LIFE BIOBEST

GUIDING THE MAINSTREAMING OF BEST BIO-WASTE RECYCLING PRACTICES IN EUROPE

D5.4 Comprehensive Guidance for effective bio-waste management in the EU

WP5: Policy and regulatory recommendations for bio-waste

T5.2: Comprehensive Guidance for the EU

LIFE BIOBEST

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Table of Contents

Acronym & Term

ABPR	Animal by Product Regulation
AD	Anaerobic digestion
BP	Best practice
CAP	Common Agricultural Policy
CFCR	Certification Framework for Carbon Removals
CH_4	Methane
D	Deliverable
EC	European Commission
EU	European Union
FPR	Fertiliser Product Regulation
KW	Kitchen waste
LD	Landfill Directive
MBT	Mechanical biological treatment
MS	Member State(s)
PAYT	Pay-as-you-throw
QAS	Quality Assurance Scheme
WFD	Waste Framework Directive
WP	Work package

1. LIFE BIOBEST Project Summary and Key Results

The EU obligation on the separate collection of bio-waste came into force at the start of 2024, increasing the availability of source-separated bio-waste for composting and anaerobic digestion. To ensure the development of bio-waste management best practices and the production of quality compost and digestate for soil applications, while minimising any negative effect and effectively closing the loop, a comprehensive analysis is required regarding bio-waste management strategies, instruments and management schemes and their results.

LIFE BIOBEST project outcomes, detailed below, identify and validate the current Best Practices and management instruments along the bio-waste management chain (from generation to treatment) that allow the production of high-quality compost and digestate. The project focuses on supporting both upper and lower levels of governance —including policymakers, waste management organisations, and technical practitioners— to facilitate the widespread adoption of recognised Best Practices. This can be achieved by effectively addressing administrative, economic, organisational, and technical barriers that both Member States (MS) and local authorities face in complying with the mandate for separate collection, as well as achieving their reuse and recycling targets by implementing optimal bio-waste management systems.

These findings are detailed in the following LIFE BIOBEST deliverables (D):

- **D2.1 Improved and homogenised datasets on municipal bio-waste management** supports the establishment of a series of reference Key Performance Indicators (KPIs). The dataset contains fundamental information on bio-waste collection and treatment in nearly all 27 MS, along with detailed data on kitchen and garden waste collection per capita at the municipal level for Italy, Denmark, and Catalonia.
- **D5.2 Policy brief** identifies the gaps in the regulatory framework and systemic barriers obstructing efficient bio-waste management with high capture rates of high-quality material.
- **D3.1 Guideline on separate collection** provides an overview of the different bio-waste separate collection schemes and assesses the pros/cons. This guideline includes in an annex, "Best practice cases on bio-waste collection" that focus on collection from households and other producers in various contexts. Best practice cases on bio-waste collection" that focus on collection from households and other producers in various contexts.

- **D3.2 Guideline on governance and economic incentives** discusses the governance tools and economic instruments needed to improve management schemes. The guideline presents these instruments alongside examples of their application and includes an analysis of the economic viability of best practices in bio-waste management from separate collection to treatment.
- **D3.3 Guideline on quality compost and digestate** breaks down the treatment technologies and resources that support the production of compost and digestate. The guideline provides insights about the processing options, analysis of product characteristics, quality assurance systems as well as related EU legislation and the ECN's Quality Assurance Scheme.
- **D3.4 Factsheets on the analysis of best practices in communication and engagement from various countries** delves into the topic of public communication and education. It includes an analysis of experiences from frontrunners and provides insights into the impact of communication activities, highlighting the need for well-coordinated outreach efforts combined with convenient collection systems to encourage citizen participation.
- **D5.3 Proposition of quality standards** aims to establish harmonised quality standards for bio-waste entering recycling processes across EU MS. It includes recommendations for a standardised methodology for quality assessment via waste compositional analysis and/or visual inspection, as well as a control value for impurities in bio-waste. This report was drafted with regards to §22, point 3 of the Waste Framework Directive (WFD).
- **D2.3 Assessment matrix of best practices** evaluates and consolidates contextual factors that affect bio-waste management, providing in-depth descriptions of each. Factors are placed beside recommendations and theoretical scenarios, which stakeholders can use to compare to their own context.

Finally, this comprehensive guidance for the EU outlines key actions needed to strengthen the current European legislative framework. Its goal is to drive and accelerate progress by supporting MS in implementing high-performing bio-waste collection and recycling, improving data management, enhancing performance monitoring, and fostering a reliable market for compost and digestate.

The LIFE BIOBEST consortium is led by **Fundació ENT** (ENT) in partnership with **Consorzio Italiano Compostatori** (CIC), **ACR+** (Association of Cities and Regions for sustainable Resource management), **European Compost Network** (ECN) and **Zero Waste Europe** (ZWE). It is a 2.5-years LIFE Preparatory Project funded by the European Commission.

Project Total Eligible Costs: 1,664,600.07, Funding Rate: 90%, Maximum Grant Amount: 1,498,140.05€.

2. Introduction

Bio-waste management in the EU: current results and challenges

A year after the EU mandate to separately collect bio-waste took effect (§ 22 the WFD), only a few EU regions and MS are achieving both high quality and large quantities of separately collected and recycled bio-waste. In many areas, bio-waste management is still in its infancy.

Despite numerous EU policy drivers, bio-waste remains an untapped resource for recycling. Notably, kitchen waste (KW) represents only 29% of the bio-waste collected separately on average, and just 26% of all KW generated in the EU is successfully collected (see **D3.1**).

With optimised collection schemes in place, up to 51 million tonnes could be captured, revealing a current shortfall of nearly 35 million tonnes (Favoino, Giavini, 2024).

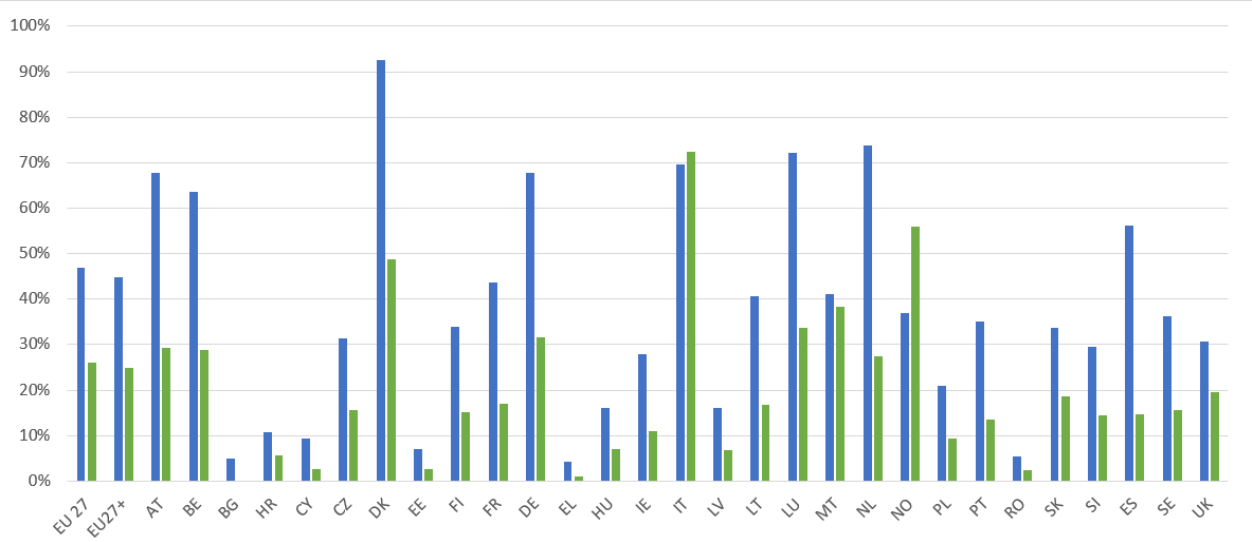
It must also be noted that significant disparities exist among MS, with the proportion of total generated KW collected separately ranging from as low as 2% in Romania to 72% in Italy. Yet, even in regions where collection systems have been in place for many years, both the capture rate and the quality of separately collected materials —particularly KW— remain below expectation.

Physical impurities, particularly from plastics, represent a significant concern as they increase the rejection rates of organic materials during pre-treatment or refining processes. High levels of impurities are often connected to the type of collection scheme, with door-to-door collection commonly yielding the highest quality of separately collected materials.

Policies should therefore aim at promoting both the highest captures and best quality of collected bio-waste, which is possible according to evidence from many best practices from across the EU.

Yet, without clear performance targets for the quality and quantity of bio-waste diverted from residual waste, local authorities may simply prioritise systems that may appear cost-effective in the short term. This often favors lower initial investment and operating costs for establishing a new collection stream. However, such an approach overlooks the potential to reallocate resources from residual waste collection to bio-waste collection, enabled by higher bio-waste capture rates and a decrease in residual waste, which of bio-waste comprises a significant proportion. Indeed, effective bio-waste management systems lead to significant municipal

Figure 1 - Comparison theoretical potential / currently collected (kitchen-waste and bio-waste), data related to year 2022. Source: (Favoino & Giavini, 2024)



cost savings through reduced collection rounds for residual waste, lower processing costs for bio-waste, and minimised expenditures for residual waste disposal.

The European Commission (EC) must therefore stress the urgency of implementing high performing bio-waste separate collection systems, with recycling in composting facilities or anaerobic digestion (AD) plants to reduce reliance on landfilling and incineration as treatment methods[1]. This is of utmost importance, as currently 74% of all KW generated is still disposed of through landfilling and incineration (Favoino & Giavini, 2024). Worryingly, poor bio-waste management produces significant amounts of methane (CH_4) from waste decomposing in landfills, which accounts for approximately 3% of total greenhouse gas emissions.

Meanwhile, most European soils are suffering from erosion, with 60-70% currently classified as unhealthy and nearly half suffering from low organic matter content, reducing their capacity to retain nutrients and water (European Commission, Joint Research Centre, 2023). Data shows that most European countries are still not currently producing enough compost to address their eroded soil. Achieving the EU's 65% recycling target through enhanced bio-waste management could potentially double the area benefiting from compost application (ECN, Data Report 2022).

Research suggests that to meet future recycling and reuse targets by 2035, the

1 Both landfilling and incineration are considered as "leakages" of resources from a circular economy perspective.

contribution of bio-waste to recycling rates needs to rise from the current 17% of separately collected bio-waste out of total municipal solid waste (MSW), to 35% of MSW (ECN, Data Report 2022). Achieving this will necessitate a substantial expansion of bio-waste treatment capacity, including an estimated 6,000 additional AD and composting facilities to accommodate the increasing demand. Nevertheless, investment levels required across the EU will not be uniform due to significant disparities in current treatment capacities among and within MS, which range from 0 to 356 kg of bio-waste per capita (Van der Linden & Brusselaers, 2020).

Local decision makers must therefore consider new, optimised plans and practices, while calling on EU policymakers to adopt result-oriented targets to accelerate progress and effectively support the obligation on separate management of bio-waste.

In the absence of sufficient guidance, performance-related legally binding targets, and effective monitoring of performance, the EU bio-waste separate collection mandate will continue to lead to the implementation of under-performing systems.

To fully realise its potential, effective bio-waste management will require coordinated policy actions across governance levels and key sectors, including, but not limited to, agriculture, soil management, biodiversity, industrial emissions, and, of course, the waste sector. A few well-defined and targeted improvements in existing policies will significantly advance progress towards climate targets and further the EU's objectives for a circular economy and soil health.

Please see the **LIFE BIOBEST video on policy recommendations**.

Waste Framework Directive

The revised WFD (2018) introduces obligations and objectives that set performance standards for MSW management in the EU, including bio-waste related management provisions (see **D5.2** for a detailed summary of the WFD provisions).

OBLIGATIONS & RELATED OBJECTIVES	SHORTCOMINGS
Separate collection mandate (Art. 22) • All MS must organise the separate management of bio-waste by January 1, 2024 to enhance material recycling **Objectives:** • Encourage the diversion of bio-waste from residual waste • Promote the recycling of bio-waste into high-quality compost or digestate • Implement efficient separate collection systems	Lack of specific quantity or quality targets does not promote high-performance bio-waste collection systems. Compliance with the law can be achieved through minimal changes, providing no strong incentive to improve system performance. Poor-performing systems (e.g., open street bins, low service coverage) may still be implemented without consequences.
Targets for "preparation for reuse and recycling" of MSW: • 2025: Minimum of 55% by weight • 2030: Minimum of 60% by weight • 2035: Minimum of 65% by weight **Objectives:** • Increase overall recycling rates across the EU • Ensure waste is diverted from landfills and incineration	Lack of specific bio-waste targets to drive efficient collection systems. MS are at risk of missing preparation for reuse and recycling targets.

OBLIGATIONS & RELATED OBJECTIVES	SHORTCOMINGS
New calculation methodology of targets for "preparation for reuse and recycling" • Effective January 1, 2027, municipal bio-waste entering aerobic or anaerobic treatment will only count as recycled if separately collected or separated at source. Mechanical biological treatment (MBT) may only be considered as a pre-treatment before landfilling and will no longer count towards recycling targets • Municipal bio-waste can be considered recycled if it results in compost or digestate used as a recycled product[2]. Waste used solely for energy recovery, incineration, production of fuels, or for backfilling, or landfilling does not qualify as recycling • The calculation of recycling rates for EU compliance must subtract rejects, which are linked to impurities in separated fractions. However, "process losses" are considered "recycled" if the compost or digestate meets quality standards[3] **Objectives:** • Minimise the quantity of impurities in the bio-waste bin • Guarantees the production of quality compost and digestate	While quality of collected bio-waste is key to minimise rejects from treatment sites, thereby increasing net recycling rates, the development of a European standard for bio-waste entering organic recycling processes has been mandated since 2018, yet no significant progress has been made to date.
Standard for organic recycling (Art. 22 (3)) • Mandate for the development of a European standard for bio-waste entering organic recycling processes	The development of an EU standard for bio-waste entering organic recycling processes mandated in 2018 has made little progress to date.
Provision for future recycling target for bio-waste • By December 31, 2024, the EC will consider setting recycling targets for municipal bio-waste; this should be done in the frame of the current mid-term revision of the WFD	There has been no follow-up action with respect to this provision.

2 Energy recovery in the form of biogas, in the case of anaerobic digestion, may be considered as "recycling", hence included in its calculation, where the primary output remains compost or digestate which may be beneficially used on soils.

3 As those stipulated in the EC Fertiliser Regulation or in National Acts and Regulations on Fertilisers, which ensure they are beneficial to soils.

Landfill Directive

In accordance with the waste hierarchy, the LD serves as a key driver to reduce reliance on landfills and prevent or minimise the negative impacts of landfilling, such as CH_4 generation from the disposal of bio-waste. Additionally, it helps reduce the loss of valuable resources that could otherwise be reused or recycled by cutting the amount of waste going to landfill. The LD directly references bio-waste management, including the following obligations and related objectives (see **D5.2** for a detailed summary of the LD provisions).

OBLIGATIONS & RELATED OBJECTIVES	SHORTCOMINGS
Progressive reduction of the amount of MSW going to landfill: • The amount of biodegradable municipal waste going to landfill must be progressively reduced, with the latest target to bring the amount of biodegradable municipal waste which is landfilled down to 35% of 1995 levels by July 2016. • By 2035, only 10% of municipal waste can be landfilled. **Objectives:** • Reduce the amount of MSW sent to landfills • Promote recycling as an alternative treatment method	Legally binding targets have led to a significant reduction of MSW landfill use. However, it was accompanied by an increase in waste incineration estimated at 98% during the same period (Eurostat, 2022). Some MS that currently meet LD targets and/or ban untreated MSW and bio-waste from landfills, do so by adopting waste management strategies heavily reliant on incineration[4].
Treatment obligation: • All waste must undergo pre-treatment before being landfilled **Objectives:** • Minimise harmful emissions (e.g., CH_4) • Reduce leachate production in landfills • Internalise the environmental costs by making landfilling more expensive to support recycling strategies	Various MS are still not complying with this obligation, keeping local costs of disposal at landfills very low. Moreover, the lack of harmonised requirements and codified criteria for accepting waste at landfills often promotes simple and not effective pretreatment methods.
Prioritisation of recycling: • By 2030, MS must ensure that all waste suitable for recycling or other recovery, particularly bio-waste in MSW, shall not be accepted in landfills, except for waste for which landfilling delivers the best environmental outcome. **Objective:** • Support the fulfillment of EU recycling targets	Since no separate collection system can capture 100% of the targeted waste fraction, a total landfill ban can drive incineration, as compliance can only be achieved through thermal treatment, potentially leading to a 'lock-in' effect.

4 In 2020, 9 MS and 2 non-EU countries sent 10% or less of municipal waste to landfills, with several of these countries incinerating a considerable amount of municipal waste (European Environment Agency, 2022). It's worth noting that only six Member States ban biodegradable waste from landfills.

Fertiliser Product Regulation

The Fertiliser Product Regulation (FPR) (Regulation 2019/1009) established rules for EU fertilising products carrying the CE label, setting out harmonised requirements for safety (including limits for physical and chemical contaminants), quality (such as minimum nutrient content and other relevant characteristics), and labelling[5]. These requirements ensure that fertilising products can be freely traded within the internal EU market. The latest version of the FPR introduced in its scope organic materials, which previously were left out.

OBLIGATIONS & RELATED OBJECTIVES	SHORTCOMINGS

Introduction of specific requirements for compost and digestate:
• The newly introduced requirements cover both the production process and product quality, aligning with those found in the ECN Quality Assurance Scheme (QAS) as well as national and regional QAS. These include:
  • Production standards
  • Maximum levels of organic pollutants, impurities (such as glass, metals, and plastics)
  • External quality control ensured through a conformity assessment conducted by a notified body, which includes both process and product controls
 	
Objectives:
• Facilitate access to CE marking and free trade in organic fertilisers, such as compost and digestate, throughout the EU, and stimulate demand for these products
• Level the playing field with mineral fertilisers by driving investment in the recycling of bio-waste
	FPR compliance is mandatory only for producers seeking "CE labelling" to market compost or digestate across Europe, while locally sold products can follow national regulations. As a result, much of the locally marketed compost does not require CE labelling, reducing the FPR's impact.
	
	Also, some FPR provisions, referencing the Animal By-Product Regulation (ABPR), impose burdensome and often unsuitable operational requirements for composting and AD sites.

5 The letters 'CE' appear on many products traded on the extended Single Market in the European Economic Area (EEA). They signify that products sold in the EEA have been assessed to meet high safety, health, and environmental protection requirements.

3. Policy recommendations to strengthen the EU legal framework for efficient bio-waste management

Drawing on the regulatory framework and systemic barriers outlined in **D5.2** as well as the four guidelines designed to enable bio-waste recycling to high-quality compost and digestate across the EU, this guidance offers key policy recommendations to European policymakers aimed at improving the efficiency of bio-waste collection and management throughout the EU.

These recommendations are intended to provide a more supportive structure for MS, regions and municipalities, enabling higher collection rates while improving the overall quality of managed bio-waste, and progressing toward a fully closed bio-waste cycle[6].

The recommendations are structured into three interconnected sections, each addressing different phases of bio-waste management:

6 Although food waste prevention falls outside the scope of this guidance, it is important to emphasise the critical need to strengthen the EU legal framework. This objective should be pursued alongside efforts to further optimise bio-waste management policies, as such alignment would enhance the cost-effectiveness of bio-waste management and prevent the unintended consequence of undermining food waste prevention efforts by expanding bio-waste treatment capacity. While the proposed revision of the WFD, which sets binding food waste reduction targets for 2030 is a positive first step, these targets fall short of the 50% reduction goal outlined in the EU Green Deal and the UN Sustainable Development Goals.

- **Boosting effective models for separate collection and recycling of bio-waste**. This section focuses on establishing clear targets and supplementary economic instruments that promote the implementation of efficient and economically viable models (see **D3.1** and **D3.3**).

- **Promote and strengthen reliable and new markets for compost and digestate**. This section highlights key measures to support the production, marketing, and application of high-quality compost and digestate in agriculture, landscaping and the growing media industry. By strengthening consumer confidence, these measures aim to stimulate public and private demand for compost and digestate, thus improving incentives for proper collection & treatment.

- **Effective monitoring and enforcement of bio-waste regulations**. This section emphasises the need for consistent data and harmonising the monitoring and reporting obligations across MS, addressing the current inconsistencies at municipal, regional, and national levels. By ensuring data availability, comparability and accuracy, policymakers will be better equipped to assess progress towards relevant waste targets and identify areas for improvement. Enhanced monitoring of the bio-waste management process would also help guarantee the quality of the final product, maximising the benefits that compost and digestate applications can provide to soil health and fertility.

3.1 Boosting high-performing models for the separate collection and recycling of bio-waste

3.1.1 Establish legally binding targets linked to the amount and quality of bio-waste managed separately

Building on the challenges and risks outlined in the section 2, LIFE BIOBEST consortium expert organisations recommend incorporating a set of three complementary legally binding targets in the ongoing and future revisions of the WFD, potentially through, or in coordination with, the proposed Circular Economy Act.

The introduction of such targets aims to address key aspects of bio-waste management by increasing the diversion rate of bio-waste from residual waste, ensuring the quality of bio-waste entering the recycling process, and promoting improved management of all waste streams to minimise residual waste generation. This would also positively contribute to the EU's targets on preparation for reuse and recycling, while supporting an overall increase of bio-waste recycling across the EU.

1. **Adopt a legally binding target for the amount of bio-waste found in mixed/residual waste**. This target aims at minimising the bio-waste "leakage" (i.e., the amount lost in residual waste) instead of setting a relative target for bio-waste collection. Such an instrument has the advantage of preventing competition among separate waste collection, home/community composting, and food waste prevention efforts. These strategies can effectively contribute to reducing bio-waste in the residuals, fostering a more integrated approach to bio-waste management. Adopting a collection target alone, in absolute or relative numbers (kg or %) would, on the contrary, only incentivise separate collection models, which could, in the long term, be at the expense of decentralised composting and food waste prevention programs. This target will be effectively supported by the other recommendations listed in this guidance, which together form a comprehensive framework to ensure that high-quality standards are maintained across bio-waste and other streams of organic waste (as those from agroindustry).

    a. The calculation may be derived from the quantities of residual waste (which are already monitored) and periodic compositional analyses, with frequency defined based on the size of the municipality or district. Before setting specific targets, a monitoring campaign could be conducted, or existing data collected from across the EU could be leveraged to determine achievable levels, also considering the contribution by non-residents (e.g commuting workers, short-term visitors) and large producers in cities and tourist areas.

    b. Based on the successful results achieved in challenging environments, such as high-density cities (and with a large contribution by commuters, visitors and food services) like Milan, one may consider e.g. setting a target of 25 kg per capita per year of bio-waste in mixed/residual waste by 2030 and 15 kg per capita per year by 2035. This target can be supported by clear evidence that these goals are not only achievable but have already been met, drawing from recognised local best-practices and KPIs defined within the LIFE BIOBEST project (see **D3.1** for more evidence supporting this target).

    c. To be most effective, the target should be transferred as close as possible to the generators, hence they should preferably be applied at, and be transferred by MS to, lower jurisdictional levels (municipalities, districts, regions, etc.).

2. **Adopt a legally binding target for the quality of bio-waste entering the recycling process** by setting a control value on accepted physical impurities in bio-waste sent for composting or AD. This control value, also foreseen in art 22(3) of the WFD, could be monitored through visual inspection supported by recurring compositional analysis of the bio-waste fraction (see **D5.3** for more evidence supporting this target).

    a. Research indicates that maintaining impurities below a threshold of e.g. 5% is essential to ensure the production of high-quality end products, reducing reject rates and driving the adoption of bio-waste management systems that deliver cleaner inputs to processing sites. The ratio of rejects to impurities, called the "dragging factor", which inflates the total amount of rejected materials in proportion to impurities, shows the importance of having the cleanest input feedstocks possible to reduce costs while maximising the agricultural, environmental, and economic benefits of compost/biogas schemes and strategies.

    b. Moreover, not all impurities such as microplastics, small pieces of glass, and fine particles can be fully removed during processing. Impurities are likely to end up in the final product, making the reduction of plastic impurities especially important, to mitigate diffusion of microplastic and to ensure high-quality compost and digestate.

    c. It will be crucial to first establish a standardised method for measuring impurities before setting a control value, ensuring that the target, once enforced, is both practical and effective in delivering the desired quality outcomes.

    d. To further enhance bio-waste quality, variable gate fees for bio-waste entering the recycling facilities depending on its quality (level and/or type of impurities), can be implemented. Agreements between compost/AD plants, municipalities, and waste haulers should include different fees for different range values of impurities, and economic penalties for batches that exceed pre-agreed threshold control values for physical impurities. Such penalties would create financial incentives for waste generators to implement measures that enhance the quality of their bio-waste, ultimately benefiting the recycling system.

    e. Regions with the lowest performance could be given a set period to adapt to evolving targets through a transitional phase, enabling them to implement necessary measures before the highest standards become fully effective.

3. **Adopt a legally binding target to reduce residual waste generation**. Such a target aligns fully with the overarching goal of a circular economy, which aims to minimise the "leakage" of resources towards disposal, and would drive better management of all waste streams, including bio-waste collection. Current estimates place the average EU residual waste generation around 250kg per capita per year, but many municipalities, including large ones, are already around or below 100kg per capita per year.

    a. Based on the positive results obtained from a range of EU municipalities that have implemented best practices in waste management, one may consider setting a target of 120kg per capita per year by 2030 and 100kg per capita per year by 2035. The levels suggested -which could be the subject of a preliminary follow-up campaign to assess their feasibility in different contexts, considering factors such as "inhabitant equivalents" in areas with high tourist numbers- have already been largely achieved in different contexts across the EU (see **D3.1** for more evidence supporting this target).

3.1.2 Supplementary mechanisms to increase the cost-competitivity of bio-waste management

There is currently no level playing field in the EU for the proper management of bio-waste. Consequently, it is often more economically advantageous to send waste to incineration and landfill, rather than invest in efficient separate collection and treatment methods.

This happens since the costs associated with the negative externalities are not consistently factored into waste management costs. However, without the inclusion of these impacts in the economic balance of waste management, alternatives available in the lower levels of the waste hierarchy remain more affordable, thereby hampering the transition to waste management systems which retain resources in the circular economy loop.

Given the significant number of MS at risk of failing to meet recycling and preparation for reuse targets, it is essential for both the EU and its MS to prioritise the stronger application of key economic instruments. These reinforce the "polluter pays" and "Do Not Significantly Harm" (DNSH) principles[7].

The ongoing revision of the WFD and other future relevant legislative reviews should reflect this, as economic and fiscal instruments may have a direct, expedient impact on operational and behavioural change, and realign habits with the overarching goals of environmental policy. While the EU has limited authority over MS fiscal policies, it can actively promote the adoption of specific economic incentives and financial instruments for waste management that enhance the cost competitiveness of bio-waste separate collection and recycling. Furthermore, by promoting and developing specific levers, particularly through the provision and implementation of guidelines and standards, as well as by reviewing investment programs, EU policymakers have several tools available to them to ensure that EU funds are not allocated to inefficient management models and treatment solutions, and also that the potential environmental impacts (or efforts to avoid negative ones) are fully embedded in the cost of managing residual waste.

Priority areas to enhance the cost competitiveness of bio-waste management include:

7 The DNSH principle is a cornerstone of the Taxonomy Regulation, the Sustainable Finance Disclosure Regulation, and the Benchmark Regulation. It aims to prevent economic activities, investments, and reforms that cause significant environmental harm, as defined by the six EU-established environmental objectives, while promoting those aligned with the EU's environmental policies. More information can be found here.

4. **Discourage landfilling and incineration by effectively promoting the implementation of economic instruments** that realign with the waste hierarchy and the polluter-pays principle. By increasing the total costs associated with landfills and incinerators, including negative externalities, these economic instruments can enhance the viability of bio-waste management and encourage sustainable treatment options, such as composting and anaerobic digestion. To ensure clarity and consistency, recommended instruments should be listed in an annex to the WFD. Key economic instruments include (see **D3.2** for detailed information):

    a. Higher landfill and incinerator gate fees which also may include mitigation of externalities (e.g. proper pre-treatment, efficient capture and treatment of leachates, EU Emission Trading System (ETS) to charge emitted fossil CO_2 from incinerators).

    b. Strategic and efficient disposal taxes to incinerators and landfills (e.g. increased tax fees, tax modulation and its evolution in time).

    c. Refund systems, based on a premium/penalty principle, funded by landfill and incineration tax revenues to reward municipalities that successfully develop efficient separate bio-waste collection systems with higher captures and quality, and charge municipalities that deliver quantities and quality below targeted values.

    d. Variable gate fees for bio-waste entering the recycling facilities depending on it's quality (level and/or type of impurities).

5. **Avoid funding of lowest tiers in the waste hierarchy, and channel funds towards efficient prevention, reuse and recycling practices**. Implementing the DNSH principle, as outlined in the EU taxonomy for sustainable finance, accounts for the negative externalities associated with harmful disposal and treatment methods. This approach increases the costs of residual waste disposal, curtailing subsidies for landfills and incinerators, while channeling funds toward the highest tiers of the waste hierarchy. Although the adoption of the DNSH principle in recent years has contributed to advancing bio-waste management in the EU, its application could be more effective.

    a. Stricter monitoring of EU spending policies is essential to prevent the use of funds that contradicts the DNSH principle and fail to prioritise efficient bio-waste separate collection and recycling — especially when "integrated waste management plans" (or other definitions alike) unintentionally support both recycling and incineration.

b. The allocation of EU funds should align with the three legally binding targets for bio-waste proposed in section 3.1.1, ensuring that resources effectively drive progress toward these goals. This requires clear specifications and allocation criteria for funding, including the management model, eligible materials, and supporting activities. A key criterion should be, for example, the project's ability to enhance both the quality and quantity of bio-waste recycling.

c. Related procedural arrangements for funds to prevention, reuse and recycling, including bio-waste management, should be aligned and simplified across all MS, to make availability of funds more certain and faster.

6. **Proactively encourage the implementation of Pay-As-You-Throw (PAYT), Save-As-You-Throw (SAYT) systems** or other variations of variable waste charges that result in higher costs for households & businesses that generate more residual waste within the next revision of the WFD.

7. **Require that user-paid waste management charges include the full cost of the services provided**, including collection, transportation, recycling, treatment, disposal, communication and monitoring activities, etc. This would ensure that households and businesses involved in the system have a full, fair understanding of the real costs of waste management, the effect of positive actions to improve the system itself, and the cost of inaction.

8. **Ensure tighter enforcement of the obligation on the pretreatment of waste**, (LD 99/31), banning untreated waste from landfills. This would make residual waste management more expensive, while internalising its environmental externalities. In order to achieve this in an effective way, the definition of 'pretreatment' should be amended to require that landfilled waste meets specific thresholds that are connected to reduction of impacts, such as having volatile solids below 5% in case incineration is adopted and related ashes landfilled, or a dynamic respiration index below 1000 $mgO_2/kgVS.h$ for biologically stabilised outputs to be landfilled.

9. **Fully integrate waste incineration into the EU ETS starting in 2028**. The upcoming review mandated by the EU-ETS Directive by July 2026 provides a timely opportunity to evaluate how best to incorporate municipal waste incinerators into the EU ETS. A robust EU ETS will include both power and heat from incineration, without free allowances for heat generation. This integration will help ensure that for local authorities, bio-waste separate collection and recycling is a more cost-competitive solution compared to incineration (Hogg, D., 2024).


LOCAL ENTITIES
Revert positively back to
Bio-waste is managed by
Separate collection
*as mandated by the Waste Framework Directive
Residual waste collection
Practice does not comply with the legal framework
Biological treatment facilities
Pre-treatment in Mechanical biological treatment facilities
Rejects
Landfill or incinerator
Quality incentivised through
Practice penalised through
Variable gate fees for bio-waste depending on quality (% of impurities)
Higher gate fees that account for externalities
Strategic and efficient disposal taxes
Tax collected (tax fund)
Funds to improve and construct facilities
Refund system
Grants
Revert positively back to

3.2 Promote and strengthen reliable and new markets for compost and digestate

3.2.1 Reinforce synergies between environmental, agricultural and product policies to develop markets for compost and digestate and improve soil health

Bio-waste is a transversal resource that impacts several sectors. Its proper management is crucial for achieving cross-cutting EU objectives, such as fostering healthy soils and attaining climate neutrality by 2050. While many EU policies acknowledge its importance, greater alignment is needed across key EU legislation to maintain ambition and coherence[8]. The following recommendations aim to address these gaps.

10. **The EU Soil Monitoring Law should explicitly recognise high-quality compost and digestate as recycled organic soil improver and fertilisers**. To do so, several improvements should be considered in the future revision:

    a. Soil health and carbon farming certification methodologies should prioritise the use of quality-assured compost and digestate, due to their proven benefits for soil health and carbon storage. EU funding should support their development to promote the creation of a viable market for these certificates.

    b. Mandate sustainable soil management practices. While organic fertiliser solutions are supported and included in the sustainable soil management principles, the adopted law should go beyond general guidelines and include specific, mandatory practices, tailored to local contexts. Priority should be given to the regular application of high-quality compost, which significantly enhances soil structure, fertility, biodiversity and nutrient retention over the long term. At the same time, the role of digestate as a short-term organic fertiliser may be also acknowledged, when its use is tailored to local needs and agricultural patterns.

    c. The Certification Framework for Carbon Removals (CFCR) and the Common Agricultural Policy (CAP) should recognise and support the vital role of bio-waste-derived organic fertilisers and soil improvers in carbon farming practices. Digestate and compost, are essential for maintaining and enhancing soil organic carbon and supporting

8 EU policies and strategies addressing bio-waste directly or indirectly include, among others: the European Green Deal, Zero Pollution Action Plan, Bioeconomy Strategy, Farm to Fork Strategy, LD, WFD, Soil Monitoring Law, Renewable Energy Directive, CAP, FPR, ABPR, and the CFCR.

sustainable agricultural practices (see **D3.3**). Therefore, they should be incorporated into the eligibility criteria for result-based payment schemes under the CFCR and the incentive schemes for achieving Good Agricultural and Ecological Conditions under the CAP (e.g. eco-schemes, rural development programmes).

d. The future Circular Economy Act and the CAP should recognise the critical role of bio-waste-derived organic fertilisers and soil improvers in replacing mineral fertilisers, supporting a transition toward sustainable and circular agricultural practices. Including organic fertilisers in fertilisation plans would maximise nutrient use, reduce reliance on chemical fertilisers, and decrease Europe's dependence on fertiliser imports. It would also support the Farm to Fork strategic goals of achieving a 50% reduction in nutrient losses and a 20% decrease in chemical fertiliser use by 2030.

e. Set a target to support the use of bio-waste-derived organic fertilisers and soil improvers in preparing/manufacturing growing media, in line with the EU Nature Restoration Law. Compost can replace peat, a non-renewable resource, in growing media.

3.2.2 Enhance the use of organic fertilisers and soil improvers through subsidy systems and quality assurance

The current FPR's limited scope, applying only to CE-labeled products in the EU market, does not represent, in itself, a driver for investment in bio-waste recycling nor for an increased demand for compost and digestate; most bio-waste-derived materials are marketed domestically, and while domestic standards are perfectly suited to address specificities of local agricultural needs, they may show diverging standards from country to country. To address this, harmonised quality requirements, such as those to be assessed through an EU-wide Quality Assurance Scheme (**Quality Manual**, ECN-QAS), along with targeted incentives like subsidies, are needed to ensure consistent product quality and foster a reliable market for bio-waste-derived products.

11. **Promote the adoption of Rural Development Plans to establish national or regional subsidy systems** for farmers using bio-waste derived organic fertilisers and soil improvers, with priority given to high quality compost.

    a. Subsidies could be based on either a lump sum amount per hectare, on the amount of compost and/or digestate used, or on the purchase of compost spreading machinery.

    b. To maximise agronomic and environmental benefits, subsidies should be linked to the use of quality assured compost and digestate. This would require a controlled biological treatment process for providing a sufficient and constant supply of high-quality bio-waste derived organic fertilisers and soil improvers.

    c. Based on the final analysed product characteristics application recommendations should be provided for their most beneficial and efficient use for agriculture and the environment.

12. **Address the current fragmentation of quality criteria and redefine more appropriate requirements**. The absence of binding harmonised End-of-Waste (EoW) criteria for compost and digestate across the EU allows national governments to define their own standards which may result in fragmentation within the EU internal market. This may be also beneficial to some extent, in that it may address the specific requirements related to local farming practices, but may also create legal uncertainties, given the different national requirements when local compost needs to access EU markets. While the revised FPR seeks to establish a unified market by introducing CE-marking requirements for compost and digestate-based fertilising products — granting them EoW status for free trade across the EU, which is crucial for cross-border marketing — it faces technical challenges in handling input materials containing animal by-products, such as “catering waste” which includes kitchen waste from households and food services. It currently implies standard transformation parameters from the ABPR for composting and AD, which are unsuitable or operationally burdensome for biological treatment processes. Consequently, compost and digestate derived from animal by-products which is marketable at MS level does not meet the FPR requirements for CE labelling. To address this, the EU must adopt more operationally viable transformation parameters and integrate them into the ABPR and FPR.

13. **Set up an EU-wide QAS for compost and digestate**. Implementing QAS for compost and digestate, based on existing approved standards that contribute efficiently to soil health, will ensure the highest product quality (Refer to **D3.3** and **Quality Manual**, ECN - QAS). This will facilitate broader appli-

cations across various market sectors, increase customer acceptance, and enhance market value compared to non-quality assured products. This approach will also foster a single, unified market, eliminate legal uncertainties at the level of single MS, and enable the free trade of compost and digestate, whether locally, regionally, or throughout the EU. While the FPR sets general quality requirements, QAS can provide higher standards (e.g. stricter limits on inorganic pollutants). The importance of a QAS in certifying product quality is evident from recent findings: over 70% of compost produced in Germany (subject to a national QAS) meets the very strict requirements of the EU Regulation on Organic Production (Regulation (EU) 2018/848).

3.3 Effective monitoring and enforcement of current EU bio-waste regulations in member states

Improving the availability, accuracy and consistency of data is essential to enhance the effective implementation of bio-waste management strategies across the EU. However, currently, apart from the general data on bio-waste collection and recycling submitted by MS to the EU and published by EUROSTAT, few MS have established a comprehensive, detailed and reliable data management and reporting system.

In some cases, data available at the local level lacks the protocols, infrastructure and capacity to be collected and centralised by regional and national institutions, which further increases the fragmentation and inconsistency of bio-waste data across the EU. The lack of detailed and up-to-date information to monitor waste flows obstructs the planning and improvements of the bio-waste management systems. Critical parameters such as the distinction between kitchen and garden waste, impurity levels, service coverage, associated costs, treatment facilities, and the mass of rejects from the recycling process, are often incomplete.

Furthermore, existing reporting requirements do not mandate for the compositional assessment of bio-waste, nor provide a standardised methodology to do so. MS and local authorities rely on their own methodologies, guided by national or regional strategies, leading to misalignments. This creates a significant gap in understanding the efficiency of collection schemes, and the quality of collected bio-waste. To address these challenges, a harmonised approach for monitoring and reporting bio-waste management is needed, supported by legally binding mechanisms based on continuous and effective monitoring, expanded to include specific KPIs (see **D2.1** for a detailed list of KPIs). This will facilitate easier comparisons of data across countries, enabling more accurate and effective EU-wide assessments and informed policymaking at both national and EU levels. Such mechanisms will support the EU's efforts to enforce compliance with both the bio-waste separate collection mandate, and existing recycling and landfill targets, enabling the timely application of any appropriate sanctions on MS that fail to comply with EU requirements. It will also support the effective implementation and monitoring of specific bio-waste related targets (section 3.1.1) while fostering the production of high-quality compost and digestate.

To strengthen reporting requirements on captured and recycled bio-waste:

14. **Introduce a legal obligation alongside a method and frequency of compositional analysis of residual waste**. This requirement will provide essential information about the effectiveness of collection schemes in minimising bio-waste in the residual waste. While these analyses are relatively affordable, they still incur costs. Therefore, establishing an EU-wide methodology to standardise the frequency and processes (e.g. scale and methodology) for compositional analysis campaigns is crucial. This framework should be flexible to accommodate municipalities of varying sizes, enabling the bundling of smaller municipalities — preferably with the same collection model — to conduct analyses at a district level, thereby maximising the benefit-cost ratio.

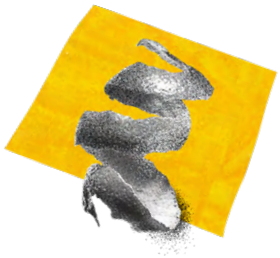
15. **Expand reporting requirements to include the monitoring of impurities in separately collected bio-waste**. This will support the establishment of a control value on accepted physical impurities in bio-waste entering biological treatment plants (see **D5.3**). A common methodology is necessary for promoting coherence in regulations, ensuring compliance with a target on the quality of bio-waste (section 3.1.1) while standardising the assessment of physical impurities across the EU.

16. **Define and include a set of KPIs in the reporting obligations for MS**, specifically targeting the bio-waste fraction. Priority should be given to those KPIs that support the implementation and monitoring of bio-waste related targets (section 3.1.1). This report recommends the use of the comprehensive list of KPI's identified in **D2.1**, as they were designed to facilitate the assessment of bio-waste management across territories and inform the development of future strategies. These KPIs are grouped into three categories, representing the relevant stages of the bio-waste recycling supply chain:

    a. Collection (& transport)

    b. Recycling (composting, AD or combined)

    c. Enabling legislation or regulation



17. **Establish a legally binding requirement for local authorities and treatment sites to collect and report bio-waste management data annually**, ensuring consistency and standardisation in the reporting process. While the WFD mandates reporting every 2 years from MS to the EC, there is currently no requirement for annual reporting. To efficiently track progress towards fulfilling the recycling targets as well as the bio-waste related targets proposed in section 3.1.1, as well as to monitor the evolution of bio-waste management implementation and assess overall coverage and subsequent performance, it's critical that this gap is closed. This requirement should be supported with clear guidelines outlining what data to report and the calculation methods, to ensure consistency and standardisation across all entities.

18. To ensure effective enforcement, **MS must coordinate the process, ensuring that data collected at the local level is accurately transferred to regional and national institutions** for public reporting, streamlining the process to avoid unnecessary reporting.

POLICY RECOMMENDATIONS TO STRENGTHEN THE EU LEGAL FRAMEWORK FOR EFFICIENT BIO-WASTE MANAGEMENT

- Establish legally binding targets on the amount of bio-waste found in residual waste per year
- Establish legally binding targets on the quality of bio-waste entering the recycling process by setting a limit on accepted physical impurities
- Establish legally binding targets on the limit of residual waste generation per inhabitant (which indirectly improves bio-waste collection)

Increase the cost-competitivity of bio-waste management

1. **Disincentivise the amount of waste sent to landfills and incinerators across EU Member States through:**
   - **a.** Strategic disposal taxes to incinerators and landfills
   - **b.** Higher landfill and incineration gate fees which include all the costs and externalities
   - **c.** Refund system associated with the landfill/incineration tax (tax fund)
   - **d.** Variable gate fees for bio-waste
   - **e.** Tighter enforcement of the obligation on the pretreatment of waste (stipulated by the Landfill Directive 99/31)
2. **Avoid any funding of lowest tiers in the waste hierarchy, and channel funds towards the highest ones through:**
   - **a.** Stricter monitoring of EU spending policies
   - **b.** The allocation of EU funds should also align with the three legally binding targets
   - **c.** Related procedural arrangements for funds to highest tiers aligned and simplified across all Member States
3. **Encourage the implementation of Pay-As-You-Throw and/or Save-As-You-Throw systems**
4. **Require that user-paid waste management charges include the full cost of the service**
5. **Integrate waste incineration fully into the EU Emissions Trading System starting in 2028**

Develop reliable markets for compost and digestate

1. **Explicitly recognise high-quality compost and digestate as essential components of the Soil Monitoring Law through:**
   - **a.** Prioritised use of quality-assured compost and digestate in Soil health and carbon farming certification methodologies
   - **b.** Mandated sustainable soil management practices
2. **Recognise and support the vital role of bio-waste-derived organic fertilisers and soil improvers in carbon farming practices and in replacing mineral fertilisers, within key legislations: the Certification Framework for Carbon Removals, the future Circular Economy Act, the Common Agricultural Policy and in the EU Nature Restoration Law**
3. **Promote the adoption of Rural Development Plans to establish subsidy systems for farmers using organic fertilisers to improve soils and sequester carbon, prioritising high quality compost**
4. **Address and revise the references to Animal By-Products Regulation in the Fertiliser Product Regulation, which are blocking its adoption by local bio-waste recycling plants**
5. **Set up and promote an EU-wide Quality Assurance Scheme for compost and digestate such as the one promoted by European Compost Network**

Ensure effective monitoring and enforcement of current EU bio-waste regulations in Member States

1. **Strengthen reporting requirements on separately collected and recycled bio-waste by:**
2. **Homogenise reporting requirements on separately collected and recycled bio-waste through:**
   - **a.** Legal obligation alongside a method and frequency of compositional analysis of residual waste
   - **b.** Expanded reporting requirements to include the monitoring of impurities in separately collected bio-waste
   - **c.** Definition and inclusion of KPIs in Member States reporting obligations, prioritising those that support bio-waste target implementation and monitoring impurities in separately collected bio-waste
3. **Establish legally binding requirement for local authorities and treatment sites to collect and report bio-waste management data annually**
4. **Introduce a legally binding requirement for local authorities and treatment sites to collect and report bio-waste management data annually and ensure that this data is compiled and provided to regional and national institutions**

Conclusions

This report presents a series of key policy recommendations that, if implemented effectively, can significantly enhance bio-waste management and treatment across the EU. Given the increasing demand for healthier soil throughout the EU, and the priority for cost-effective solutions, it is imperative that these measures be prioritised within the new mandate of the EC.

From a comprehensive overview of current EU policies and regulations which include provisions, or influences, on bio-waste management, processing of bio-waste and use of compost/digestate, we have singled out the following areas where action is needed on the following page.

Coordinated action at national, regional and municipal levels is required to ensure success. Access to knowledge and the dissemination of know-how are vital to ensure that the implemented systems operate as efficiently as possible. The EU and each MS must therefore collaborate to endorse validated guidelines and leverage best practices to achieve good results and meet established goals.

OBLIGATIONS & RELATED OBJECTIVES	SHORTCOMINGS
Waste Framework Directive	Adopt legally binding targets on reduction of bio-waste in resid-ual waste
	Adopt legally binding targets on the quality (defined as presence of physical impurities) of bio-waste to be accepted at compost-ing and AD facilities
	Adopt a "residual waste cap"
	Encourage/mandate MS to adopt financial/incentive schemes to make management of residual waste more expensive (putting extra-charges and taxes for jurisdictions that do not meet the targets) and separate management of bio-waste more cost-competitive (providing subsidies or tax rebates to jurisdictions that meet and go beyond the targets)
	Mandate that waste taxes/fees ensure full coverage of costs of waste management (i.e. including all costs for collection, transport and treatment of waste along with complementary activities such as communication and monitoring) and apply variable charges (PAYT, SAYT, other variants) based on the user participation and residual waste generation
	Consolidate and reinforce reporting requirements for MS related to the management of bio-waste (to include compositional anal-ysis of residual waste to assess percentages of bio-waste in it, compositional analysis of bio-waste to assess physical impuri-ties, and a set of KPIs)
	Establish or mandate local authorities and treatment sites to collect and report bio-waste management data annually and transfer them to relevant local, regional and national authorities
Landfill Directive	Ensure tighter enforcement of the obligation on pretreatment of mixed or residual waste; define, accordingly, limit values for ac-ceptance at landfills
Taxonomy of Sustainable Finance / Funding programmes	Consolidate the DNSH principle, and avoid any funding to facili-ties for treatment and disposal of residual waste
Emissions Trading Scheme	Confirm full inclusion of incineration in the scope of the ETS
Soil Monitoring Law	Mandate sustainable soil management practices based on the use of soil improvers, and prioritise the use of quality-assured compost and digestate
Certification Framework for Carbon Removals and Common Agricultural Policy	Recognise and support the key role of soil improvers and organic fertilisers in practices related to carbon farming and sustainable agriculture
Nature Restoration Law	Support the use of bio-waste recycled materials in prepar-ing/manufacturing growing media from renewable resources to protect peat bogs by reducing harvesting of peat
Rural Development Plans	Promote national or regional subsidy schemes for farmers using organic fertilisers, obtained from bio-waste recycling, to improve their soils and sequester carbon, with priority given to high quali-ty compost and digestate
Fertiliser Product Regulation	Address and revise the references to ABPR which are often block-ing its adoption by local bio-waste recycling plants
Multiple files	Set up and promote an EU-wide QAS for compost and digestate such as the one promoted by ECN

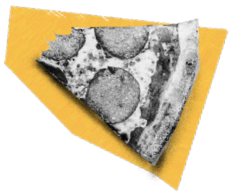
Validation Process

Due to the importance of this document, a validation process from bio-waste-related stakeholders was conducted. This process was performed separately for each of the three main sections of this report (3.1 - 3.3).

In a first step, members of the LIFE BIOBEST Advisory Board as well as members of the European Compost Network ECN e.V. were selected to validate one section each, according to their expertise. In sum, 21 stakeholders representing 13 entities from various countries revised the document, with some validating more than one section.

Due to the intensive internal revision process beforehand, the validation process was meant to raise any red flags and add points of clarification.

After being sent the feedback, the consortium evaluated each comment and integrated carefully selected revisions.



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