GrAins

Greening Agrifood in Social Economy

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Capacity building on Greening Agrifood in Social Economy

Taste the waste - how does food waste occur; how can we prevent it and what is its ecological footprint?

TRAINING MATERIAL

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1. Introduction

Food waste is one of the central problems of our time. In a world where around 828 million people suffer from hunger (FAO, 2022), around 59 million tonnes of food are wasted every year in the EU (Eurostat, 2022). This waste not only puts a strain on the social and economic fabric, but also has significant environmental consequences, including the unnecessary consumption of resources such as water and soil and the emission of greenhouse gases. Against this backdrop, it is crucial to comprehensively analyse the issue of food waste and food loss and identify measures that can help prevent such waste.

This paper summarises facts about food waste in the EU and the associated ecological footprint. It shows where the waste occurs, what are the causes and what measures have already been taken to eliminate them. It also takes stock of what efforts to prevent food waste have achieved. The focus is on the following questions:

- What are the facts and figures about food waste in the EU?
- What are the main causes of food waste in the EU?
- What is the ecological footprint of food and what is the ecological footprint of food waste?
- What measures have already been taken in the EU to effectively reduce food waste?
- What is the contribution of the social economy to preventing food waste?
- What are best practice examples for preventing food waste?

2. Definitions, basics and facts

2.1 Food waste versus food loss: definition

Food waste refers to edible food that is disposed of along the entire value chain - from cultivation to the end consumer. In contrast, the term food loss primarily refers to losses that occur before processing or marketing, for example due to harvest losses or improper storage (FAO, 2019).

2.2 Causes of food waste in the EU

The causes of food waste in the EU are complex and multi-layered. At the agricultural level, overproduction, strict trade standards and harvest losses lead to considerable losses. In the retail and catering sectors, unrealistic best-before dates, miscalculations and oversupply contribute to the problem. On the consumer side, a lack of planning, incorrect storage and a low appreciation of food play a major role (Caldeira et al., 2019).

2.3 The ecological footprint of food: Definition

The ecological footprint describes the amount of resources required for the production, processing, storage and disposal of food. Factors such as land use, water consumption and energy consumption as well as the resulting greenhouse gas emissions are taken into account.

2.4 Current facts and figures

The EU is one of the largest food producers in the world and also produces considerable amounts of food waste. According to current estimates, around 88 million tonnes of food waste are generated in the EU every year, which corresponds to 20% of total food production (FAO, 2020). A study by the European Commission (2020) shows that around 53% of food waste is generated at household level, while agriculture, processing, catering and retail account for the remaining 47%. As losses generally occur at every link in the value chain, it is a logical consequence that waste tends to increase with the length of the value chain. In other words, the more stages a product passes through from production to the end consumer, the greater the risk of losses and waste.

- **Agriculture**: The main losses are caused by unutilised harvests and quality standards.
- **Processing**: Losses often occur due to inefficient processes and production surpluses.
- **Trade**: Oversupply and strict cosmetic requirements contribute to waste.
- **Consumption**: Lack of planning and throwing away edible food are key causes.

3. Ecological footprint of food waste

3.1 Water consumption due to wasted food

Food waste has a significant impact on the use of water. Every year, around 250 billion cubic metres of water are used in the EU alone to produce food that is not consumed (FAO, 2020).

3.2 Greenhouse gas emissions from wasted food

Food waste is a significant contributor to greenhouse gas emissions in the EU. According to an estimate by Eurostat (2022), wasted food in the EU causes around 186 million tonnes of CO2 equivalents annually, which accounts for 3-4% of the total CO2 equivalents emitted in the EU. Methane emissions caused by the decomposition of organic waste in landfills are particularly problematic. In a global context, food waste, if it were a country, would rank third behind China and the USA in terms of CO2 emissions (FAO, 2020). It makes a considerable difference which food is wasted: While, for example, a kilo of tomatoes produced regionally and seasonally only generates around 0.2 kilograms of CO2 equivalents (Federal Environment Agency, 2020), wasting 1 kg of beef generates around 27 kilograms of CO2 equivalents. This illustrates that the ecological footprint of food varies greatly and that avoiding the waste of particularly resource-intensive products has a greater impact on climate protection.

3.3 Land consumption of food waste

A significant proportion of global agricultural land is used to produce food that is never consumed. In the EU, it is estimated that around 30 million hectares of land - an area larger than Italy - is used for wasted food.

3.4 Comparison: EU in a global context

In a global comparison, the EU is in the upper range when it comes to food waste. While losses in developing countries mainly occur in the early stages of the value chain, in industrialised countries such as the EU, the largest quantities occur at retail and consumption level. The amount of food loss correlates strongly with a country's prosperity. Food waste is therefore a problem of prosperity and thus also a problem of social justice. According to an estimate by UNEP (2021), the 828 million starving people worldwide could be fed if the globally wasted food were distributed fairly. World hunger is therefore not a problem of a lack of food, but a problem of unfair and senseless distribution.

4. Sources of Food Waste

Food wastage follows inefficiency and systemic problems at the food supply level. For the understanding of the sources, following is the analysis along with relevant studies and insights: (cf., Food Waste in School Catering: An Italian Case Study, 2021)

4.1 Agriculture

Agricultural food waste could be due to various reasons that can be economic, environmental, and logistic.

Market price fluctuations: FAO studies show that as much as 14% of food produced globally is lost between harvest and retail, much of it left in the fields due to low market prices or high transportation costs (cf. FAO, 2019).

Quality and aesthetic standards: The appearance expectations of retail and consumers result in the rejection of fruits and vegetables, adding up to immense wastage. For example, the FUSIONS project by the European Commission estimates that cosmetic filtering accounts for 20-40% of produce losses (cf. European Commision, 2016).

Surpluses due to overproduction: In order to protect themselves against low yields, farmers might plant more than what is actually needed. This results in excess harvests that might not fiend a market.

Poor harvest methods: many of the losses in the field, particularly for grains and root vegetables, are linked to inefficiencies in the technological machinery utilized for harvest.

4.2. Processing and Manufacturing

During processing, food losses occur because of industrial inefficiencies and standard operations:

Trimmings and by-products: One example could be the millions of tonnes of fish heads, bones, and general waste produced as a result of seafood; this can, in turn, potentially be transformed into something usable, like fertilizers or animal feeds.

Operational errors: Wraps reported 2021 that recipe formulation and packaging or labelling mistakes could generate about 1.5 million tonnes of wastes within UK food manufacturing annually.

Energy costs: Businesses could be discouraged due to high energy costs needed for the preservation or processing of surplus food.

Batch overproduction: Most large-scale productions result in goods that exceed demand.

4.3. Distribution and Retail

Food waste at retail and distribution is because of inefficiencies and consumer-driven causes:

Cold chain breakdowns: Poor refrigeration during transportation is a big contributor to spoilage. According to studies conducted by the Food Loss Index of UNEP, perishable items such as meat, dairy, and seafood are more prone to getting spoiled (cf. FAO, 2019). This is particularly unfortunate because, as we saw in the chapter on the ecological footprint of food, these products have a larger footprint than most others.

Overstocking: Overstocking by retailers to ensure full shelves results in unsold items reaching their expiration date (cf. FAO 2019).

Promotions and discounts: Bulk sales and promotions encourage over-purchasing, leading to waste when products are not consumed in time (cf. FAO 2019).

4.4. Households

The households continue to top the list as among the most key contributors of food waste; all this has been mainly brought about by lack of awareness and social norms:

Food waste statistics: Households generate an estimated 570 million tons of food waste annually, accounting for over 60% of global food waste, according to a report by the UN Environment Programme (2022).

Storage practices: Not knowing the right conditions in which fruits, vegetables, and dairy products should be stored causes them to go bad. Potatoes and onions, for example, accelerate the process of decaying when kept together.

Confusion over date labels: The UK's Food Standards Agency estimates that 20% of all household food waste is confused by "use by" and "best before" dates (cf. FAO, 2019).

Poor portion sizes and leftovers: Lousy meal planning and large portions also mean that often, too much food is prepared, which does not get eaten (cf. FAO, 2019).

4.5. Institutional Settings - Schools, Hospitals, Restaurants

Operational inefficiency and inflexibility in food preparation result in generation of waste from institutions:

Large-scale preparation: Food preparation in bulk results in overproduction in school canteens. The Rockefeller Foundation has estimated that up to $1.2 billion worth of food is wasted every year in the United States because of this very fact.

Lack of choice: Standardized meal portions do not align with the preference or appetite of the individuals, which may lead to waste by not being consumed.

Lack of redistribution mechanisms: Most institutions lack the systematic way of redistributing surplus food for charity purposes or composting.

Cultural issues: In some areas, food waste is further perpetuated by cultural practices that make people not reuse leftovers.

5. Measures against food waste

5.1 Measures at European level

The EU has taken a variety of measures to reduce food waste at different levels of the value chain, focusing on technical, legislative, and collaborative approaches. Together, these measures reflect a comprehensive approach to tackling food waste, addressing the issue from multiple angles to achieve significant reductions.

Technical measures: The EU has promoted the adoption of smart packaging technologies through the Circular Economy Action Plan and initiatives like the EU Packaging Directive. These aim to improve product traceability and reduce waste by providing consumers with real-time information on freshness. These technologies help minimise waste during processing and retail by extending shelf life and preventing spoilage.

Legislative measures: Legal frameworks play a significant role in addressing food waste. The EU has worked on the harmonisation of best-before dates to avoid unnecessary disposal of still-edible food. Tax incentives have been introduced to encourage food donations and channel surpluses more efficiently to those in need. The "Farm-to-Fork Strategy" is central to achieving the EU's ambitious goal of halving food waste by 2030. Legislative adjustments also target the simplification of donation processes to ensure surplus food reaches vulnerable populations.

Collaborative initiatives: The "EU Platform on Food Losses and Food Waste" (UN 2025) brings together stakeholders from different sectors to share best practices and develop innovative solutions. Programmes like Horizon Europe fund research and innovation projects aimed at creating

advanced technologies and methodologies to tackle food waste. By fostering cooperation across the value chain, these initiatives strengthen the collective effort to reduce waste.

The European Food Banks Federation (FEBA) plays a central role in promoting food donation. In 2020, 335 food banks in Europe collected and distributed 860,000 tonnes of food to 12.8 million people in need, supported by over 37,000 volunteers (Gorgan et al. 2022) The Food Loss and Waste Platform, launched by the European Commission (United Nations 2025), is a collaborative effort involving various stakeholders, with the goal of achieving the United Nations Sustainable Development Goal 12.3 by 2030. This ambitious objective aims to halve food waste and facilitates the exchange of best practices. See also the best practice examples on 5.3.

5.2 Measures at national level

In addition, various EU countries are focusing on national initiatives. Germany is focusing on educational programmes and tax incentives for food donations, food banks have developed into a widespread system that is now represented in even the smallest municipalities (cf. Zhu et al., 2023, Fesenfeld et al., 2022). Italy is pursuing a legal basis to facilitate food donations with the Gadda law. The Portuguese retail chain Sonae is in the process of developing a digital platform called LIFEFood Cycle, with the aim of optimising the management of surplus food and facilitating its donation to charitable organisations or sale to business partners at reduced prices (Eurocommerce, 2025). In Estonia, an agreement was signed between the Ministry of Social Affairs and the Estonian Food Bank to support people in financial difficulty and optimise the use of food (cf. Dongo et a l. 2024).In Slovenia, an agreement was signed by eight interest groups with the aim of achieving the goals of the national strategy to reduce food losses and waste (cf. ibid.). In Denmark, the 'Stop Wasting Food Denmark' movement has been working with the REMA 1000 retail chain since 2008 to achieve 'zero food waste' by 2030 (ibid.). In France, retailers are obliged to donate food. In Ukraine, the main focus is on improving logistics and establishing a donation culture, while Romania is focussing on projects that reduce losses in agriculture.

These examples show that social economy enterprises in Europe are actively contributing to the reduction of food waste through innovative solutions, collaborations and research projects. Collaboration between different stakeholders and the creation of a favourable framework for innovation appear to be key factors for success (Zhu et al. 2023; Fesenfeld et al. 2022). But even all these measures will not be enough to achieve the goal of halving food waste by 2030.

After all short food supply chains play a crucial role in reducing food waste by promoting efficient and sustainable food systems. Since waste occurs at every stage of the food supply chain, it stands to reason that shortening the chain can prevent waste. By minimising the distance between producers and consumers, these systems significantly reduce the time food spends in transit and in storage, helping to maintain its freshness and prevent spoilage. This benefit is especially important for perishable goods, as faster distribution reduces the likelihood that food will be thrown away due to overripening or damage.

Furthermore, short food supply chains enable producers to better match supply with actual demand. By selling directly to consumers or local markets, producers can more accurately anticipate

consumption patterns and avoid overproduction. By contrast, longer supply chains often suffer from unpredictable demand, leading to higher levels of overproduction and waste.

Promoting seasonally and locally produced food also helps to prevent waste. Seasonal products require less storage and transport, which reduces the risk of spoilage. In addition, local sales encourage the acceptance of 'ugly' or imperfect products – products that are often discarded in larger supply chains due to cosmetic defects. These products are perfectly edible despite their appearance and can help to avoid unnecessary waste.

However, achieving short food supply chains requires major changes across the entire food sector, which are not so easy to achieve.

5.3 Individual initiatives - best practice

There are numerous successful approaches and initiatives around the world that show how food waste can be effectively reduced. These best practice examples serve as inspiration for countries, companies and individuals and illustrate that creative solutions, technological innovations and a strong community can help to significantly reduce food waste.

Too Good To Go: The app from Denmark connects restaurants, bakeries and supermarkets with consumers to offer surplus food at a reduced price. This model has already spread across Europe and is helping to reduce food waste in the catering and retail sectors. For more information check here: https://www.toogoodtogo.com/de.

Community food sharing: Initiatives such as "Foodsharing" in Germany enable volunteers to collect surplus food from households, shops and restaurants and distribute it free of charge. This movement has not only led to a reduction in waste, but has also raised awareness of the value of food. For more information check here: https://foodsharing.de/.

Unpackaged shops: These shops promote the purchase of food in the exact quantity required, thus reducing packaging and food waste. In particular, products such as rice, pasta or nuts, which often spoil when packaged in large quantities, can be purchased here. For more information check here: https://www.unverpackt-verband.de/.

Consumer awareness campaigns: Countries such as France and Italy have used legislation and awareness campaigns to encourage consumers to use food more efficiently and use leftovers creatively. For more information check here: https://www.sprecozero.it/.

Food banks: Organisations such as the "Tafel" in Germany collect surplus food that is still edible and distribute it to those in need. This practice has both social and environmental benefits and shows how surplus food can be put to good use. For more information check here: https://www.eurofoodbank.org/.

Community Supported Agriculture (CSA): A remarkable example of best practice is the concept of Community Supported Agriculture (CSA). Consumers and farmers join together to form a direct partnership. Consumers pay a membership fee that secures them regular deliveries of fresh, seasonal food, while farmers receive a stable source of income. This model not only reduces food

waste by avoiding overproduction, but also raises awareness of the origin and value of food. For more information check here: https://urgenci.net/.

EuroCoop: Another best practice is the EuroCoop initiative, an association of consumer cooperatives in Europe. EuroCoop focuses on educational programmes that promote the responsible use of food and supports members in adopting sustainable practices. One successful example is the co-operation with food banks, through which surplus but edible food is distributed to those in need. These measures not only help to reduce waste, but also promote social responsibility. For more information check here: https://www.eurocoop.coop/.

School Canteens: Schools in Italy or Portugal that have successfully reduced waste by introducing flexible portion sizes and "share tables" for uneaten but untouched food. Implementing strategies like flexible portion sizes and "share tables" in school canteens has proven effective in reducing food waste. Flexible portion sizes allow students to choose quantities that match their appetites, minimizing leftovers. "Share tables" provide a designated area where students can place unopened or untouched food items they don't wish to consume, making them available for others. (Food Waste Perception of Workplace Canteen Users—A Case Study, 2019)

“Brutti ma buoni”: The "Brutti ma Buoni" project (translated as "ugly but good or in Germany for example called ugly food") is an initiative focused on reducing food waste by using imperfect or surplus produced products that would otherwise be discarded. The project promotes the idea that food doesn't need to be perfect in appearance to be delicious and nutritious. It involves creating products, often in the form of snacks or packaged goods, made from fruits and vegetables that are misshapen, overripe, or slightly damaged but still perfectly good to consume. The project aims to raise awareness about food waste and sustainability while offering consumers an eco-friendly alternative to conventional food products. By utilizing "ugly" produce, the project helps minimize waste at the farm level, supporting local farmers and reducing the environmental impact of food production. The goal is also to shift consumer perceptions about the value of food based on its appearance rather than its nutritional quality. "Brutti ma Buoni" often includes partnerships with local businesses, farmers, and community initiatives, and it may involve a variety of products such as jams, juices, crisps, and dried snacks, all made from produce that would otherwise go to waste (Brutti ma buoni, 2017).

6. Foodsharing as a model of cooperative economics

6.1. The concept

Food-sharing initiatives collect surplus and surplus food that would otherwise be wasted and redistribute it to people who consume it. This is done by collecting the food either directly from private households and businesses or through online platforms and communities. In some cases, cooperation with shops and supermarkets is also sought. The food sharing platform currently has over 100,000 users in Germany, Austria and Switzerland. Registration on the platform is free.

In Germany alone, more than 30,000 volunteers are involved (NAHhaft e.V. 2025). They create spaces for people to meet and exchange ideas, and promote solidarity and mutual support.

6.2. Foodsharing: an example of social economy for food rescue and cooperative economies

Foodsharing initiatives can be characterised as social economy projects for various reasons. One of the main characteristics is their focus on the common good, with profit maximisation taking a back seat. Food-sharing initiatives primarily pursue social and ecological goals and are not geared towards maximising profits. Instead, they are committed to reducing food waste and using resources more sustainably (foodsharing e.V. 2023). Food-sharing is an alternative economic model that differs from conventional businesses in some ways: The initiative works without money and food is rescued and redistributed for free (ibid.). In contrast to commercial food rescue apps, there is no monetisation of activities. The work is based almost entirely on volunteer efforts (Foodsharing Cafe Network 2023). An important aspect is the promotion of community and participation. Foodsharing creates new forms of collaboration and social exchange. The initiatives connect people from different backgrounds and foster community building. Decisions are often made democratically, e.g. through community votes, and everyone has the opportunity to get involved and actively shape the initiative.

Creative concepts are developed in food sharing to combat food waste, e.g. digital technologies such as online platforms for networking, ‘Fair-Partner’ as public redistribution points for rescued food (Wickert & Günther 2023), as well as educational and awareness-raising work to sensitise the public.

Foodsharing favours cooperation over competition. The initiative works with companies, social organisations and other initiatives, and complements existing services such as food banks.

These characteristics clearly distinguish foodsharing initiatives from for-profit companies and embody central principles of the social economy such as solidarity, sustainability and social participation.

7. Take stock

Food waste is a problem of prosperity and represents a huge challenge in the EU, with social, economic and environmental impacts. Millions of tonnes of edible food are thrown away every year, resulting in significant resource consumption and greenhouse gas emissions. At the same time, people are starving worldwide for whom there would actually be enough food if it were distributed fairly.

The EU has already taken important steps with strategies such as the "Farm-to-Fork Strategy", the promotion of food donations and the platform for the exchange of best practices. Nevertheless, there is still a long way to go to achieve a sustainable reduction in food waste. National initiatives and innovative approaches, such as community-supported agriculture (CSA), apps like Too Good To Go and collaborations with food banks, show that effective solutions exist. However, these need to be scaled up and implemented more widely across the EU.

Achieving the goal of halving food waste by 2030 will require a combination of technological innovations, legal adjustments and a broad sensitisation of the population. Collaboration between all stakeholders along the value chain - from agriculture to retail to consumers - will be crucial in order to bring about sustainable change. Every step in this direction not only contributes to environmental protection, but also to greater social justice.

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