wet or dry systems. Each facility's licence specifies not only emission thresholds, but also which input materials can be processed. A plant will only accept inputs that can be turned into marketable products. Even when waste is sieved and pre-sorted, some contaminants such as plastic or glass cannot be completely removed. For this reason, operators often define their own stricter quality requirements. If input material varies in composition or shows hotspots of contamination, it may only be accepted at a higher gate fee.

A step further in the value chain are bio-refineries. Unlike composting or digestion, these facilities aim to produce higher-value materials. Examples include chemical intermediates such as fatty acids, or molecules extracted from fruit peels and kernels, which can be used in a wide variety of consumer products. Their motivation is therefore to secure input materials suitable for **biochemical transformation** into specialised, high-value products.

Finally, let's look at the end-users, the farmers. Farmers who purchase compost are usually interested in a clean, cost-effective product that is available right after harvest, to increase the humus content of their soils. Visible plastics or glass make compost unacceptable.
To match their needs, soil conditions should be checked with local experts such as chambers of agriculture. Compost should not only increase carbon levels but also contribute nutrients

in line with local requirements. Ideally, the compost will comply with the EU Fertiliser Regulation and carry a recognised quality label.
Many countries already have associations dedicated to quality assurance of compost and digestate. These associations bring transparency to the market, which builds trust with farmers. For organic farming, soil improvers from bio-waste are particularly valuable because only a limited number of fertiliser products are permitted. Organic farmers are even more sensitive to contamination risks, so it is vital to keep them fully informed with analytical data and to guarantee stable quality year after year.
Establishing quality circles with farmers can also be a useful approach. This shows transparency and a willingness to exchange views openly.

Beyond all these stakeholders, we must also consider the broader policy framework. The EU has not only committed to reducing greenhouse gas emissions but also to **removing carbon from the atmosphere** through plants and soils. The upcoming Carbon Removal Certification Framework is expected to create standardised, tradable carbon credits, which could attract new investment.
As discussed in Module 3, carbon sequestration in soil can be assessed using model calculations. Yet, in practice, achieving the predicted values is challenging. For this reason, carbon sequestration is not yet formally included in the certification framework. Nevertheless, research continues at both European and national levels to make measurement more reliable. A good example is the Netherlands, where farmers can use the BodemC or BodemCarbon tool to evaluate the carbon balance of their fields over a 10 to 15-year period, taking into account crop rotation and management practices. Tools like this may offer future opportunities to add yet another step of value to the bio-waste-to-soil chain.

Understanding the motivations of commercial clients along the value chain allows you to better design your business model and anticipate the needs of producers, processors, and users of compost.
In the next video, we will learn how to **enhance both the quantity and the quality of compost and other products**, so that the value chain delivers consistent benefits for soils, farmers, and the environment. See you in the next module!

Module 6 – Enhancing the quantity and quality of compost and other products

Hello and welcome back to the BIN2BEAN training series on awareness raising and community engagement. In this module, we will focus on how to enhance both the quantity and the quality of compost and other products. This means looking at how much material is produced and, just as importantly, at the standards of the final output.

Focusing on **quantity**, The amount of compost produced depends directly on the quantity of kitchen and garden waste collected. During processing, part of the mass is lost. In anaerobic systems, this happens through the production of methane, carbon dioxide, and hydrogen, while in aerobic systems, it happens through the release of carbon dioxide, water, and other compounds.
Whatever the system, about **40 to 60 percent of the initial mass is lost**, mostly as water vapour. Anaerobic digestion facilities aim for a high yield of biogas because of its economic value, while composting facilities are usually optimised for time and space. In either case, this mass reduction is unavoidable.

Industrial units typically process between 10,000 and 100,000 tonnes of input material each year. Within that capacity, the overall quantity of bio-waste can be increased by simple means:

- Include more households or city districts in the bio-waste collection.
- Decrease charges for bio-waste compared to residual waste, to encourage citizens to sort correctly at source.

However, as many cities have experienced, lowering charges can sometimes lead to a **decline in quality**, with more residual waste, plastics, and other impurities ending up in bio bins. This is why controlling quality along the process is crucial. The value chain includes several control and intervention points that can help ensure a good final compost.
Community composting is one effective approach. It is easier to manage quality at a smaller scale, and successful community models often attract more citizens if their achievements are publicised, for instance on social media. The main limitation is usually the availability of space for composting and land where the compost can be applied.

Moving on, enhancing **quality** starts with the collection system itself. Pay attention to the quality of new bins, and keep in close contact with city administrations. Whenever a collection area is expanded, communication with citizens should begin before the new bins are installed.
For quality control, some national compost associations already provide practice guidelines. If these are not available in your country, it is recommended to follow the guidelines of the European Compost Network or the Bundesgütegemeinschaft Kompost in Germany. These include procedures for quality assurance of compost and digestate, as well as for rapid detection of impurities.
Quality control can be carried out at several points:

- **QC No. 1** – The quality of the waste in bins can be checked directly by rubbish collectors or waste advisers. This does not need to happen all the time, but it helps to identify areas that need intervention. By opening lids and checking the surface, it is usually clear whether visible impurities are present.
- **QC No. 2** – When new areas are added to the collection system, it is useful to check several truck deliveries at the facility to see the general level of contamination. This provides a first overview before focusing on problem areas.
- **QC No. 3** – In facilities, pre-sorting is done before waste enters digesters or composters. Operators control this step, and their information can guide communication campaigns. Citizens should focus on avoiding impurities that cannot be managed in the facility.
- **QC No. 4** – The final quality check takes place after post-sorting and sieving of mature compost. This stage confirms compliance with regional or national quality labels. If the compost is used to make added-value products like peat substitutes or potting soil, additional parameters are checked. At this stage, it is always helpful to keep in mind the requirements of the end product.

Compost should also be made available to citizens, which strengthens their involvement. There are several options:

- Citizens can collect compost free of charge from the facility, bringing their own containers.
- They can rent a bucket from the facility at a low annual cost, and refill it at any time.
- Compost can be packaged in bags and sold at municipal recycling centres or DIY stores, which works well in large cities.

Whatever the system, quality labels should be clearly visible, either at the delivery point or on packaging. Labels such as “Quality compost made from bio-waste collected in our city” help build trust.
The results of occasional quality checks, such as QC No. 1, and the quality labels confirmed at QC No. 4 should be shared with citizens, ideally together with messages of appreciation. There are some events that represent excellent opportunities to do this, such as:

- TheEuropean week for waste reduction (22-30 November, 2025)
- The International compost awareness week (each year in the first week of May)
- The World Soil Day (each year on December, 5)

Slogans like *“Be proud of your compost – thank you for carefully separating your bio-waste!”* work well. Contests for the best bio-waste quality are another effective idea, encouraging cities to share their experiences and motivating citizens by creating a sense of achievement and competition.
When problems arise, particularly in newly included collection areas, communication should be open and direct. Publishing photos of contaminated bins compared to clean bio-waste can make the message very clear. At the same time, it is important to reassure citizens by showing that other city districts are doing well and by reminding them that the soil in their region depends on their contribution of clean organic waste. If these measures are not enough, further actions described in Module 7 can be applied, which include more detailed awareness campaigns.
Finally, remember that **end users of compost, such as farmers, are your strongest allies**. They can be included in communication campaigns as credible advocates for soil health. Their direct experience with compost in the field adds weight to your message and motivates citizens to continue separating bio-waste correctly.

To conclude, increasing the quantity of compost and ensuring its quality requires coordinated action: from citizens separating their waste correctly, to facilities applying strict quality control, and to end users confirming the value of compost for soil health.
In the next video, we will continue with tools aiming at better quality along the value chain. See you in the next module!

Module 7 – Tools aiming at better quality along the value chain

Hello and welcome back to the BIN2BEAN training series on **awareness raising and community engagement**. In this module, we will focus on one essential message: **quality is key!** There are many ways to improve the quality of compost and soil improvers. These can be grouped into four main areas:

- separation at source,
- input screening during collection,
- pre-sorting at the facility,
- and optimisation of the output.

The last two points – pre-sorting and output optimisation – are mainly questions of intelligent engineering. But the first two, separation at source and input screening during collection, rely heavily on communication. Contaminants such as stones, glass, plastic bags, diapers, or dust are very costly to remove at the facility. And small plastic particles or glass fragments cannot completely be removed. This makes it even more important to raise awareness among citizens from the very beginning.

To do this effectively, remember what we discussed earlier about the motivations of citizens and commercial clients in Modules 4 and 5, and about general recommendations in Module 6. Those modules covered how to introduce bio bins and how to organise regular awareness activities.
But what happens if bio bins are contaminated with residual waste or plastic bags? In that case, special campaigns are needed. And in this module, I will present one very practical tool: the **traffic light procedure**.

The traffic light system is simple, familiar to everyone, and easy to understand. Green means everything is fine. Yellow means there is a problem. Red means the bin is contaminated and will not be collected.
The steps are straightforward:

- First, identify the areas where contaminated bio-waste is being produced. This can be done by screening the waste at the drop-off point of the facility.
- Second, inform the inhabitants of these areas. Explain the problems caused by contaminated bio-waste and appeal for their cooperation. Use the right communication channels to reach them.
- Third, prepare traffic light stickers to give quick feedback. A green sticker could say: *"Thank you for sorting bio-waste correctly – we will yield good compost!"* A yellow sticker could say: *"Be careful when sorting waste! This bin should only contain kitchen and garden waste."* And a red sticker means the bin will not be emptied until it is sorted properly.
- Finally, monitor the bins before or during collection. This should be done at least twice, and ideally three times during a campaign. Use green stickers for clean bins, yellow for slightly contaminated ones, and red for bins that fail the quality check.

Waste producers who receive a red sticker can be asked to sort their waste again. Depending on local regulations, they may also be fined to reimburse the cost of an extra tipping tour, or even excluded from bio-waste collection altogether.
Today, these inspections can be supported by AI detection systems. These use cameras and trained software to identify contamination in real time. Some systems analyse the waste as the bin is tipped into the truck, while others check the material as it falls inside.
The traffic light procedure is most useful when only a few bins are heavily contaminated while most are filled correctly. But if many households are not separating waste at all, the first step should always be a broad communication campaign, as described in Module 4.
If there is still no improvement, then bio-waste collection in that area may need to stop, except for households that consistently receive a green sticker. This reduces the overall quantity of waste collected, but it guarantees the necessary quality.
It is important to make such decisions transparent and, just as importantly, to **reward households that participate correctly**. Positive reinforcement builds trust and encourages long-term commitment.

In conclusion, enhancing the quality of compost starts with clear communication and effective monitoring. The traffic light system is a simple but powerful tool to guide citizens and maintain high standards. In the next video, we will close the training by discussing potential problems arising from different national implementation of EU legislation.

Module 8 – Legal frame II - EU regulation and national implementation - examples

Hello and welcome back to the BIN2BEAN training series on **awareness raising and community engagement**. This is our **final module**, and in it we will look at some potential problems that can arise due to different national implementations of European legislation. To make this clear, I will walk you through three practical examples.

As we saw in Module 2, soil improvers and other products made from bio-waste must meet the requirements of the EU Fertilising Products Regulation, or FPR. Threshold values for contaminants are provided in your support material, and these are a hot topic because changes are expected in the near future.
One key issue is contamination by plastic particles. From 16 July 2026, the EU will introduce a new limit of 2.5 grams per kilogram of dry matter for plastics larger than 2 millimetres.
Some Member States are even stricter. Germany, for instance, has introduced limit values for the bio-waste itself, not just for the final product. Bio-waste from commercial sources may contain no more than 0.5 percent plastic particles, while household bio-waste may contain up to 1 percent. Deliveries with more than 3 percent foreign material can be rejected, and the authorities must be informed. These strict rules are in place because small plastic particles cannot be eliminated during pre- or post-sorting.
When speaking to farmers or city administrators, citing such regulations — and showing how they are enforced — can help to build trust in the quality of compost and soil improvers.

Let's move on to residues from anaerobic digestion. When organic waste is digested, it produces both a solid material, which can be composted, and a liquid residue rich in nutrients. In regions where soils already suffer from over-fertilisation, such as from heavy manure application, this liquid residue cannot be used. In fact, in the Netherlands it is illegal to apply it to fields. To address this, some Dutch companies produce a solid fertilizer by dewatering the residues. The fertilizer can be transported to countries with nutrient-poor soils. Germany also has strict rules. Farms must not exceed an average of 170 kilograms of nitrogen per hectare per year, regardless of the source. For compost, the limit is 510 kilograms per hectare within three years. In addition, compost application is prohibited on rural soils between 15 December and 31 January, in order to protect groundwater after thawing.
These examples show that nutrient management varies across Europe and must be carefully taken into account in any business plan.

Our third example concerns the treatment of animal by-products, or ABPs, as defined in Regulation 1069/2009. This regulation aims to prevent contaminants and pathogens from entering the recycling chain.
ABPs are divided into three categories according to their hygienic risk. Catering residues from restaurants, for example, are classified as Category 3 material. Before such waste can be composted, it must undergo thermal treatment at 70°C for 60 minutes. This requirement creates challenges for composting and dry digestion processes.
In many Member States, food waste from restaurants, hotels, or butchers is collected separately from household bio-waste and hygienised before further treatment. By contrast, household bio-waste can be processed directly.
Community composting projects face particular difficulties. For example, in "worm hotels" where compost worms process kitchen waste, the Animal By-Products Regulation prohibits mixing food scraps with worms unless the material has been hygienised first. Although

exemptions can sometimes be requested from local authorities, the 70°C hygienisation requirement makes it hard for community-driven initiatives to operate.

These three examples highlight how national differences in legislation can affect the bio-waste value chain, and why entrepreneurs must always check both European rules and national interpretations.

With this, we conclude our training on awareness raising and community engagement. Thank you for following this learning journey with us. We hope these modules have broadened your understanding of the organic waste value chain and inspired you with practical ideas for your own business.
On behalf of the BIN2BEAN project, we wish you every success in starting or developing your business in this exciting and fast-growing field. Let's continue working together towards healthier soils, stronger communities, and a truly circular economy.