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## Biowaste Collection in Selected EU Countries

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The European Commission has set stricter regulations on waste separation, including biowaste. By the end of 2023, biowaste must be completely separated or recycled at source. Separate biowaste collection and composting play an essential part in the bio-based circular economy. This article analyses current biowaste management trends in selected European regions.

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## **Introduction**

The ever-increasing resource consumption is causing waste production to be growing each year. In an effort to achieve sustainable development, cities across the globe are pushed to improve the waste management. An important part of household waste comes in the form of biomwaste. EU considers as biomwaste every biodegradable waste in the form of food (households, canteens, enterprises etc.) and green waste (parks, gardens etc.) (Council Directive 2008/98/EC).

Biomwaste comprises waste from biodegradable nature, meaning it can be broken down naturally. The degradation, however, has negative environmental impacts as it produces Greenhouse gases (GHGs) such as methane. Additionally, if not correctly handled, it can pollute the waterways through run-offs. Even though environmental issues are known, the reality is that still many cities are dumping high amounts of biomwaste in landfills.

Biomwaste collection is an essential part of the waste management systems. It is considered the first step in biomwaste management and if carried out correctly, it can positively impact the posterior steps in the process. The importance of adequate collection systems is due to the need of separating biomwaste from general waste.

Therefore, correctly managed biomwaste not only has environmental benefits but opens a market to new possibilities. The treatment aims at converting the waste into useful by-products, such as fertilizers or energy (biofuels). Conversion is a sustainable method that is a part of the biological cycle of circular economy ( Ellen MacArthur Foundation 2017). Some examples of biomwaste treatment include the conversion of lignocellulosic biomass from food waste into ethanol, anaerobic digestion to create biogas (methane) or liquid bio-oil creation through pyrolysis (Khanal & Surampalli 2010). Composting is an attractive method, which is proven to directly benefit households, as it can be practiced domestically by citizens (Mihai & Ingraio 2018).

Treating biomwaste as a valuable resource for products and energy challenges many governments, including the EU. Through the creation of the waste package, the EU addressed four different directives. The main directive is the waste framework directive (WFD). WFD sets the guidelines on waste management for national policies. The landfill directive aims at reducing the amount of waste destined to

landfills, including biomaste. The packaging waste and the electronic waste directives regulate the use of packaging and electronic waste respectively. (Council Directive 2008/98/EC)

In a new effort to improve waste management in the EU, the European Council reached a provisional agreement with the Commission (with the ambassadors' approval) (European Council 2017). The provisional agreement is a result from the action plan following the 2015 Circular Economy Package (European Commission 2015). It aims at reinforcing the objectives of the waste package by updating current standards. In fact, it sets stricter regulations including extended producer responsibility and mandatory waste separation (including biomaste). In addition, the agreement sets that by the end of 2023 biomaste must be completely separated or recycled at source (European Council 2018). Finally, with the new agreement, countries are expected to comply with higher standards. The situation of biomaste management in the EU is of special interest. This article analyses the biomaste management trends throughout different European regions, in order to understand how it works.

## **Research**

Biomaste management practices are collected through the implementation process of two Interreg Europe projects, BIOREGIO and ECOWASTE4FOOD, due to their common aim at promoting bio-based circular economy and moving towards a sustainable and inclusive growth. Both projects desire to promote biomaste and foodwaste as a valuable resource for an efficient and environmentally friendly economy.

BIOREGIO focuses on regional circular economy models and best available technologies for biological streams. The project boosts the bio-based circular economy through a transfer of expertise about best available technologies and cooperation models, such as ecosystems and networks. The project runs from 2017 to 2021 and involves eight partners from six European regions. (Interreg Europe 2017a)

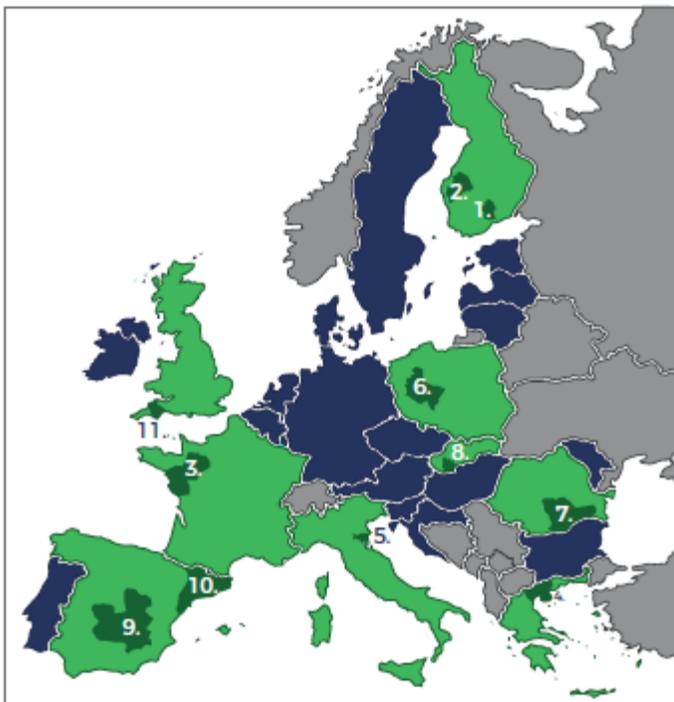
ECOWASTE4FOOD project supports eco-innovation to reduce food waste and promotes a better resource efficient economy. The project brings together seven local and regional authorities throughout Europe to address the crucial issue of food waste. The project runs from 2017 to 2020. (Interreg Europe 2017b)

Besides the project partners, both aforementioned projects actively involve groups of local stakeholders in the identification of local good practices, recognition of good practices from other EU regions, and their selection and implementation in the regional action plans. At the same time, by increased knowledge gained during the project, regions will be better equipped to improve their own policy instruments, in particular by funding new projects, improving the management of the instruments and influencing the strategic focus of the instruments.

Specifically, questionnaires were distributed in the framework of the BIOREGIO and ECOWASTE4FOOD projects in the participants regions. Those include regions in Finland, France, Greece, Italy, Poland, Romania, Slovakia, Spain and the UK (Figure 1).

Questionnaires were distributed to 11 regions by emails and completed electronically. To avoid any misunderstandings, the researcher had a close monitor of the procedure. All data were subjected to quality control and measurements not satisfying the requirements were rejected. Studied countries were responsible for providing the most relevant and up-to-date information based on their regional trends.

The questionnaire was distributed during March-April 2018. The questionnaire involved a series of questions based on biowaste collection, processing and future policies. However, only biowaste data will be presented in this article. A qualitative assessment was carried out at the collected data.



**Regions on the map:**

1. Finland, Päijät-Häme
2. Finland, South Ostrobothnia
3. France, Pays de la Loire
4. Greece, Central Macedonia
5. Italy, City of Ferrara
6. Poland, Wielkopolska
7. Romania, Sud Muntenia
8. Slovakia, Nitra Region
9. Spain, Castilla-la Mancha
10. Spain, Catalonia
11. United Kingdom, Devon

Figure 1. The studied regions

## Results

The survey proves existence of different biowaste management services and operations among the European regions. An overview of the results can be seen in Table 1.

<b>Biowaste Collection</b>	<b>Päijät-Häme FI</b>	<b>South Ostrobothnia FI</b>	<b>Pays de la Loire FR</b>	<b>Central Macedonia GR</b>	<b>City of Ferrara IT</b>	<b>Wielkopolska POL</b>	<b>Sud Muntenia RO</b>	<b>Nitra SK</b>	<b>Castilla-La Mancha ES</b>	<b>Catalonia ES</b>	<b>Devon UK</b>
Separate collection	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
% separated from total biowaste	50 %	24 %	5.60 %	5 %	48.94 %	Unknown	1 %	20-25%	0.90 %	33 %	65 %
Food packaging separation	YES	YES	NO	NO	YES	YES	n.a	YES	YES	YES	YES
Biowaste separate collection interval	Once / 2 weeks	Once / a week	n.a	n.a	Once / a week	Once / a week	n.a	Once / 2 weeks	n.a	Three times / a week	Once / a week
% of self/collective composting	62 %	n.a	Between 20 and 100 families per composting site	n.a	3.20 %	n.a	n.a	20 %	n.a	5 %	10 %

Table 1. Biowaste Collection in select EU countries

The majority of the regions separately collect biowaste. Sud Muntenia (Romania), on the other hand, does not collect it separately.

The percentage of biowaste separately collected from the total amount of bio-waste produced in a region varies significantly. In fact, regional differences are observed even within the same nations. For example, Finland's Päijät-Häme region separately collects about 50% biowaste from the total biowaste in contrast with 24% in the South Ostrobothnia region. In Castilla-La Mancha (Spain), Pays de la Loire (France), and Central Macedonia (Greece), only 5% of biowaste is separately collected from the total biowaste production. Other regions, like Catalonia (Spain) and Ferrara (Italy), operate between 33 and 48%. The results are based on both garden waste and foodwaste. However, for instance, in the city of Devon, UK, the majority of the biowaste separated (65%) includes garden waste (39%). Regarding Castilla-la Mancha, the data collected constitutes from garden waste only.

In every separate collection service, except in Greece, households are responsible for the biowaste separation. In addition, enterprises and food industry participate to the biowaste management in Finland, Spain, France, UK and Italy. Enterprises include businesses and institutions such as education centres, government offices, businesses and zoos. Currently, Greece focuses only on enterprises as the main responsible for separating biowaste, however, responsibility of municipalities has been piloted.

The concern of the EU for reduction of food waste ending up in landfills is linked to the concern of waste packaging as expressed in the recent waste management agreement (European Council, 2018). According to the questionnaire, the waste generator (supermarkets, consumers, etc.) usually removes food packaging. However, in the regions of Central Macedonia and Pays de la Loire, no food

packaging rule is applied upon producers before its disposal. Nonetheless, it is important to mention that in France, further treatment regarding food packaging is voluntary on the waste collector. On the other hand, Finnish regions and Devon (UK), implement an extensive food packaging management system, where consumers and industries are responsible for the separation. Furthermore, processing plants are capable of removing the packaging on site (e.g. anaerobic digestion plants have front-end technology to remove plastic packaging).

In the majority of the regions who separately collect biowaste, household biowaste is defined as a pure household (domestic) and biowaste produced in small businesses (cafeterias, schools, offices etc.). Only Finnish and Spanish regions consider additionally green/garden waste as household biowaste. In the UK, other types of waste, such as cooking oil, fall under the biowaste umbrella for that region.

Household biowaste is collected for further treatment, in either separate (bin) collection or in collective (shared bin) collection, except for the Spanish and French regions. Separate collection is mainly collected twice a week, although in South Ostrobothnia this is done every week.

An interesting method of biowaste handling, which is linked to household waste management, is self-composting. This method is used on a smaller scale in comparison to separate bin collection. Households in Devon, Pays de la Loire, Catalonia and Ferrara do not exceed 10%. This is a significantly small amount if compared with Päijät-Häme 62% private composting rate. In Finland, the limitations are seen in winter, when the temperatures can freeze the compost. Halfway, we can find Nitra's 20% separation rate. Self-composting is also implemented in several municipalities in the Region of Central Macedonia but without recording a number of users.

Overall, biowaste collection services are charged in two different ways: to the Municipal authority as a tax or directly to the waste management company in the form of a private contribution. Finnish, Italian and Polish regions opt for the latter, making biowaste collection a private business, which is managed by the collection companies. In Romania, waste fees are collected either by local authorities or by private companies. The rest of the European regions tax the families for the collection services, acting as a mediator between the waste management companies and the waste producers. In France, there is a possibility of delegation where the municipal authorities give the responsibility to waste management companies directly and/or associations (recycling companies). In Slovakia, there are two methods taking place. The waste collection is financed according to the producer status. This means

local domestic waste is financed by a municipal tax whilst business generated biowaste is managed by private contributions to a waste transportation company.

According to the study, there is a positive change envisioned for the future. In Castilla-La Mancha, a recent regional proposal was approved making biowaste separation mandatory for the food industry, restaurants, enterprises and households. It will be implemented in late 2018 and the collection method will be decided by each council.

Furthermore, the recent regional law implemented in January 2018 in the region of Wielkopolska, is still progressively being implemented in the remaining municipalities. This means that for now only, the city of Poznan is implementing mandatory biowaste separation and the rest of the municipalities are to follow in the upcoming years. Those are indeed, promising news for the biowaste collection situation in the European Union.

## **Conclusions and discussion**

To conclude, it is important to point out the main trends regarding waste management in the selected European regions. Major disparity has been found in biowaste separation from general waste, as some regions such as Pääjät-Häme, Devon or Ferrara are recovering 50% or more of their biowaste, whilst others are struggling to meet a 1% separation rate. Differences between regions in the same territory have been found. For example, in Spain, Catalonia separates 32% more than Castilla-La Mancha (0.9%) or in Finland, Pääjät-Häme separates double the rate of South Ostrobothnia. Regarding Spain, Catalonia is one the pioneering regions in the implementation of household biowaste collection. As a result, other regions nationwide are found to be behind in that aspect but are working on improving their collection systems. Thus, Catalonia can be considered an exception within the country.

Out of all the countries, Romania does not collect nor separate biowaste as it ends in the landfills contributing to the country's waste management concerns. Whilst other regions, such as, Castilla-La Mancha do not separately collect biowaste but rather separate later on in waste management centres.

In the region of the Pays de la Loire, France, composting is the main method of handling biowaste and a separate collection exists for garden waste only. The rest of the regions are separately collecting biowaste through a variety of methods. Mainly it

includes the use of private containers for single families or common containers that are shared among different households/businesses. Composting is also practised in combination with this method; however, the main limitations include freezing winter conditions (Finland) or lack of infrastructure (Poland).

Biowaste is mainly collected once a week (Finland, Poland, UK), once in two weeks (Finland, Slovakia) or twice a week (Italy). Furthermore, in Spain, biowaste is collected up to 4 times a week during the hotter summer periods.

The topic of the study was actual and had a direct connection to the goals of both Interreg Europe projects: BIOREGIO and ECOWASTE4FOOD. The study contributed to a better overall understanding of the disunited biowaste terminology, various collection systems and rates, local challenges, and preferences in the selected regions. Identification and sharing of good practices related to biowaste and foodwaste may considerably accelerate the achievement of completely separated or recycled biowaste at source as required by the European Council. Findings are also useful for future research and development purposes of waste management systems.

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← *Odotuksia vastavalmistuneelle insinöörille yrityksissä*

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