



From Bio-waste to soil

Report on the regulatory framework at the European, national, and regional levels of biowaste.



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Executive Summary

This document (IR2) offers a comprehensive review of the existing European biowaste policy framework and associated management practices. It covers aspects such as bio-waste collection, recycling, and soil improvers from bio-waste, at EU, national and regional levels (in the 7 countries involved in the BIN2BEAN project).

Currently, all waste streams generated by EU citizens fall under the Waste framework directive (WFD) (Directive 2018/851), however, significant actions remain to be implemented to ensure the efficient valorization of biowaste streams in the future. A considerable barrier exists in most EU countries, hindering the approval of "biowaste-derived products" as alternatives to conventional ones.

This report delves into the prevalent biowaste treatment solutions currently adopted in Europe and provides an overview of the existing regulations influencing the development of innovative approaches for processing biowaste into valuable products. The objective of this report is to serve as a guideline for the BIN2BEAN project, aiding in navigating the regulatory framework and devising strategies for swift market penetration.

List of Abbreviations

Name	Abbreviation
Circular economy action plan	CEAP
Member state	MS
European Union	EU
European Commission	EC

Introduction

Biowaste, also known as organic waste, is a category of waste that originates from living organisms and biological processes¹. It includes a diverse range of materials that can be recycled or converted into valuable resources such as:

1. **Food Waste:** Food waste is a significant component of biowaste, comprising leftovers, spoiled food, and kitchen scraps. It is rich in organic matter and nutrients. Proper management of food waste involves composting, anaerobic digestion, or conversion into bioenergy to reduce its environmental impact.
2. **Agricultural Residues:** Biowastes from agriculture include crop residues, pruning waste, and post-harvest leftovers. These materials can be utilized for composting, soil conditioning, or bioenergy production. Effective management of agricultural residues supports sustainable farming practices.
3. **Green Waste:** Green waste consists of yard and garden waste, such as grass clippings, leaves, and tree branches. Recycling green waste through composting or mulching enhances soil fertility and reduces the need for chemical fertilizers.
6. **Bio-based Packaging Waste:** Biodegradable packaging materials, such as those made from cornstarch or sugarcane, fall into the category of biowaste. These materials break down more easily than traditional plastics, contributing to reduced environmental impact.
7. **Industrial Biowastes:** Certain industries generate biowastes, including agro-industrial residues and byproducts from food processing. These materials can be repurposed for various applications, such as the production of bio-based products, biofuels, or feedstock for other industrial processes.

Understanding the various forms of biowastes is critical for creating effective waste management plans that promote sustainability and resource efficiency. Recycling and repurposing biowastes helps to reduce the environmental impact of waste disposal while also capturing valuable resources for a variety of applications, including agriculture and energy production. For a greener and more sustainable future, we must embrace innovative technologies and implement appropriate waste management methods.

Methodology

The national legislation on biowaste was comprehensively examined through a collaborative effort involving the use of shared policy framework [template](#) among all participants.

These templates facilitated the systematic collection of relevant biowaste management practices, compliance requirements, and regulatory frameworks across different EU countries. In addition, partners contributed to the process by aiding in the translation of national laws, ensuring that they were rendered comprehensible to all stakeholders involved. This collaborative effort not only facilitated a deeper understanding of the legislative framework but also promoted inclusivity and accessibility, enabling all participants to engage effectively in the analysis and interpretation of the collected data. Subsequently, the collected data were meticulously analysed, taking into consideration the biowaste management flow, to gain insights into the legislative landscape and identify areas for improvement or harmonization in biowaste management strategies.

¹ https://environment.ec.europa.eu/topics/waste-and-recycling/biodegradable-waste_en

Results

The results of the policies research are arranged first by describing the EU policy framework on BIODWASTE and secondly by collecting rules and regulations from the 7 MS involved in the **BIN2BEAN** project (Germany, Denmark, Finland, France, Italy, Greece, the Netherlands). At the end of this report will be presented a list of good practices as well as a list of local actions that could improve the reuse of biowaste.

While this report doesn't explore the details of all identified documents, a summary of each document with a focus on project aims was used, in the Database on Policy Framework (DBPF). For each of the 7 MS involved there was a compiled excel regional document that covers a range of topics related to biowaste management, encompassing binding acts, plans, and programs at both European and national level, as well as at the regional level in the LIVING LABS cities with the intention to offer a broad overview of each region.

Understanding how the DBPF was constructed and interpreting its results involves considering only currently active legal acts; modifications that partially alter rules are excluded unless they are significant enough to justify inclusion and prevent the database from becoming overly extensive. The EU and national legislation concerning biowaste is always changing, and in the event of significant changes the relevant document could be updated.

EUROPEAN BIOWASTE POLICY FRAMEWORK

Circular economy and related plans

The **circular economy action plan (CEAP)**², adopted in 2015, serves as the foundation for the European Union's biowaste strategy, it unites the bioeconomy with the waste hierarchy to ensure a sustainable use of natural resources, increase resource efficiency, and lessen environmental pressures. The bioeconomy focuses on converting organic wastes and biomass from forestry and agriculture into various goods and materials that can be used as renewable carbon reserves.

In March 2020, The European Commission adopted a **new circular economy action plan (CEAP)**³, becoming one of the main building blocks of the **European Green Deal**⁴, Europe's new agenda for sustainable growth. The new action plan announces initiatives along the entire life cycle of products. It targets how products are designed, promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented, and the resources used are kept in the EU economy for as long as possible. The EU's transition to a circular economy will reduce pressure on natural resources and will create sustainable growth and jobs. It is also a prerequisite to achieve the EU's 2050 climate neutrality target and to halt biodiversity loss.

To do this, the EU has developed a variety of strategies based on plans and programmes rather than laws, as evidenced by the waste framework directive and other directives about waste, plastics, eco-design, fertilisers, and water reuse. These have been in place since the first circular economy action plan (2015–2019). Aside from the circular economy, other plans, programmes, and initiatives include the European Green Deal (2019) and documents centred on sustainability, zero pollution, or vital raw commodities.

Other initiatives to support the circular economy include the **Programme LIFE**, which is implemented in accordance with Regulation (EU) 2021/783⁵, which establishes a programme for environmental and climate action.

Biowaste policies

The **European Union's biowaste management policy**, which is governed by multiple EU laws, seeks to advance the circular economy in Member States (MSs) by reducing waste generation, enhancing recycling, assigning greater accountability to waste producers, and enforcing more stringent waste separation regulations, which includes biowaste.

The main goal of a circular economy strategy is to valorise biowaste as a resource for biorefineries and prevent it from ending up in landfills. Biowaste's carbon and nutritional contents can be removed, changed, or converted into a variety of bio-based products, such as organic fertilisers, soil enhancers, and growing media that can safely reintegrate into the biosphere after usage, completing the cycles of nutrients and carbon.

² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A98%3AFIN>

³ <https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-new-circular-economy-action-plan>

⁴ https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

⁵ <http://data.europa.eu/eli/reg/2021/783/oj>

At the European level, different types of documents concerning circular bioeconomy and biowaste management were identified. In this sense, **Regulations** can be applied directly in the EU Member States, while **Directives** are mandatory but allow for some flexibility to national Governments in the way of executing them, and **Decisions** are only applicable in the specified territories. Then, the Member States can apply some of the rules without enacting national documents.

To transition to a circular economy in Europe and achieve optimal resource efficiency, the CEAP establishes multiple objectives:

- Reuse and recycling of 55% of municipal garbage is required by 2025, 60% by 2030, and 65% by 2035.
- By 2035, the proportion of landfilled municipal garbage to total municipal waste created shall be lowered to 10% or less.
- Starting in 2030, all garbage that may be recovered through recycling or other means (especially municipal waste) must not be placed in a landfill, unless doing so will result in the greatest possible environmental outcome.
- The overall quantity of packaging waste that is recycled needs to reach 65% by 2025 and 70% by 2030. In some situations, MSs may request derogations from the EC.
- Certain minimum goals are set for recycling certain materials found in packaging trash, such as paper, cardboard, aluminium, plastic, wood, and ferrous metals.
- Member States shall guarantee that biowaste is either collected separately and not combined with other waste types or is separated and recycled at the source by December 31, 2023.

It will be acknowledged that biowaste is one of the biomass streams that is essential to the establishment of a sustainable bioeconomy. Biowaste management, on the other hand, includes a range of activities that affect the quality of the material and the associated dependable end applications, from collection to treatment and recovery through specific channels. The phases in the management of biowaste are shown in “Figure 1” below.

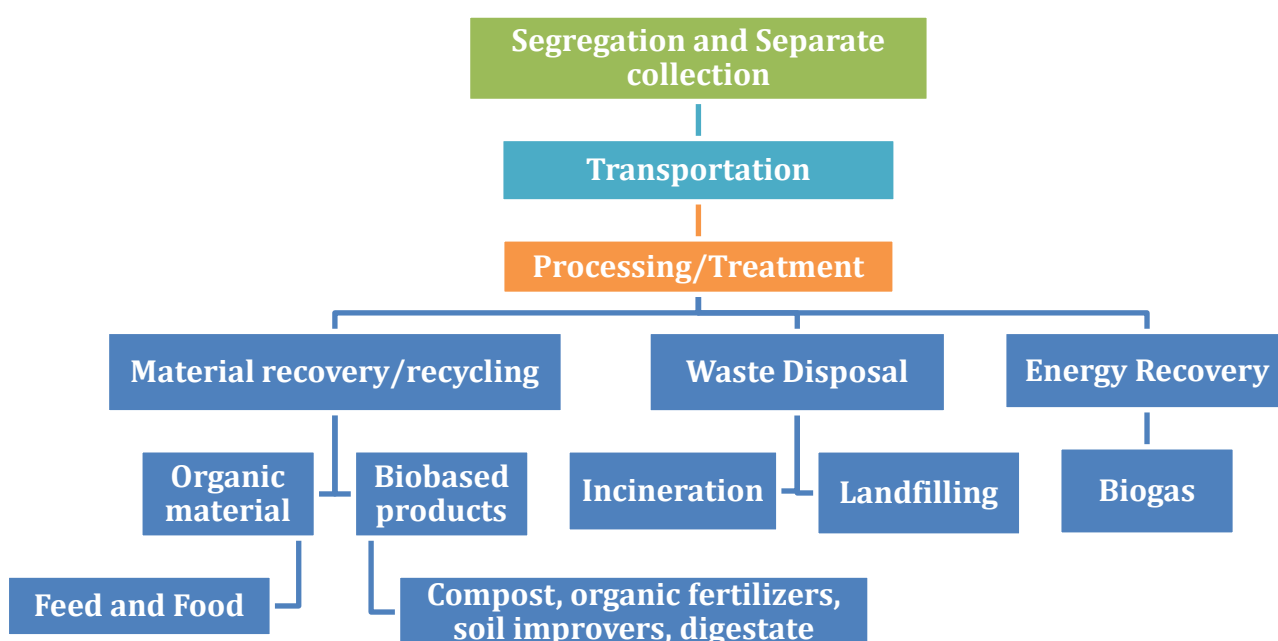


Figure 1: Biowaste management flow

Nevertheless, there isn't currently a uniform management model for all of Europe, and member state biowaste management practices vary greatly.

Waste Management – Segregation and separate collection.

- **Waste framework directive (WFD)** (Directive 2018/851⁶ of the European Parliament and the Council on amending Directive 2008/98/EC⁷ on waste) Aims to collect biowaste separately by 31-12-2023 and encourage recycling and the use of materials from recycled biowaste. It sets the basic concepts and definitions related to waste management, such as definitions of waste or recycling. It introduces the waste hierarchy, the Polluter Pays principle and the Extended Producer Responsibility and sets out separate collection targets. This includes the Waste Oil Directive 75/439/EEC, which was repealed as of 12 December 2010. Waste Framework Directive requires all European Union member states to:
 - Roll out separate organic waste collection by the end of 2023 in all municipalities.
 - Hit new recycling targets of 55% by 2025, 60% by 2030 and 65% by 2035.
 - Meanwhile, Directive 2018/850⁸ sets a cap for waste landfilled at 10% of total municipal waste by 2035. Action on organic waste is crucial to achieving this".
 - A provisional agreement was reached in February 2025 to revise the WFD, introducing binding targets for food waste reduction (10% in processing and manufacturing; 30% per capita in retail, restaurants, food services, and households by 2030) and measures for textile waste management, including extended producer responsibility schemes.
- **Council Directive 1999/31⁹ and Directive 2018/850¹⁰** about landfill and the limitation of landfilling biodegradable waste are also relevant since they contribute to improving the separate collection of biowaste to achieve the targets of the waste framework Directive and the reduction of biodegradable waste in landfills. Just 10% of all MSW (Municipal Solid Waste) will be accepted into landfills by 2035, and biowaste from separate collection is already forbidden from being dumped there. Simultaneously, Decision 2019/1004¹¹ states that starting in 2027, the recycling percentage will only consider biowaste from separate collection. This implies that "recycled material" will not apply to the biostabilized material produced by mechanical and biological treatment.
- **Packaging and Packaging Waste Regulation (Regulation (EU) 2025/40)**
Replaces Directive 94/62/EC and sets harmonised EU rules on packaging design, labelling, reuse, and recyclability. It introduces binding targets for packaging waste reduction and requires compliance with strict sustainability and recyclability standards. The regulation strengthens the Producer Responsibility principle and expands obligations for producers across the packaging lifecycle.

⁶ <http://data.europa.eu/eli/dir/2018/851/oj>

⁷ <http://data.europa.eu/eli/dir/2008/98/oj>

⁸ <http://data.europa.eu/eli/dir/2018/850/oj>

⁹ <http://data.europa.eu/eli/dir/1999/31/oj>

¹⁰ <http://data.europa.eu/eli/dir/2018/850/oj>

¹¹ http://data.europa.eu/eli/dec_impl/2019/1004/oj

- **Single-Use Plastics Directive (Directive (EU) 2019/904, as amended by Regulation (EU) 2025/40)**, targets the reduction of specific single-use plastic (SUP) items through bans, consumption reduction measures, and market restrictions. It strengthens Extended Producer Responsibility schemes and mandates that Member States ensure separate collection of plastic beverage bottles (77% by 2025, 90% by 2029). It also sets out a definitive list of SUP products and imposes labelling requirements and design obligations.
- **Waste Statistics Regulation** (Regulation (EC) No 2150/2002¹² of the European Parliament and the Council on waste statistics). It creates a framework to produce waste management statistics at the EU level, which provides the EU with data to monitor the implementation of the Community policy on the generation, recovery, and disposal of waste.
- The right method to compute the recycling percentages is defined **by Commission Decision 2011/753¹³, Commission Decision 2019/1004¹⁴, and the EC's Guidance on Municipal Waste Data Collection (2016).**

The **end-of-waste criteria**, elaborated in Article 6 of Directive 2008/98¹⁵ and Directive 2018/851¹⁶, are relevant to the BIN2BEAN project as it attempts to apply these requirements in the event that biowaste is valorised. By lessening the administrative load on private businesses and municipal governments, these requirements would promote recycling while also helping to achieve greater levels of environmental protection and economic gains.

Waste Management - Transportation

- **Waste Shipment Regulation (Regulation (EU) 2024/1157 of the European Parliament and of the Council on shipments of waste)**
Specifies procedures for controlling waste shipments to enhance environmental protection across the EU. It establishes a digital system for monitoring waste movements, applies stricter rules on exports—particularly to non-OECD countries—and aligns with EU circular economy objectives. It concerns nearly all types of waste shipped within, into, or out of the EU.
- **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal**
An international treaty that governs the movement and disposal of hazardous waste between nations. It aims to reduce cross-border transport of dangerous waste, particularly from developed to developing countries, and promotes environmentally sound management. Recent amendments include tighter controls on plastic and electronic waste.

¹² <http://data.europa.eu/eli/reg/2002/2150/oj>

¹³ <http://data.europa.eu/eli/dec/2011/753/oj>

¹⁴ <http://data.europa.eu/eli/dec/2009/1004/oj>

¹⁵ <http://data.europa.eu/eli/dir/2008/98/oj>

¹⁶ <http://data.europa.eu/eli/dir/2018/851/oj>

Material recovery - Soil improver

Quality Standards

- **REGULATION (EU) 2019/1009¹⁷** The EU quality standards for biowaste fertilizers are outlined in the Fertilising Product Regulation amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009 and repealing Regulation (EC) No 2003/2003.

This regulation sets criteria covering safety, quality, and labelling requirements that all fertilizing products must meet to be freely traded throughout the EU. The regulation introduces limits for toxic contaminants such as cadmium, mercury, or arsenic, contributing to soil protection and reducing health and environmental risks^{18,19}. The new EU rules on fertilizing products aim to boost the role of the Single Market, reduce the environmental impact of fertilizers, limit risks to human health, and decrease Europe's dependency on imported fertilizers. Producers of biowaste fertilizers need to comply with safety, quality, and labelling requirements before their products can be freely traded across the EU without additional formalities. The regulation also allows optional harmonization for locally produced fertilizing products^{20,21}. To support businesses in implementing these new rules, the European Commission has issued a Guidance document on the labelling of EU fertilizer products. Additionally, the Commission has extended the rules to allow the marketing of additional fertilizers with components from recovered waste and adopted legislation on the safe use of by-products from other industries.

The Fertilising Product Regulation replaces 27 differing sets of rules with one single set of requirements for safety and quality across all EU countries. Producers will need to demonstrate compliance with these requirements before affixing the CE mark on their products²².

Ecolabel

The EU Ecolabel criteria for biowaste fertilizers focus on promoting the use of recycled or organic materials for fertilizing purposes while limiting the content of contaminants such as heavy metals to ensure product safety and reduce risks to human, animal, plant health, and the environment. The criteria aim to incentivize circularity by incorporating secondary raw materials, setting requirements on components, energy consumption, CO₂ emissions, recycling/recovery of materials, chemical safety, and product quality²³. Mineral growing media are not typically included in the EU Ecolabel due to their intensive



Figure 2: Ecolabel logo

¹⁷ <http://data.europa.eu/eli/reg/2019/1009/oj>

¹⁸ https://single-market-economy.ec.europa.eu/news/new-eu-rules-prepare-ground-more-use-organic-and-waste-based-fertilisers-2022-07-15_en

¹⁹ <https://www.compostnetwork.info/policy/from-waste/product-regulation/>

²⁰ https://single-market-economy.ec.europa.eu/news/new-eu-rules-prepare-ground-more-use-organic-and-waste-based-fertilisers-2022-07-15_en

²¹ <https://www.compostnetwork.info/policy/from-waste/product-regulation/>

²² <https://www.sciencedirect.com/science/article/pii/S2772826923000226>

²³ https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/2021-08/JRC126068_Draft_Technical%20Report_PUBSY.pdf

use of non-renewable resources and energy, which is inconsistent with sustainable production practices²⁴.

Waste disposal

- **Industrial Emissions Directive** (Directive 2024/1785²⁵ on industrial emissions - integrated pollution prevention and control) recast). It aims to prevent and control the environmental impact of industrial activities. All industrial installations, including waste incineration and co-incineration plants in the EU, must have an environmental permit based on the requirements imposed by this directive. The Waste Incineration Directive and legislation on titanium dioxide was replaced by the IED. The 2024 amendment (IED 2.0) expands the scope of the directive to cover additional sectors such as intensive livestock farming and mining, sets stricter emission limits, and enhances public access to environmental performance data.
- **Landfill Directive** (Directive 2018/850²⁶ on the landfill of waste and Amending Directive 2018/851 on waste) It aims to prevent or reduce the adverse effects of the landfill of waste on the environment. It defines the different categories of waste and applies to all landfills. It also classifies the types of landfills and obliges Member States to minimize biodegradable waste to landfills, introducing higher quotas for reuse and recycling of municipal waste and massively lowers the amount of biowaste permitted for landfills.

Energy recovery

- **Renewable Energy Directive (RED III) – Directive (EU) 2023/2413²⁷** Sets a binding EU target of 42.5% renewable energy in final energy consumption by 2030, with an aim to reach 45%. It strengthens support for sustainable bioenergy, including biogas from biowaste, and updates sustainability criteria and eligible feedstocks. RED III replaces key elements of RED II to align with the EU Green Deal and Fit for 55 objectives.

RED III also emphasizes the role of biogas and biomethane, particularly from biowaste, in achieving these targets. Member States are required to transpose the directive into national law by May 21, 2025²⁸.

²⁴ https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/2021-11/Table_of_comments_received_during_the%20_public_consultation.pdf

²⁵ <https://eur-lex.europa.eu/eli/dir/2024/1785/oj/eng>

²⁶ <http://data.europa.eu/eli/dir/2018/850/oj>

²⁷ <https://eur-lex.europa.eu/eli/dir/2023/2413/oj/engoj>

²⁸ <https://observatory.clean-hydrogen.europa.eu/media/news/eu-continues-energy-transition-ambitions-red-iii-adoption>

BIOWASTE POLICY FRAMEWORK IN DENMARK

Waste Management – Collection, Segregation, Transportation.

Based on the European waste framework directive (Directive 2018/851 of the European Parliament), Denmark has implemented the following national policies:

- **Executive Order on Waste (Bekendtgørelse om affald)** The updated 2022 version sets detailed requirements for the handling, sorting, transport, and treatment of waste, including biowaste. It aims to ensure consistency with circular economy principles and EU environmental standards.
- **Waste Act (Affaldslov)** Introduced in 2023, this act governs all aspects of waste management in Denmark, including biowaste. It outlines provisions for source separation, municipal collection schemes, treatment procedures, and national targets for recycling and landfill reduction.
- **Environmental Protection Act (Miljøbeskyttelsesloven)** The consolidated 2024 version strengthens environmental oversight of waste activities. It regulates impacts from waste treatment and use of waste-derived materials on soil and ecosystems, supporting sustainable application of biowaste.

Processing/treatment:

Biowaste treatment in waste management plants:

- **Executive Order on Composting and Anaerobic Digestion (Bekendtgørelse om kompostering og anaerob behandling af affald)** Updated in 2021, this order defines technical and operational standards for facilities processing biowaste through composting or anaerobic digestion, ensuring high-quality output and environmental protection.
- **Executive Order on Environmental Approval (Bekendtgørelse om miljøtilsyn)** Revised in 2023, it outlines the requirements for obtaining environmental approvals for facilities involved in biological waste treatment. It includes provisions for monitoring, emissions control, and regulatory inspections.

Material recovery - Soil improver:

Based on the European Regulation 2019/1009 with rules and Quality standards for EU fertilising products Denmark has introduced the following national orders:

- **Executive Order on the Use of Waste in Agriculture (Bekendtgørelse om anvendelse af affald til jordbrugsformål)** (2018) If biowaste is used as a soil improver in agriculture, this executive order specifies guidelines for its application, considering agricultural and environmental considerations.

- **Executive Order on Fertilizers and Soil Improvers (Bekendtgørelse om gødning og jordforbedringsmidler) (2023)** This executive order regulates the production, marketing, and use of fertilizers and soil improvers, including those made from biowaste. It sets detailed requirements on composition, labelling, quality standards, and application limits to ensure safe use in agriculture and to protect soil health and the environment.
- **Executive Order on Organic Farming (Bekendtgørelse om økologisk jordbrugsproduktion) (2021)** This executive order outlines the rules for organic farming in Denmark, in line with EU organic regulation. It includes provisions on the use of organic materials such as compost and digestate in organic crop production, ensuring compliance with organic certification standards and sustainable soil management practices.
- **Environmental Protection Act (Miljøbeskyttelsesloven) (2019)** The Danish Environmental Protection Act (Miljøbeskyttelsesloven) plays a significant role in governing activities related to biowaste and soil improvement. It includes provisions for protecting the environment during waste treatment and soil application.

BIOWASTE POLICY FRAMEWORK IN FINLAND

Waste Management – Collection, Segregation, Transportation.

Based on the European waste framework directive (Directive 2018/851 of the European Parliament), Finland has introduced the following national policies:

- **National Waste Law 17.6.2011/646**, amendment 15.7.2021/714 (2021) The law applies to waste and waste management as well as products and activities that generate waste.
- **National waste plan until 2027** (2022) The national waste plan is a guideline that includes both the amount of waste and harm reduction plan and waste management plan.
- **Government Regulation on Waste 978/2021** (2021) Food industry operator's accounting and reporting obligation on food waste, approval, and notification procedures.
- Every municipality has **local waste management regulations**, which concern, among other things, the sorting, collection, transportation, and prevention the littering. Example: Municipal waste management regulations of the capital region and Kirkkonummi (2022)

Material recovery - Soil improver

Based on the European Regulation 2019/1009 with rules and Quality standards for EU fertilising products Finland has introduced the following national orders.

Quality requirements for compost and limits for overfertilize

- **Degree of the Ministry of Agriculture and Forestry on fertilizer products 964/2023** (2023) The regulation determines the quality requirements for product categories, the list of ingredients and their quality and handling requirements, the content of the list of ingredients, the use of fertilizing products and manure, the product category-

specific labels, declarations methods and permitted deviations from the properties of the fertilizer products.

- **Degree of the Ministry of Agriculture and Forestry on the conduct of activities related to fertilizer products and their supervision 965/2023** (2023) The degree provides for the information to be reported regarding the nature of the operator's activities and the reporting procedure, the content and organization of the file, the content of the quality system, what information must be reported about a batch containing fertilizer products, and when and how the advance notification must be made. In addition, the degree provides for the inspection and supervision procedures of the authorities.
- **Degree of environmental protection 713/2014** (2014) The Degree determines the environmental permit, notification and registration procedures and the authorities who ensure that various activities are carried out in a responsible and environmentally friendly manner.
- **National Law of the fertilizers (711/2022)** (2022) The law is for the manufacture, use, storage, transportation, export and import of fertilizer products and their ingredients. The law also applies to the use of manure.
- **National law on animal by-products 517/2015** (2015) The regulation lays down the health rules for animal by-products and products derived from animals other than those intended for human consumption.

QA/QC national standard

- **Fertilizer quality system for recycled fertilizer products** (2020) The quality fertilizer system is a service and tool for users, producers, and authorities of fertilizer products. The system is open to all manufacturers of recycled fertilizers.

BIOWASTE POLICY FRAMEWORK IN FRANCE

Waste Management – Collection, Segregation, Transportation.

Based on the European waste framework directive (Directive 2018/851 of the European Parliament), France has introduced the following national policies:

Separate collection

- **Arrêté du 15 mars 2022 listant les emballages et déchets compostables, méthanisables et biodégradables pouvant faire l'objet d'une collecte conjointe avec des biodéchets ayant fait l'objet d'un tri à la source** (2022) This regulation lists all the compostable, methanisable and biodegradable packaging that can be collected together with source-separated bio-waste
- **National Law n°2020-105** on the fight against waste and the circular economy (AGEC) (2020) "This law completes the previous one of 2015. "The law provides for all French citizens to be able to collect their food waste and recycle it into biogas or compost that can be used in the local circular economy. In order to introduce source separation of household food waste throughout France by 1 January 2024, each local authority

must study and identify the most appropriate solutions for sorting food waste at source and ensuring that it can be recovered and not landfilled.

- **Article L.541-21-1 of the French Environment Code** (2010) "Any producer or holder of waste shall be responsible for the management of such waste until its final disposal or recovery, even where the waste is transferred to a third party for treatment. Any producer or holder of waste shall ensure that the person to whom it is handed over is authorised to take charge of it. Those provisions do not apply to households: for their waste, it is the local authority responsible for waste management who is in charge. https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000006834445/2021-11-15/"

PAYT system

- **Tax/fee for household waste collection** (1926) tax or fee introduced by local authorities for financing the public waste management service (for household). Since the law of 2015, this tax can be an incentive.

Incentives

- **National Law n°2015-992 on energy transition for green growth** 2015 This law introduced the concept of "circular economy" into French law and made waste policy a key lever for this concept. It mentions the "generalisation of sorting at source" for every biowaste producer as an objective by 2025, but the deadline was moved forward to 2023, due to the EU directive. This law has also introduced the generalisation of incentive-based charging for waste management by local authorities.

Processing/treatment

Biowaste treatment in waste management plants

- **Circulaire du 13 décembre 2012** relative aux règles de fonctionnement des installations de compostage de proximité (2012) Regulation that precises the technical and organisational framework within community composting sites must be set up and conducted.
- **Arrêté du 22 avril 2008** (2008) This order sets the technical requirements for the operation of composting facilities in France. It defines environmental and process standards to ensure safe and effective compost production. The regulation was updated by the **Order of 27 May 2021**, which introduced revised provisions on hygiene, emissions control, and monitoring procedures for composting installations.
- **Arrêté du 9 avril 2018** fixant les dispositions techniques nationales relatives à l'utilisation de sous-produits animaux et de produits qui en sont dérivés, dans une usine de production de biogaz, une usine de compostage ou en « compostage de proximité », et à l'utilisation du lisier (2018) National technical rules relating to the use of animal by-products and products derived there from notably in composting plants and community composting units.

Material recovery - Soil improver

Based on the European Regulation 2019/1009 with rules and Quality standards for EU fertilising products France has introduced the following national orders.

Quality requirements for compost and limits for overfertilize

- **Rural and Maritime Fishing Code - articles L.255-1 and following** (2020) national rules that governs the use of fertilising materials and soil improvers.
- **NF-U 44-051** (2006) This AFNOR-accredited standard defines the quality and safety criteria for marketing soil improvers in France, especially compost. It sets thresholds for contaminants such as pathogens, heavy metals, and physical impurities. The standard is **still in force**, and a **revision process was initiated in 2024** to update its specifications in line with evolving environmental and agricultural requirements.
- **NF EN 13432** (2000) Norm accredited by the French Association for Standardization (AFNOR) about requirements for packaging recoverable by composting and biodegradation (national transposition of the same European standard)

Ecolabel

- **ASQA (Amendement Sélectionné Qualité Attestée)** (2011) Created by the French association "réseau CompostPlus", it is a label attesting the quality of the entire value chain (biowaste as input material, composting process, quality of the resulting compost)

BIOWASTE POLICY FRAMEWORK IN ITALY

Waste Management – Collection, Segregation, Transportation.

Based on the European waste framework directive (Directive 2018/851 of the European Parliament), Italy has introduced the following national policies:

- **Environmental code (D.Lgs. 152/2006)** This legislative decree, commonly called "Single Environmental Text" is the main law in Italy that establishes general rules and fundamental principles regarding the prevention, production, recovery, and disposal of waste, including organic waste. The Decree establishes responsibilities at the level of state, region, Optimal Territorial Area (OTA) and municipality. The OTAs are generally represented by provinces. Pursuant to Law 191/2009 regions are responsible for organizing the integrated management of municipal waste within ATOs (EEA, 2016). Regional obligations include the preparation and updating of regional waste management plans and the regulation of waste management activities, including the separate collection of municipal waste. Municipalities, as part of the OTA, contribute to the management of municipal waste and establish the methods for municipal waste collection and transport, as well as the procedures for separate collection and further management of the obtained waste fractions (Institute for Environmental Protection and Research, 2021).
- **L. n. 116/2020**, Update of the D.Lgs. 152/2006
- **Legislative Decree 213/2022:** Introduced changes to Part IV, concerning waste management and contaminated site remediation.
- **Law 191/2024 (converted from Decree-Law 153/2024):** Further amendments on environmental authorizations, circular economy, and site cleanups.
- **Decree-Law of 16 June 2023:** Modified several provisions of the Environmental Code, especially on permitting and waste control systems.

These updates modernize waste governance and align national law with evolving EU environmental standards.

Separate collection

- **Art.182-ter (D.Lgs. 152/2006)** which requires the competent authorities to implement measures aimed at encouraging the separate collection of bio-waste.
- **Article 205 (D.Lgs. 152/2006)** fixes separate collection objectives to be achieved at the OTA level or at the municipality level. If an OTA does not achieve the separate collection targets, the Legislative Decree 152/2006 foresees a financial penalty to be paid, consisting of a cumulative addition of 20 % on the landfill tax, to be divided among the municipalities whose bad performances failed to obtain the result (EEA, 2016; Institute for Environmental Protection and Research, 2021). In the event of non-observance of international laws and treaties, or of European Union regulation, or in case of serious risks to public health and safety, legal procedures are in place that enable the government to take back control from regions, metropolitan cities, provinces, and municipalities, respecting subsidiarity and loyal cooperation principles.
- **Article 222-5bis (D.Lgs. 152/2006)** the Ministry of Ecological Transition can demonstrate that local administrations did not implement adequate separate collection systems, or that implemented systems are insufficient to reach the separate collection targets, it can deploy subsidiary measures, even invoking support of public entities, collective systems, consortia or private companies (identified by a public tender), for a maximum period of 24 months.
- Additionally, if the specific, national separate collection targets on packaging waste, as laid out in article 205, are exceeded, the Consorzio Nazionale Imballaggi (CONAI), under **article 224 subparagraph 13**, can finance actions that incentivize or implement waste collection in those areas where the targets are not met yet.
- **Deliberation n. 105/2021.** Guidelines of waste classification
- **National Waste Prevention Plan (PNPR):** The PNPR provides guidelines and objectives for waste prevention and sustainable management, including organic waste. The **2013 version is being revised** to align with EU directives and 2030 climate targets. No new version published yet as of May 2025.
- **Regional Legislation:** Each Italian region may have specific regulations on waste, including organic waste. Therefore, it is essential to consult the specific regional regulations of your area of interest.
- It is noted that several regions may have included objectives, plans and measures related to bio-waste in their **regional Waste Management Plans** (e.g. Lazio, Sicily), but no countrywide inventory of bio-waste related measures included in regional plans is available.

Pay-as-you-throw (PAYT)

- ISPRA (Institute for Environmental Protection and Research, 2021) has indicated that in 2019 about 10.8 % of the population is covered by PAYT charging systems. This corresponds to 9.5 % of the total number of municipalities in Italy (Fise Assoambiente, 2021). In the Italian context, charged door-to door collection is characterized by overall higher performance as compared to systems of free access waste containers on the road, in particular in terms of the quality of the differentiated fractions.

Three different tariff types are in place in ITALY (ISPRA, 2020):

- **Tari Tributo Puntuale**, corresponds to a variable part of the waste tax, that is calculated through the actual measurement of the quantity of waste at the 'point of

generation'; the application of such measurement systems envisaged by the Ministerial Decree of 20 April 2017 for this tariff is optional and not mandatory.

- **Tariffa Puntuale Corrispettiva**, is a non-tax waste fee that can be applied by the municipal authorities that have implemented waste measurement systems at the 'point of generation'. It is specifically aimed at guaranteeing the effective proportioning between the rate charged to each user and the actual service offered to and/or used by this user. The corresponding fee is regulated through the combined provisions of article 1, c. 667 and c. 668 of Law 147/2013 and, compared to the traditional tax on waste, it is characterized by a greater implementation of the polluter pays principle. For the asset-related waste fee, the application of the measurement systems provided for by the Ministerial Decree of 20 April 2017 is mandatory. This way, the waste tax is no longer exclusively based on presumptive parameters such as square meters or the number of family members, but also on the actual production of residual waste, through measurement at the 'point of generation'.
- **Tariffa Puntuale Corretta**, is a non-tax waste fee. In this case, the distribution of the costs of the waste management service among the users consider, in addition to the precise measurement of the quantity of waste generated by each of them, the corrective systems foreseen in the provisions of article 9 of the Ministerial Decree of 20 April 2017.

Processing/treatment

- Regulation about the single environmental authorisation and simplifying administrative requirements in the field of the environment for small and medium-sized enterprises and installations not subject to an integrated environmental permit "Regolamento recante la disciplina dell'autorizzazione unica ambientale e la semplificazione di adempimenti amministrativi in materia ambientale gravanti sulle piccole e medie imprese e sugli impianti non soggetti ad autorizzazione integrata ambientale, a norma dell'articolo 23 del decreto-legge 9 febbraio 2012, n. 5, convertito, con modificazioni, dalla legge 4 aprile 2012, n. 35. (13G00101)"
- In Italy, a nationwide tax for landfilling of residual waste was introduced by Law 549/1995 and subsequently revised by **Law 62/2005**. However, it is the individual regions that decide on the amount of the tax applicable in their territory, which cannot be less than 5.17 EUR/t.

Material recovery - Soil improver

QA/QC

To create a market for compost and digestate, compost should be of a good quality for use as a soil improver or fertilizer. Legally binding standards provide guarantees regarding the quality of the compost/digestate produced. A quality management system aims at addressing different elements of a production process to ensure a stable and high-quality output (product) which helps toward reaching a defined quality for the product. Italy has developed and implemented compost quality management and assurance schemes (EEA, 2020). In Italian legislation, compost is considered as a soil-amendment. Three categories of compost are distinguished, according to the feedstock:

- **Green Compost (GWC)**: compost produced from green-waste only;
- **Bio-waste Compost (BWC)**: compost produced from both food-waste and green-waste;
- **Sludge Compost (SWC)**: compost produced from feedstock including sludges.

The Italian legally binding standards for end-of-waste compost, are set in the Legislative Decree on Fertilizers **D.Lgs 75/2010** and subsequent amendments, and consider both agronomical and environmental parameters.

Ecolabel

A 2003 initiative, **the CIC Quality Label for Compost (CQL)**, aims to assess the quality of compost produced by CIC's members. In 2016, there were 46 composting facilities complying with the CIC's Quality Label scheme. To join the CIC Quality Label, companies have to pay an annual membership fee, depending on the particular type of compost to be labelled (Consorzio Italiano Compostatori, 2017b). The CQL Manual underwent its latest update to refine certification procedures in September 2020 and in 2023 internal regulations for obtaining the CQL were revised, as noted in Circular No. 072/2023.

ACTIONS

1. Food waste prevention in Milan (Italy)

Objective of the measure: Incentivising food waste prevention and reduction through awareness raising and voluntary agreements

Description: The Milan Urban Food Policy Pact is a global agreement signed by 209 cities representing over 450 million people (Milan City Council, 2015). Milan formed a technical team to coordinate this endeavour, consisting of recognised professionals with a proven track record in food-related issues and worldwide expertise. International Partners for Sustainable Agriculture (IPSA) coordinates this technical team, which includes the RUAF Foundation (International Network of Resource Centres on Urban Agriculture and Food Systems), the UN Food and Agriculture Organisation (FAO) through the Food for Cities Initiative, and the Habitat International Coalition's Housing and Land Rights Network. This effort is based on the Milan Food Policy, a voluntary agreement formed in 2015 by the Municipality of Milan and Fondazione Cariplo (Milan City Council). This policy aims to assist the city's food sector actors in developing a new strategic approach for food systems and food-related challenges, such as food waste prevention. Cities attempt to construct more resilient urban food systems by promoting local sourcing, developing infrastructure for distributing surplus food, and valorising discarded organic materials. Food waste is one of six categories that group the framework indicators outlined in this international agreement. Each city should analyse the following indicators: 1) The total annual volume of food losses and waste; 2) The number of events and programmes targeted at reducing food loss and waste; and 3) The presence of laws or legislation addressing food waste prevention, recovery, and redistribution; and 4) the total annual volume of surplus food recovered and redistributed for direct human use.

In Italy, there are some good examples of actions, one of which is the Circular Economy Network²⁹. It is a group of companies, organizations and entities aiming to further develop the circular economy concept in Italy. There are annual conferences in which the aim is to collect and share studies, research, and data on the circular economy to identify the key indicators and analyse the national performance over the years. Also, it is focused on the main challenges and bottlenecks to address, identifying the potential solutions. The resulting

²⁹ <https://circulareconomynetwork.it>

strategies will be then shared with policymakers trying to create a link between industries and entities.

Another good example is the Osservatorio Recovery³⁰, which is a platform hosting the criteria for projects related to the separated collection and recycling of wood, plastics and electronic wastes, as indicated by the PNRR.

Finally, hosted by the Ministry for the Ecological Transition (MITE)³¹, there are the initiatives and project criteria on the recycling plants, separate collection and flagships initiatives for wood, plastic and electronic waste supply chains.

BIOWASTE POLICY FRAMEWORK IN GERMANY

Waste Management – Collection, Segregation, Transportation.

Based on the European waste framework directive (Directive 2018/851 of the European Parliament), Germany has introduced the following national directives:

Separate collection:

- **Kommunalabgabengesetze** (regulations for municipal charges, levies etc.) → Basis for the collection of charges by the municipalities including waste (legislation by the States)
- **Abfallsatzungen** (waste statutes) → Local statutes for compulsory use of waste collection systems (i.e. types of bins, minimum weekly volume for residual or other waste types, special obligations of the citizens / owners of properties, allowance of self-composting etc.)
- **Verordnung über die getrennte Erfassung von Bioabfällen der Freien und Hansestadt Hamburg 2010/2017** → The ordinance focuses on bio-waste from private households. Bio-waste from other source is restricted to waste from vegetable origin. 3: All residents must use the bio-waste collection system. Bins are provided by the city. 4: This obligation does not apply in case of home-composting if the compost is used in the own garden without harm to the environment or if there is not enough space to install a bin. A detailed list of bio-waste that can be collected can be found in the annex.
- **Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltverträglichen Bewirtschaftung von Abfällen** (Federal Circular Economy Act); <https://www.gesetze-im-internet.de/krwg/> 2020 → 3(7): Definition of bio-waste (biodegradable vegetable, animal or fungal materials, i.e. garden and park waste, landscape maintenance waste, food and kitchen waste and similar waste from other origins). 11(2): Authorization for the Federal Government to issue ordinances on collection, processing and composition of the products obtained by recycling of bio-waste. 11(1) has been deleted.) 12: Quality assurance for products from bio-waste (conditions for awarding quality labels; approval of organizations awarding labels; requirements for quality control).

³⁰ <https://www.osservatoriorecovery.it/i-decreti-del-mite-per-leconomia-circolare-e-per-il-piano-operativo-per-il-sistema-avanzato-e-integrato-di-monitoraggio-e-previsione/>

³¹ <https://www.mite.gov.it/pagina/pnrr-pubblicazione-decreti-economia-circolare>

→ **Update (2023 amendment):** Strengthened obligations for **separate collection**, expanded to include **textiles, bulky and hazardous household waste**. New **recycling targets** set for 2025 and 2030 to improve circular economy performance.

- **Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltverträglichen Bewirtschaftung von Abfällen (Federal Circular Economy Act);** <https://www.gesetze-im-internet.de/krwg/> 2020 → 9: recyclable waste must be separately collected. 19: Owners of properties are obliged to tolerate the installation of bins.
- **Gewerbeabfall-Verordnung** (Commercial waste ordinance) 2017→ 3(2): Commercial waste producers must collect biowaste separately, divided into packaged biowaste, especially packaged food waste, and unpackaged biowaste. 3(3): Separate collection must be documented by the waste producer (on demand to be presented to the authorities). **Updated in 2022**, it introduced a distinction between packaged and unpackaged bio-waste and enhanced requirements for documentation and compliance monitoring.
- **TRBA 213:** Technical guidelines for biological agents / waste collection / protective measures 2021→ Hazard assessment and protective measures (clothing, cleaning,...) for collection of all types of waste including bio-waste.
- **TRBA 214:** Technical guidelines for biological agents / waste processing / protective measures → Hazard assessment and protective measures (clothing, cleaning,...) for processing of waste (sorting, composting, anaerobic digestion, MBT, incineration)

PAYT system:

- **Abfallgebührensatzungen** (waste charging statutes)→Charging of waste collection and processing on the local level, e.g. differentiation of charges for residual and bio-waste, bonus for self-composting. Fess is based on the cost recovery and the equivalence principle.

Processing/treatment

Biowaste treatment in waste management plants:

- **TA Luft (Technical Instructions on Air Quality Control)**2021; https://www.verwaltungsvorschriften-im-internet.de/bsvwvbund_18082021_IGI25025005.htm →Numerous specific regulations that must be observed when installing and operating plants for the recycling of bio-waste including purification of biogas (~ 10 pages, see separate WORD document)
- **Gewerbeabfall-Verordnung (Commercial waste ordinance)** 2017 → 6: Definition of requirements for pretreatment installations (minimum equipment of machinery, recycling rate); 11: Independent audit of pretreatment installations and documentation
- **Biostoff-Verordnung / Ordinance on Safety and Health Protection during Activities with Biological Agents** (based on the EU directives 2000/54/EG including amendments 2019/1833/EU and 2020/739/EU) 2013 →Requirements for sanitation (3), e.g. temperature, number of transpositions, feeding. Annex 1 and 2: Definition of wastes from biomass that can be applied to soil after processing Annex 3: Definition of materials that can be mixed with bio-waste.
- **Bundes-Klimaschutzgesetz (Federal Law for Climate protection)** Amendment is under discussion2021→ 3a (1): The average of the annual emission balances of

the respective target year and the three preceding calendar years of the land use, land use change, and forestry sector is to be improved as follows: minus 25 million Mg CO₂-eq by 2030, minus 35 million Mg CO₂-eq by 2040, minus 40 million Mg CO₂-eq by 2045 as compared to the emissions in the year 1990. Climate protection plan: To achieve this goal ecosystems and their function as carbon reservoirs and sinks are to be protected and strengthened.

- **Erneuerbare Energie Gesetz (Renewable Energy Act);** https://www.gesetze-im-internet.de/eeg_2014/ 2023→ 43: The price for biogas from anaerobic digestion (bio-waste >90% of the input) is fixed at 14,16 Ct/kWh (< 0,5 MW) and 12,14 Ct/kWh (0,5-20 MW)
- **Biokraftstoff-Nachhaltigkeitsverordnung (Bio-fuel sustainability ordinance)** - based on Directives 2009/28 and 2018/2001 (Directives on the promotion of the use of energy from renewable sources) 2009→ 2021 Mandatory submission of certificates for the sustainable production of biofuels (at least 50-65% less GHG emissions than fossil fuels along the complete value chain)
- **Biomassestrom-Nachhaltigkeitsverordnung** 2009 2021→ Obligatory proof of the origin of biomass and processing methods to avoid the promotion of biofuels from intensive agriculture, rain forests etc.
- **Tierische Nebenprodukte-Beseitigungsgesetz - TierNebG (Law on Animal By-Products)** - based on the Animal By-Products Regulation (No 1069/2009) 2016 2022 →The regulation covers three different risk categories. Only low risk waste (i.e. catering waste from households and restaurants, former food, part of slaughterhouse waste may be composted or digested without further pretreatment.
- **VDI Richtlinie 3475/1** 2003 →General requirements for emissions from composting and anaerobic digestion
- **REDcert2010**→Certification system for sustainable biofuels (authorised by Bundesanstalt für Landwirtschaft und Ernährung) - see regulation above

Material recovery – Soil improvers

Quality requirements for compost and limits for overfertilizing

- **Bodenschutzgesetz (Soil Protection Act);** https://www.gesetze-im-internet.de/bbodschg/_6.html 1999→The Federal Soil Protection Act (BBodSchG) ensures the soil function and gives among others precautionary requirements for the contamination of soils. BBodSchG is relevant for the application of compost for landscaping and recultivation. 6: The federal government is authorized to issue requirements for the application and placement of materials regarding pollutant content and other properties. 17(2) Principles of good agricultural practice: 6. promoting the biological activity of the soil through appropriate crop rotation, 7. maintaining the humus content of the soil typical of the site, through an adequate supply of organic matter or by reducing the intensity of cultivation.
- **Düngegesetz (Fertilizer Act);** https://www.gesetze-im-internet.de/d_ngg/DüngG.pdf (The Fertilizer Act is amended to implement the requirements of the EU Commission for settling the infringement proceedings in fertilizer law. Changes will be documented later.) 2022 2: Definition of fertilizers, i.e. inclusion of soil improvers, definition of soil adjuvants, i.e. substances without significant nutrient content as well as microorganisms intended to influence the biological, chemical or physical properties of the soil in order to improve the conditions for the growth of crops; or promote the symbiotic fixation of nitrogen; 3(4+5): Authorization to issue ordinances

restricting the amount, the use of fertilizers on certain areas or at certain seasons, the storage capacity for fermentation residues... with special consideration for water bodies. 5: Fertilizers that are not labelled as "EC fertilizers" (cf. Regulation (EC) 2019/1009 and 2003/2003) may be applied as well, if... soil fertility, especially the concentration of humic material is enhanced. 11a: The use of nutrients should be sustainable based on good agricultural practice. Compulsory management of nutrients in case of large farms (> 20 ha): Material balance to be provided by the farmers.

- **Dünge-VO - Verordnung über die Anwendung von Düngemitteln, Bodenhilfsstoffen, Kultursubstraten und Pflanzenhilfsmitteln nach den Grundsätzen der guten fachlichen Praxis beim Düngen (Ordinance on the application of fertilizers, soil adjuvants etc.);** https://www.gesetze-im-internet.de/d_v_2017/2017_3 defines good practice for application of fertilising agents on soil, especially in agriculture. Over-fertilization must be avoided. 6 (4) limits the average amount of total nitrogen on a farm's utilised agricultural area: This may not exceed 170 kilograms of total nitrogen per hectare and year. For compost, 510 kg N / ha may not be exceeded within 3 years. According to 6(8) compost application on rural soil is not allowed between December 15 and January 31.
- **"Verordnung über den Umgang mit Nährstoffen im Betrieb und betriebliche Stoffstrombilanzen - Stoffstrombilanzverordnung (Ordinance on the handling of nutrients on the farm and operational material flow balances - Material Flow Balance Ordinance);** <https://www.gesetze-im-internet.de/stoffbilv/index.html#BJNR394210017BJNE000200000> 2017
Implementing regulation (based on the DüngeG) for the yearly compilation of material flow and nutrient balances plus three years overview; farmers have to assess the N and P balance using detailed data for the concentration of N and P in plants etc. Threshold limit: N surplus of 50 kg / ha · yr (Compost is not explicitly mentioned, but included by "other organic fertilizers" and "soil adjuvants")
- **Düngemittel-Verordnung (Ordinance on fertilizers):** https://www.gesetze-im-internet.de/d_mv_2012/D%C3%BCMV.pdf 2019 The Fertiliser Regulation (DüMV) regulates the trade of fertiliser. Special regulation for "non-EU fertilizers": 3: Conditions for input material of fertilizers, threshold limits for contaminants (Annex) and limitations for soil adjuvants 5: Protection measures to prevent infectious diseases or plant diseases.

QA/QC organization

- **Bioabfall-Verordnung (Bio-waste ordinance) implements Art. 22 Waste Framework Dir. into German law;** <https://www.gesetze-im-internet.de/bioabfv/> 2022 3(3) and Annex 2: Requirements for hygienisation; 3(4): Quality control of the process and the product; 3(8) Quality control in special cases to be performed by independent auditors. 4(1): Limitation of pollutants in materials before processing; 4(2-4) Threshold limits for plastics, glass, heavy metals; 4 (5,6): Regulation for quality control, i.e. sampling and analysis (every 2,000 Mg); 6: Application of compost, digestate etc. on soil is limited (20 Mg / ha d.w. for 3 years, in case of very low metal concentrations 30 Mg / ha d.w.; 80 Mg / ha d.w. for 12 years in case of landscape construction) 9: The competent authority must be informed when composts etc. are applied for the first time. The soil must be analysed in advance to avoid application on already contaminated soil. 10: Certain unprocessed wastes from biological origin can be applied to soil (listed in Annex 1, 1.3) 11: Facilities (i.e. for

composting, fermentation, mixing with other materials) must retain samples of processed batches and products. The delivery of products must be documented by a delivery bill containing (inter alia) information on the analyses carried out, restrictions on application and an assurance of hygienic safety. A copy of the delivery bill and the documentation of the area used for application must be provided for the competent authority. The reporting obligations do not apply if the operator of the plant is a member of a bio-waste quality association. (EMAS certification is nice but must not be proven.)

Updates:

1 May 2023: General applicability of the updated BioAbfV provisions.

1 November 2023: Introduction of new labeling requirements for biodegradable plastic collection bags used in separate bio-waste collection (Annex 5).

1 May 2025: Enforcement of 2a, which sets stringent requirements for the removal of foreign materials, particularly plastics, from bio-waste prior to biological treatment.

- **Quality criteria (regularly amended) issued by Bundesgütegemeinschaft Kompost (BGK - Federal Association for Quality of Composts);** <https://www.kompost.de/guetesicherung> Law makers acknowledged RAL GZ as "self-obligation of the industry". "Quality guidelines and QA/QC procedures are available for composts and digestates. Moreover, BGK provides guidelines for the assessment of the suitability of bio-waste for processing. Members of BGK can obtain the quality label for their products if they meet the standards defined by the law and the BGK. In detail: RAL quality monitoring system for compost (GZ 251), RAL quality for digestate produced from waste (GZ 245), RAL for fertiliser source material, mainly for depackaged food waste (RAL GZ 252). Also available: RAL for wood ashes and digestate from manure."

BIOWASTE POLICY FRAMEWORK IN GREECE

Waste Management – Collection, Segregation, Transportation.

Based on the European waste framework directive (Directive 2018/851 of the European Parliament), Greece has introduced the following national directives:

- **GG 29/9/2020:** Basic Measures proposed by the Reviewed Plan for Waste Management.
 - Modernization and implementation of the environmental levy (landfill fee) on waste sent to landfills, so that it acts as a deterrent to the burial of waste, including residues from municipal waste treatment units. The measure has been successfully implemented in many EU member states, which have finally managed to significantly reduce the percentages of waste being buried in landfills.
 - Implementation in practice of "pay as I throw", both with legislative regulations and with supporting the agencies with resources through NSRF, so that they can measure the production of waste as a whole, or in some of

the currents, especially at the residential level, building, urban planning unit, selected producers.

- Encouraging and reinforcing “Sorting at the Source” by expanding the collection network of recyclable materials and bio-waste. The equipment for the collection of all recyclable materials will be reinforced (such as recycling bins, and garbage trucks) in one of the green bins (of mixed solid waste), which is currently the main municipal waste reception bin. At the same time, it is planned to expand the brown bin network nationwide (organic waste/bio-waste) and additionally to strengthen the separate collection of waste by type of material, where spatially feasible.
- The above will result in a significant increase in recycling rates, the collection of high-quality and clean recyclable materials and, at the same time, a significant reduction in the amount of waste that is sent for processing in residual MSW units and, by extension, in burial. Based on the above, the redesign of the location of the waste bins will proceed, as well as the rationalization of the routes.
- Strengthening and upgrading of recycling centers. the expected increase in the quantities of waste that are separately collected for recycling will create increased needs in the operation of recycling centers, both qualitatively and quantitatively.
- This can be achieved by increasing the number and/or capacity of recycling centers, but also by upgrading their technology. at the same time, the recycling centers could be upgraded so that they can produce alternative (secondary) fuel from the unusable materials, something that can also be achieved by feeding the residues of the Recycling Centers to the corresponding waste treatment units.

Separate Collection:

- **Law 4042/2012----** Definition of organic waste (biowaste): biodegradable garden and park waste, food and kitchen waste from homes, restaurants, catering facilities and retail premises and associated waste from food processing facilities. By 2015, the rate of separate collection of bio-waste must rise, as a minimum, to 5% of the total weight of biological waste and by 2020, as a minimum, to 10% of the total weight of biological waste.
- **Υ.Α. ΥΠΕΝ/ΔΔΑ/90439/1846/2021** “Measures and conditions on the landfill of waste in alignment with the provisions of Directive 99/31/EC «on the landfill of waste», as amended by the DIRECTIVE (EU) 2018/850 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018” Reduction of municipal waste sent to landfill to 10% of 1995 levels by 2035 through its diversion from landfill towards the production of added value products (bioethanol, biogas, biofertilizer, used oil) Prohibition of landfill of waste that is separately collected and is suitable for recycling and recovery, biodegradable waste included.
- **N. 4819/2021:** Integrated framework for waste management-Transposition of Directives 2018/851 and 2018/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 amending Directive 2008/98/EC on waste Improving the efficiency of resource use and ensuring that waste is valued as a resource through the conversion of biowaste towards added value products Improving the efficiency of resource use through the creation of an interactive platform for the maximum and

sustainable exploitation of the available biomass in national level. Obligatory separate biowaste collection by the end of 2023. **Law 5151/2024** introduced changes to modernize waste management, including adjustments to the deposit-return scheme and enhanced roles for the Ministry of Environment and Energy.

- **GG 174/15-12-2015 – amended in 2020:** The strategy and the basic framework for the separate collection of bio-waste and the development of networks for its recovery are formed. Key elements are the following: 40% bio-waste separate collection target by 2020 (higher target compared to Law 4042/2012); Processing of separately collected bio-waste with the aim of production of compost that meets quality standards for further use according to international and/or national standards; Priority creation of small-scale decentralized recovery units.
- According to the **Local Government Decree 18485/10.04.2017** (Government Gazette B' 1412/26.04.2017), which defined the categories and specifications of the Green Points and which was issued according to art. 11 of Law 4042/2012, as amended with the No. 21 of Law 4447/2016, at the Green Points it is possible to collect - store individual streams of biowaste, particularly biodegradable waste of gardens and parks (EKA code 20 02 01) and Edible Fats and Oils (EKA code 20 01 25).
- **According to the Law 4555/2018** (Government Gazette B'133/19-7-2018) it is attributed to the Municipalities (Grade A) the competence - among others - for: The organization and implementation of separate collection of bio-waste that comes from restaurants, households, large producers and green park and garden waste. Informing and raising awareness among citizens and businesses operating within their administrative boundaries. The construction and operation of bio-waste processing units up to and including B category of the 4th group "Environmental Infrastructure Systems" of the No. Management of Regional Development/37674/2016 (Government Gazette B' 2471/10-8-2016) of the Minister's decision Environment and Energy and subject to the provisions of the concerned Regional Plan for waste management.
- **According to par. 2 of art. 12 of Law 4496/2017** (Official Gazette A' 170/8.11.2017), with which Law 2939/2001 was amended, the operators of places of public assembly (cinemas, theatres, sports facilities with bleachers, shopping centres, conference centres, tourist facilities, training facilities, hospitals, clinics, airports, ports, central railway stations, passenger-ferry ships, ports, universities, concert venues, banks, as well as mass catering manufacturing and supply businesses full meal with the possibility of more than 100 people served), are obliged to ensure the separate collection of individual packaging materials.
- **With the document YPEN*/DDAP/75118/2890/26.10.2018** of the Ministry of Environment and Energy is requested: in places where the public gathers, the separation should be organized and implemented collection of the organic fraction as a separate stream, The inclusion of conditions, regarding the mandatory separate collection of individual material wastes, in the Environmental Conditions Approval Decisions (EACO) of projects and activities that constitute public gathering areas. Based on the specific document of the Ministry of Foreign Affairs, direction is given for the supply and organization of the means of separate collection within the assembly areas common with the same means of the holder of their operating license and not of the Municipality.

PAYT system:

Two new pieces of legislation have recently been completed, amending the pricing policy and costings for the management of individual MSW streams. The specific settings are as follows:

- The "**Invoicing Regulation of Solid Waste Management Agencies (SWMA)**" which was sanctioned with the number YPEN*/DDAPP/31606/930/08.04.2019 KYA* of the Ministers of Interior and Environment & Energy (Government Gazette B 1277/15.04.2019). It provides for the fees paid by the Organizations of Local management to those Organizations of Solid Waste management per service provided, to be determined in relation to the efficiency of sorting at the source, the diversion of organic waste from landfills, packaging waste collection per inhabitant and the total recycling carried out.
- With the **no. 55 of Law 4609/2019 (Government Gazette A 67/03.05.2019)**, which replaces art. 43 of Law 4042/2012, the special burial fee is abolished and environmental contribution to FoDSA (10) euros per ton of waste (codes EKA 20 01, 20 02, 20 03 and 15 01), available without prior processing, which is attributed to the Green Fund for subsidizing circular economy actions. Its validity begins on 1/1/2020 and from 1/1/2021 how much increases by five (5) euros per year up to thirty-five (35) euros per ton. The levy will be reduced depending on the progress in the implementation of the provisions in the relevant Regional Plan for waste management of Mechanical Biological Waste Treatment Units and bio-waste recovery facilities, the competence of Organizations of Solid Waste management.
- **Law 4685/2020:** "Article 41 (Article 22 of the Directive) Biological waste (bio-waste)
1. Until December 31, 2022 and subject to reservation of paragraphs 3 and 4 of article 29, the biological ones waste must either be separated and be recycled at source or collected separately and not mixed with other types of waste in order to undergo recycling, including composting and digestion, in such a way as to ensure a high level of environmental protection and the resulting product from it to meet the relevant high quality standards. Waste with similar biodegradation properties is allowed to be collected with biological waste and composting according to the relevant European standards or possible equivalent national standards for packaging that can be recovered through composting and biodegradation. 2. The operators of mass catering businesses, regardless of capacity, in the sense of paragraphs 5D, 5D1, 5D2, 5D3 and 5D4 of article 2 of under no. 47829/23.06.2017 (B' 2161) of the decision of Minister of Health, are obliged to ensure the separate collection of bio-waste resulting from their activity, having within their company containers of sufficient capacity. The same obligation have business owners of food supermarkets, grocery stores, fruit shops, bakeries, already prepared meals shops, pastry shops/dairies/butcher shops with preparation room, of the open air markets, and all of the above regardless of capacity. As business operator is considered any owner that may hold the corresponding license to establish and operate the business or the notification of the start of operation of the business according to the provisions of the joint ministerial decision no. 16228/2017 (B' 1723). 3. The operators of the businesses of paragraph 2 are obliged to immediately apply the above on the condition that the implementation of the separate bio-waste collection has been initiated by the relevant Municipality. 4. The Organizations of Local Management First degree, in

case of non-compliance to the obligation of paragraph 3, impose financial sanctions depending on the gravity and frequency of the infringement, provided that the Commission Quality of Life of the OTAs of the first grade has decided the financial sanctions and has been notified by in advance to the operators of mass enterprises focus, regardless of capacity, based on the meaning of paragraphs 5D, 5D1, 5D2, 5D3 and 5D4 of the article 2 of 47829/23.06.2017 (B' 2161) under no. decision of the Minister of Health, setting an explicit deadline for adjustment, which cannot be shorter than thirty (30) days.

Processing/Treatment:

Biowaste treatment in waste management plants:

- **GC 29/9/2020:** Basic Measures proposed by the Reviewed Plan for Waste Management.
 - Creation of an adequate national network of waste treatment units throughout the country. Today only 5 units operate. Another 30-38 units are expected by the end of 2023.
 - Promoting the production of alternative secondary fuels from waste treatment units and from recycling centers, in order to reduce the quantities of waste from these units that end up in landfills.
 - Creation of energy production units indicatively at least 3-4 units from the residues of the waste treatment units or from the residues of the recycling centers or from alternative fuels and from any other residual flow resulting from the treatment/sorting of the separately collected streams, so that in combination with the above, the country should be able to achieve a reduction of urban waste that is sent to landfill below 10%.
 - Creation of a special electronic platform based on which the regional waste management plans and the national waste management plan will be monitored with input from the Regional Associations of Solid Waste Management.
 - Issuance based on the provisions of the new environmental law 4685/2020 of the decisions approving environmental conditions of industrial facilities with the aim of the least possible production of industrial waste as well as intensifying the controls of compliance with the decisions approving environmental conditions.
 - Development of a special electronic waste platform in order to promote synergy between industrial sectors (industrial symbiosis) for the utilization/recovery of industrial waste in compliance with the specifications for the necessary new tests.
 - Definition of streams of industrial waste that can be secondary raw material or alternative fuel from industrial facilities throughout the territory as well as definition of the technical specifications for the use of inorganic waste of industrial origin as secondary materials.
 - Development of a network for the collection of biodegradable waste of agricultural and livestock origin either for the benefit of agriculture or for the production of animal feed or for another way of utilization including the production of energy from biogas or biomass.
 - Creation of a program to monitor the management of agro-livestock waste and unification of agricultural activity monitoring registers in conjunction

with the organization and licensing of a collective alternative management system for the packaging of plant protection products in Greece.

- Raising public awareness, strengthening confidence in recycling. In addition to the development of the relevant separate collection networks and systems and the required infrastructure, a holistic approach is proposed to raise awareness and inform citizens about the environmental and economic importance of recycling and the diversion of waste from landfill with the ultimate goal of adopting the principles of circular economy. Public opinion surveys show a lack of trust and credibility. Particular emphasis will be placed on special campaigns aimed at young people such as in schools, awareness campaigns and specific measures such as the collection of waste from the alternative management systems themselves, even the upgrading of the sorting centers for recyclable materials and their network will contribute to strengthening the separate waste collection.
- **According to the Law 4555/2018** (Government Gazette B'133/19-7-2018) it is attributed to the Municipalities (Grade A) the competence - among others – for the construction and operation of bio-waste processing units up to and including B category of the 4th group "Environmental Infrastructure Systems" of the No. Management of Regional Development/37674/2016 (Government Gazette B' 2471/10-8-2016) of the Minister's decision Environment and Energy and subject to the provisions of the concerned Regional Plan for waste management.
- According to **Ministry Decision No. Management of Regional Development/37674/2016**, which amended the Ministry Decision 1958/2012, falls under the activity with serial number 15 of the 4th Group – Environmental infrastructure systems:
 - The treatment-recovery units, in which aerobic treatment of bio-waste is applied, are characterized as composting units.
 - "Facilities for the preparation of soil improvers - compost from pre-selected or separated organic fraction of urban solid waste in industrial buildings or other suitable constructions, e.g. greenhouse type, non-roofed, etc."
 - As mentioned above, the Municipalities are responsible for the construction and operation of such units, as long as the daily capacity of those entering them of waste ranges from 1 t to 20 t (Category B).
- Under the provisions of the Ministry of Internal Affairs/ Management of Regional **Development/11936/836/2019** (Government Gazette B'436), the purpose of which is to implement the provisions of Law 4442/2016 (Government Gazette A' 230), amended by Law 4549/2018 (Government Gazette A' 105), regarding the simplification of the installation and operation framework of environmental systems infrastructures, MEBA category B is subject to a notification regime as towards their operation (article 7 par. 2), with the procedure and the relevant justifications being included in article 10 thereof.

Material recovery -Soil improver:

Greece is one of the last countries in Europe in the production of compost and soil improvers even though the needs are great in Greek crops. The lack of organic matter characterizes 90% of the Greek agricultural land. There is a risk of desertification in many areas. The use of biofertilizers is a decisive factor in reversing the phenomenon.

The recorded production of compost in Greece is a few thousand cubic meters, and their quality, in most cases, is low to toxic.

The biggest producer of compost is the Mechanical Recycling and Composting Factory (EMAK) located in the region of Attica (Fyli).

Ecolabel

The Municipality of Vari – Voula – Vouliagmeni is the first Municipality in Greece to receive the relevant certification and is now able to use **Vita Green and Vita-Green Plus**³² in the rapidly growing market of organic agriculture, a market with significant potential, both at European as well as at national level. Vita Green is an organic soil improver crafted through innovative natural processing of clean plant residues, it boasts a rich composition of organic matter, including active humic and fulvic components, surpassing well-digested manure by fivefold. This revolutionary formula significantly enhances mineral fertilizer utilization and fosters a thriving biological environment for plants by introducing beneficial soil microorganisms. Vita Green's water-retention capacity reduces consumption by a third, while meeting international standards as black humus peat. Certified for organic farming according to EU regulations, it comes conveniently packaged in a 50L bag, offering a sustainable solution for nurturing healthy crops.



Figure 3: Vita Green fertilizer

BIOWASTE POLICY FRAMEWORK IN THE NETHERLANDS

Waste Management – Collection, Segregation, Transportation.

Based on the European waste framework directive (Directive 2018/851 of the European Parliament), the Netherlands has introduced the following national directives:

- **National Waste Management Plan (LAP)** (2021) The policy framework describes the national policy for waste prevention and waste management, the objective of the waste policy, definitions, and minimum requirements of recycling in sector plans. Biowaste from households is sector plan 6 and biowaste from businesses is described in sector plan 7. It also provides insight into monitoring and enforcement. As for collected biowaste, the minimum requirement is (1) composting for the purpose of recycling; or (2) fermentation for biogas and followed by after ripening (subsequent composting or another form of aerobic drying) with a view to recycle the digestate. The **third National Waste Management Plan (LAP3)** underwent its second amendment, effective from 1 January 2024. This amendment aligns with the Environment and Planning Act (Omgevingswet), which also came into force on the same date
- **Waste Management directive - composting and recycling** (2016) Completely renewed as per 01.01.2024 All organic waste / organic waste / swill processing from biowaste of more than one household is a commercial activity and therefore requires

³² <https://www.vvv.gov.gr/index.php/kainotomies-diakriseis-synergasies/vita-green>

a permit under the Environmental law decision. This means that an Environmental Permit is required. The law does not grant exceptions for certain processing methods, small quantities, or other specific situations. This also includes small-scale processing devices. Private individuals (one household) are not required to have a permit, because this is not considered a business activity.

- **Compost and Sewage Sludge Transport Permit (VCZ)** is required for the transport of compost. Exceptions are compost packaged in units of 25 kg or less, compost that you deliver to a private individual (max. 3,000 kg per delivery) and compost that the buyer moves within his own company. Each load has its own VCZ, which also includes the analysis results of the compost.

Processing/treatment:

Biowaste treatment in waste management plants:

- **Executive Order on Composting and Anaerobic Digestion (Bekendtgørelse om kompostering og anaerob behandling af affald):** (2018) If biowaste is processed through composting or anaerobic digestion, specific regulations apply to ensure proper treatment and environmental protection.
- **Executive Order on Environmental Approval (Bekendtgørelse om miljøtilsyn):** 2019 If composting activities are conducted as part of a larger facility, this executive order outlines the requirements for obtaining environmental approval for the facility.

Material recovery - Soil improver:

Based on the European, "A bioeconomy strategy for Europe – Working with nature for a more sustainable way of living," the Netherlands has introduced the following national orders:

- **Meststoffenwet (Fertilizer Law)** (2023) The Fertilizer Law contains general rules on the production, trading and use of fertilizers that are based on animal products. These rules have been elaborated in detail in the Fertilizer Law Implementation Decree and the Fertilizer Law Implementation Regulations. As for biowaste, there is no separate regulation for fertilisers from strictly plant-based waste products, so the fertiliser law applies to all soil improvers made from waste products. If a facility wants to produce soil improvers from biowaste, there is a need to certify the process at the "NVWA) (Netherlands Food safety Authority). The only exception is for private use by individual (not collective) households

QA/QC organization

- **Exception of Implementation Decree for vermicomposting** (2023) Various worms, including the 'compost worm' *Eisenia foetida*, have been designated as production animals in the Animal Keepers Decree. The Animal Products Regulation states that it is prohibited to have food scraps available at locations where they are kept, with the exception of fur-bearing animals. With regard to processing by worms, the Ministry of Agriculture, Nature and Food Quality published a decision note in June 2023. An exemption can now be requested from the NVWA to supply kitchen waste and food scraps and have them available at the same location where compost worms are kept. The material must be hygienized (60 minutes at 70°C) before it is fed to the worms.
- **Implementation Decree on the Fertilizer Law** (2023) This Decree defines the agricultural, environmental, packaging and labelling requirements for fertilizer

products that are (also) based on animal products. For compost (that is based on food waste including kitchen waste that contains animal products), the following quality requirements apply to the end-product: (1) Compost does not contain biodegradable parts with a diameter greater than 50 millimetres and no more than 0.5 percent by weight of non-biodegradable parts foreign to the soil. (2) Compost contains at least ten percent organic matter by weight of the dry matter. (3) It is only permitted to use soil components in the preparation of compost if this concerns soil as referred to in Article 1 of the Soil Quality Decree, the quality of which does not exceed the background values established pursuant to Article 40 of that Decree. (4) Compost does not exceed the maximum values for heavy metals included in Annex II, under table 3, to this decision, expressed in milligrams per kilogram of dry matter.

RELATED PROJECTS

During the compilation of our research, we referred to a wide range of related initiatives, such as the innovative VALUEWASTE project, BIO CIRCULAR CITIES and LIFE-BIOBEST, that offered insightful information on the fields of European law and biowaste management. These projects were valuable tools that improved our comprehension and analysis of European law, and gave insights on legal frameworks, regulatory compliance, and policy implementations across biowaste sector. This includes research on how EU directives influence national legislation, how EU member states harmonise their legal systems, and how enforcement measures are used to guarantee that standards are followed. Concurrently, our exploration into biowaste management drew upon a group of projects focusing on sustainable waste practices, circular economy models, and innovative technologies aimed at minimizing environmental impact.

CONCLUSIONS

The policy framework has been analysed by collecting legal acts and other documents jointly with all partners and by countries.

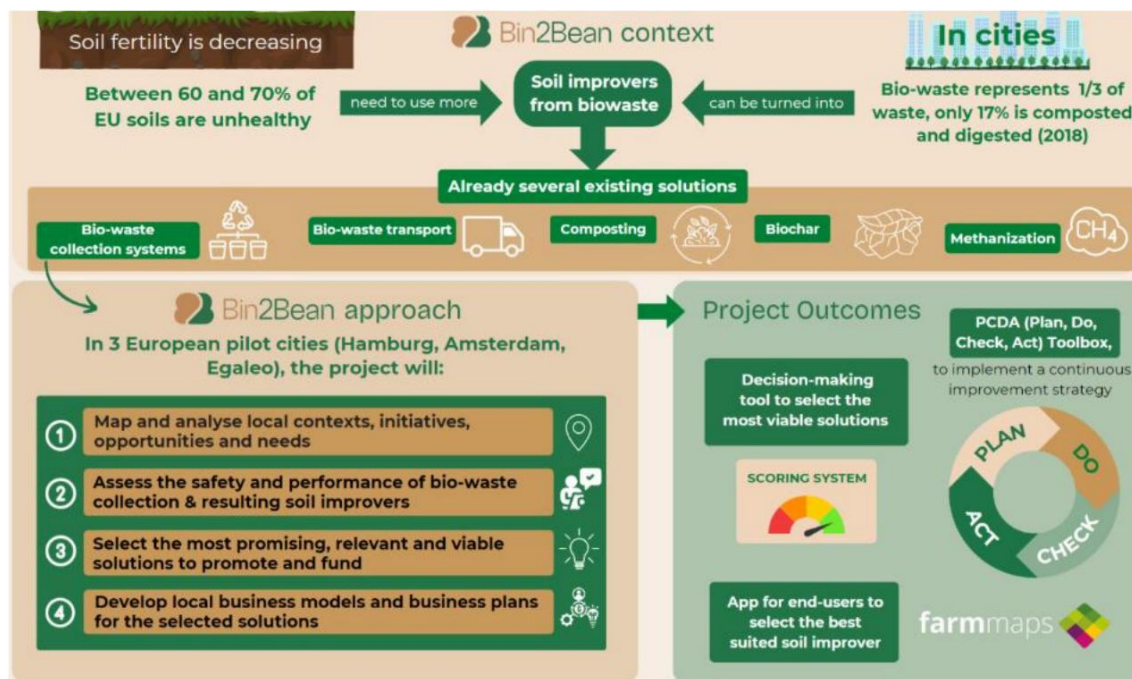
After the **Waste Framework Directive** was published in 2008, plans and municipal rules aimed at achieving the goals began to appear, marking the most active time at the national and regional levels. This indicates that crucial EU laws have a key role in accelerating local government measures to put plans and regulations into effect, especially those pertaining to the circular economy. The gathered documents address a wide range of issues, including legal actions. This implies that the topics covered are not limited to just one sort of waste, but rather encompass general elements such waste management and environmental protection. However, very few publications discuss particular waste or specialised subjects like product marketing or waste classification. According to the study done, there is still room for programmes like BIN2BEAN to assist generate helpful policies, for instance, regarding new technologies.

When it comes to the quality of biowaste for various applications, separate collection is essential, and individual engagement is crucial. In this view, only a small number of local administrations (municipalities) carry out initiatives that engage citizen participation, despite the fact that the policy framework is extensively defined regarding the breadth of waste types, management, etc.

Whereas European regulation tends to give guidelines to be implemented by Member States, more precision at national level would help to achieve the goals.

Annex

[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](#), [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.