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# FOOD WASTE– A GLOBAL PROBLEM

Case  
Study

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## **Keywords**

*Food waste,  
Food loss,  
FAO,  
FUSIONS project,  
REFRESH project*

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## **JEL Classification**

*Q56*

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## **Abstract**

*This paper addresses the issue of food waste, which is currently a global problem with repercussions on all the links in the food supply chain. The method used in drafting the paper focuses on extensive documentation based on the official websites of the European Union and International Organizations (FAO, OECD, etc.) concerned with finding solutions that would lead to the reduction of the amount of wasted food. Thus, the paper discusses issues related to: the main situations that generate waste and food losses along the food chain, costs associated with food waste and the projects initiated by the EU to reduce food waste. The final part of the paper presents the programs by which Romania tries to process and capitalize on the current food surplus in order to reduce food waste.*

## INTRODUCTION

Food waste is recorded in the agricultural fields, in the processing industry, in the distribution companies and in the consumer homes. As far as industrialized countries are concerned, most of the food waste occurs in the final stages, that is to say in the distribution and consumption stages, especially because of the overabundance of the food produced, while in developing countries the food waste occurs mainly in the first stages (production, harvesting, processing and transport) because of the lack of advanced agricultural technologies, of efficient transport systems and infrastructure (for instance, the uninterrupted maintenance at low temperature) and of the possibility of safe storage (Salvatore, C. 2011:13). Situations that generate waste and food losses along the food chain are summarized in figure no.1.

## DEFINITIONAL FRAMEWORK

Most experts differentiate between food losses and food waste; a distinction which is also relevant when thinking about solutions (Tristram S. 2002; Gustavsson J. et al., 2011; Gunders D. 2012; Lipinski et al., 2013; etc.). According to FUSIONS (Food Use for Social Innovation by Optimising Waste Prevention Strategies), “*Food waste is any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed (including composted, crops ploughed in/not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea)*” (according to FUSIONS, 2012/2016a).

Within the FAO’s (Food and Agriculture Organization of the United Nations) definitional framework, food waste is delimited by two other notions: food loss, food waste and food wastage (according to FAO, 2013:8-9).

- ✓ *Food loss refers to a decrease in mass (dry matter) or nutritional value (quality) of food that was originally intended for human consumption;*
- ✓ *Food waste refers to food appropriate for human consumption being discarded, whether or not after it is kept beyond its expiry date or left to spoil. Often this is because food has spoiled but it can be for other reasons such as oversupply due to markets, or individual consumer shopping/eating habits.*
- ✓ *Food wastage refers to any food lost by deterioration or waste. Thus, the term “wastage” encompasses both food loss and food waste.”*

## CONSEQUENCES AND COSTS ASSOCIATED TO FOOD WASTE

According to FAO (Food and Agriculture Organization of the United Nations) around 1/3 of the total food intended for human consumption (1.3 billion tons annually) is wasted or becomes a loss throughout the *farm to consumer* circuit. This high level of inefficiency generates both economic costs, which amount to approximately US \$ 1 trillion/year (FAO, 2015:3), as well as environmental (water scarcity, soil erosion, increase of greenhouse gas emissions, etc.) worth around US \$ 700 billion/year (FAO, 2014:7).

From the information provided by the FAO (in 2014 and 2015) can be observed that food waste has negative consequences both from an economic, as well as an environmental point of view, aspects highlighted in the study entitled *Food System and Natural Resources* conducted by the International Group for sustainable management of resources within UNEP (The United Nations Environment Program). Moreover, such negative consequences are very well exemplified by Lipinski B. in the paper “*Reducing Food Loss and Waste*”: *food waste at the consumption stage costs an average of US\$1,600 per year for a family of four in the United States and £680 (about US\$1,000) per year for the average household in the United Kingdom. Annually, about US\$32 billion worth of food is thrown away in China. In Sub-Saharan Africa, where many farmers earn less than US\$2 a day, postharvest losses have a value of up to US\$4 billion per year. ... the amount of food loss and waste in 2009 was responsible for roughly 3,300–5,600 million metric tons of greenhouse gas emissions (carbon dioxide equivalent), the upper end of which is almost equivalent to the amount of carbon dioxide emissions from energy consumption by the United States in 2011. Food loss and waste are associated with approximately 173 billion cubic meters of water consumption per year, which represents 24 percent of all water used for agriculture* (Lipinski, B. et al. 2013:8-9)

From the examples presented above, it can be inferred that the costs associated to food waste are at least of two types: economic costs and environmental costs. Economic costs include not only costs related to the value of the products themselves, but also costs related to the production, transport and storage of the wasted products, as well as the cost of treating them. Thus, the economic cost is paid by at least three different groups of actors: the consumers, certain operators in the food chain (producers, consumers and traders) and the charitable organizations. From the environmental point of view, the waste of food stands for a waste of resources (such as water, soil, energy and other production factors) throughout the life cycle of products, and the consequent increase

in greenhouse gas emissions (according to European Court of Auditors, 2016:15-16).

Wasting food also raises social questions, particularly given the current global financial crisis, rising food prices and international food shortages. These social costs should be measured in terms of losses to human welfare or quality of life (FAO, 2014:48:67). If only one-fourth of the food lost or wasted globally was consumed it would be sufficient to feed 870 million people, 12% of the world's current population (FAO, 2016:2).

## ROLE OF EUROPEAN UNION IN REDUCING FOOD WASTE

### Linear economy -> Circular economy -> Green economy

Current production and consumption processes produce not only goods and services but also residues. Taking into account that in order to produce goods we need resources, any part that is not used is, in fact, a potential economic loss, as well as an environmental problem.

A first solution to achieve the goal of the European Union of living *"a good life within our planet"* would be the transition from the current *linear economy* (based on the *"production-use-disposal"* principle) to the *circular economy*. This implies maintaining, as much as possible, in the economic cycle physical materials and their value, which would contribute to reducing waste, saving energy and lowering greenhouse gas emissions. At the end of 2015, the European Commission presented the *Package of Measures on the Circular Economy*, which contains a series of actions designed to benefit both the environment and the economy. Proposals cover the whole life cycle: from production and consumption, to waste management and the secondary raw materials market (European Commission, 2015).

The second solution aims at a broader approach, based on a green economy. The green economy is seen by the EU, the UN and the OECD as a strategic approach to the systemic challenges posed by environmental degradation, natural resource security, employment and competitiveness. Initiatives of policies in support of a green economy can be found in major EU strategies, including the Europe 2020 Strategy, the 7th Environment Action Programme (adopted by the European Parliament and the Council of the European Union in November 2013 and covers the period up to 2020), the EU Framework Program for Research and Innovation (Horizon 2020), as well as in sectoral policies such as transport and energy (European Environment Agency, 2015:152).

If the circular economy focuses on optimizing the flows of material resource by reducing waste to the level closest to zero, the green economy expands its

area of interest beyond aspects targeted by the circular economy (figure no.2), focusing as well on how the use of water, energy, soil and biodiversity are in accordance with the objectives of ecosystems and human well-being (European Environment Agency, 2015:153).

### Examples of projects initiated by the European Union to reduce food waste

Reducing food waste is a global challenge that requires action at global, regional and local level. (table no.1). Thus, the European Union, EU Member States, various international organizations (FAO, OECD, etc.), as well as actors in the food chain (farmers, shepherds, fishermen, etc.) are looking for solutions to reduce food waste (table no. 2): *"by 2030, the global food waste per capita at the retail and consumer level must be halved and food losses throughout the production and supply chains, including losses after harvesting must be reduced"* (UNITED NATIONS, 2015:21)

The purpose of the FUSIONS project (Food Use for Social Innovation by Optimising Waste Prevention Strategies) initiated by the EU, was for Europe to become more efficient in terms of resource use by significantly reducing food waste throughout the supply chain. The project ran for 4 years, from August 2012 to July 2016, being funded under the Seventh Framework Program of the European Commission (table no. 3). Experts in the FUSIONS team have identified 105 causes that produce food waste: *17 were imputable to primary production, 9 to processing of agricultural staples, 14 to food processing and packaging, 15 to wholesale and logistics, 18 to retail and markets, 13 to food services and 19 to households* (according to FUSIONS, 2012/2016b). The success of the project was also emphasized by Dr. Hilke Bos-Browers (Coordinator of FP7 project FUSIONS) who said that *"at the beginning of the project we did not know even half of what we now know about how to reduce food waste."* The FUSIONS project, along with other research projects (such as, for instance, *Food waste plug-in*, initiated by Eurostat), and the experiences of EU Member States, have been the starting point in developing a common and practical protocol of the EU defining food waste and how to quantify it (according to FUSIONS, 2012/2016c). Using the FLW (Food Loss and Waste) Standard can help governments and countries understand how much, where, and why food loss and waste is occurring – so they can measure and manage it. The case study on the FLW Protocol website provide examples for how some entities are using this table to describe their FLW inventory (FUSIONS, 2012/2016d).

Another EU initiated project, entitled REFRESH (Resource Efficient Food and dRink for the Entire Supply cHain) has as its main objective: *reducing food waste at the retail and consumer level and*

*reducing food losses along production and supply chains.* This project runs over a period of 4 years (runs from 2015 to June 2019) based on the results and experiences gained through the FUSIONS project. Since its beginning, REFRESH has published 16 reports, established 4 voluntary Frameworks for Action in pilot countries and organized a Food Waste Solution Contest. REFRESH Solution Waste Solution Concept has received over fifty project applications across Europe from which three winning projects have been selected: Wastewatchers and Transition Surplus Food (two projects selected by the jury) and Zero Waste Aiud (project selected based on votes received from the public). The winners were able to present their projects at the REFRESH Food Waste Conference, organised in Berlin, on 18 May 2017 (according to REFRESH, 2017).

### **Waste hierarchy applied to food waste**

The EU Waste Framework Directive (DIRECTIVE 2008/98/EC) establishes a priority order for what constitutes the best option from an economic, social and environmental point of view. Thus, the waste hierarchy applicable in the EU is based on the following priorities: waste prevention; preparation for re-use; recycling; other recovery operations (for instance, energy recovery); and removal. (DIRECTIVE 2008/98/EC, Art. 4, 2008:9). Several Member States have adapted the food waste hierarchy, opting for the order of preferences indicated in figure no.3.

The first three levels (prevention, donation, and feed) are the measures that should be taken into consideration to avoid food waste, at the same time being the most optimal solutions (both economically and environmentally) for waste reduction.

### **REDUCING FOOD WASTE. CASE STUDY: ROMANIA**

In Romania, the highest waste is related to households (about 49%), followed by the food industry (37%), retail (7%), the public sector (5%) and the agricultural sector (2%), according to the data provided by representatives of the Ministry of Agriculture and Rural Development (MADR, 2016). Romanians claim that the main reasons that make them throw food away are the rapid degradation (26%), the inaccurate estimate of the amount of food consumed at a meal (21%), but also the excess purchases (14%), according to a study conducted by InfoCons and the Association of Large Commercial Networks in Romania (AMRCR, 2014:7).

The law on food waste reduction (no. 217/ 2016) adopted by the Romanian Parliament and published in the Official Gazette no. 934 on 21 November

2016, entered into force in May 2017. The law was aimed at limiting food waste and, at the same time, give a helping hand to those who have difficulties in providing food for themselves, the major stores being forced to donate the food whose warranty period is approaching expiration (according to the law no. 217/ 2016).

But just one month after its entry into force, the Tudose government has placed on the agenda an emergency ordinance draft (O.G. no. 45/ 2017) to suspend the law until December 31, 2017. The reason? ... as stupid as it can be: "*a lack of clarity of the law was observed*", aspect not found on November 21, 2016, when it was published in the O.G.

### **Romania against Food Waste Project**

The project *Romania against Food Waste* (carried out during March 2016 and May 2017) was co-financed by a grant from Switzerland (through the Swiss Contribution to the enlarged European Union) and was implemented by the MaiMultVerde Association in partnership with [www.foodwaste.ch](http://www.foodwaste.ch) (Switzerland) and the Resource Center for Public Participation ([www.ce-re.ro](http://www.ce-re.ro)).

The general objective of the project focused on *increasing the role and the level of information and involvement of the civil society and the public at large in the process of realizing and implementing the public policies in Romania in the field of reducing the food waste* (according to MaiMultVerde Association et al., 2016/2017).

Activities carried out throughout the project were based on: *identifying sources and causes of food waste, as well as ways to reduce food waste, by conducting a nationwide study on the distribution chain, from manufacturers and importers to consumers in the urban environment, entrepreneurship and advocacy sessions supported by project partners.* The message of the project reached over 1,000,000 people by informing the general public about food waste in an educational caravan in seven cities of the country (Bucharest, Constanța, Iași, Brașov, Cluj, Timișoara and Craiova) by participating in agro-food fairs, information campaigns in hypermarkets, and by making a documentary on food waste in Romania and animated clips showing tips for reducing waste (according to MaiMultVerde Association, et al. 2016/2017).

### **Existing solutions in Romania for fighting food waste**

There are several exceptions in Romania for taking over/capitalizing on the surplus of food: "*Masa Bucuriei*" ("*Meal of Joy*") program and the *Somaro* social stores. A few details on how they work are presented further below.

"Meal of Joy" program was founded in 2009 by Selgros Cash&Carry S.R.L. together with the

Romanian Patriarchate. The beneficiaries of “Meal of Joy” program consist of poor people, who receive help in the centres administered by the organizations patronized by the Romanian Patriarchate: *canteens and trapezes, kindergartens and children centres, homes for the elderly and social settlements, educational institutions, monasteries, social services offices, foundations and associations of the Romanian Patriarchate*. From the start of the program until now, November 2016, Selgros donations exceed Euro 4 million. Another major retailer that has recently adhered to the “Meal of Joy” is Carrefour, (supermarkets, hypermarkets), where, every evening, program representatives come and collect the surplus food left over during the day (according to PATRIARHIA ROMÂNĂ and S.C. SELGROS CASH&CARRY S.R.L, 2009).

In Bucharest, the Somaro social store has been struggling with food waste since 2010. The whole range of products offered in the Somaro stores includes 100% consumer-friendly products, but which no longer can be marketed in other stores due to damaged or dirty packaging, because their validity will expire soon or for other reasons. The products are donated by various distributors, manufacturers, supermarkets or wholesalers with whom they have concluded sponsorship contracts. Somaro social stores receive donations from approximately 23 companies in the food industry. The main types of donated foods include: *bakery products, dairy products, cheeses, preserved products*, etc., and the time interval at which such takeovers take place is, usually, 1 delivery every 2 weeks. Somaro, has collected and distributed to people with low and very low incomes over 100 tons of food in Romania, in 2015 (according to SOMARO team).

#### Other initiatives

Cosmina Paul is the initiator of the “A Hot Meal” program, by which dozens of needy families receive meals cooked with donated foods. The project has started on 1 June 2013, by preparing 50 hot meals at the Cantina of the City Hall in Cluj. This activity was continued on a weekly basis, every Thursday between 2 pm and 4 pm hours, the food dishes being distributed next to the canteen. Community initiatives of this kind are quite widespread. The program, initially run in Cluj, was also initiated in the capital city, in Bucharest (2014), Bistrița (2015) and Satu - Mare (2015). Volunteers cook with donated ingredients and the meal of people depends on the generosity of donors. The project will continue depending on the existing resources (Paul, C. et al., 2013).

## CONCLUSIONS

The way globe resources are currently used is not at all sustainable: we extract and consume more raw materials than the planet can offer us in the long run. In a context where the number of consumers is constantly growing, a large number of specialists argue that a possible solution to increase global food production by 70-100%, would be agriculture. But at a time when agriculture is one of the greatest threats to the health of the planet: *intensive farming is responsible for 70% of the world's freshwater losses, 80% of tropical and subtropical deforestation and 30-35% of human-caused greenhouse gas emissions* (Royte, E. 2016:46), another group of specialists believe that enough food could be provided to the growing population (without destroying other forests, meadows, marshy areas, etc.), precisely by finding/using the most appropriate solutions for reducing current food waste, such as: waste prevention through accountability, education and price reductions for foods approaching the expiry date, transfer of food by donation or sponsorship, directing agro-food products that have become inadequate for human consumption towards being transformed into feed.

We would like to conclude our paper with an eloquent quote: “*Gather the pieces that are left over, let nothing be wasted.*” (Jesus in John 6:12).

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## ANNEXES

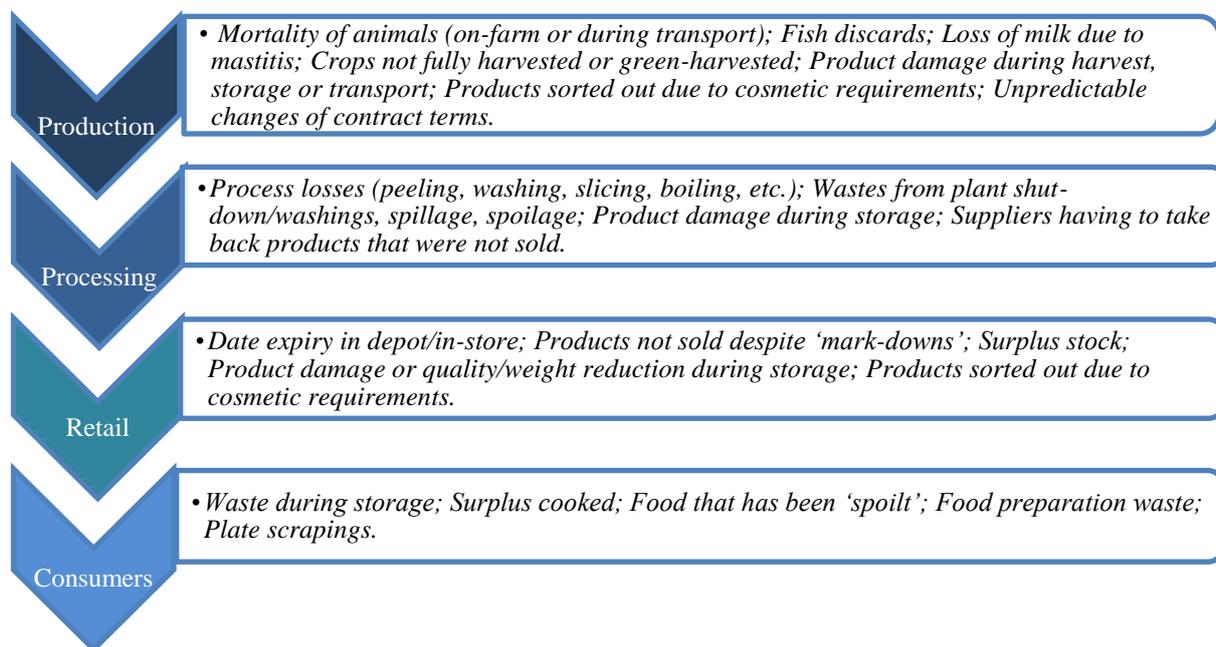


Figure no.1 Situations that generate food waste and food losses along the food supply chain

Source: Curtea Europeană de Conturi (2016). Raportul special nr.34/2016, p.13. [European Court of Auditors Combating Food Waste: Special Report No. 34/2016].

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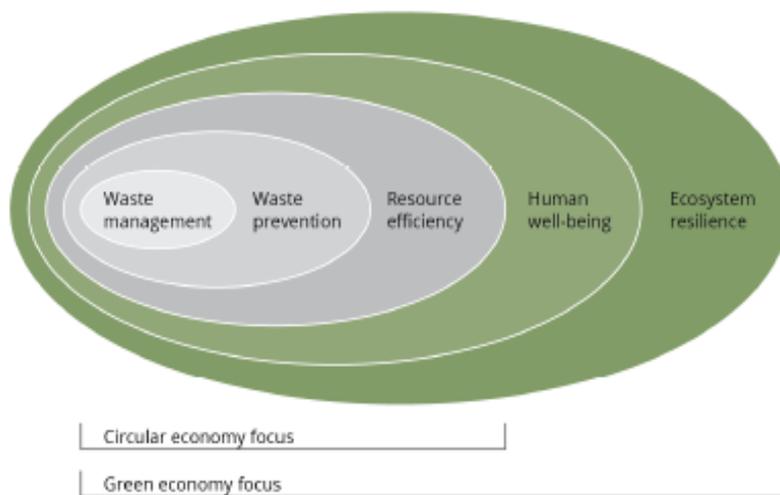


Figure no.2 The green economy as an integrating framework for policies relating to material use

Source: SOER (2015). Green economy, p.5. Retrieved from <https://www.eea.europa.eu/soer-2015/europe/green-economy> and Agenția Europeană de Mediu. Mediul European. Starea și perspectiva 2015. Raport de sinteză. p.153 [EEA - The European Environment State and Outlook (SOER) 2015. Synthesis report.] Retrieved from <https://www.eea.europa.eu/soer-2015/synthesis/mediul-european-2013-starea-si>.

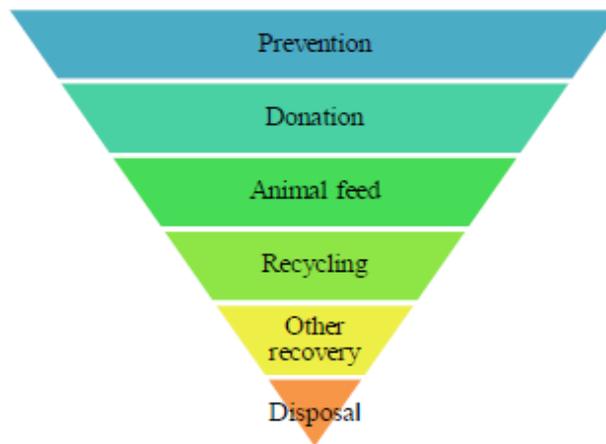


Figure no.3 Food waste hierarchy

Source: Curtea Europeană de Conturi (2016). Raportul special nr.34/2016, p.11. [European Court of Auditors Combating Food Waste: Special Report No. 34/2016].

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Table no.1  
Some Leading Food Loss and Waste Reduction Initiatives

Geography	Initiative or organization	For more information, visit...
Global	<b>SAVE FOOD</b>	<a href="http://www.save-food.org">http://www.save-food.org</a> and <a href="http://www.fao.org/save-food">http://www.fao.org/save-food</a>
	<b>Think. Eat. Save</b>	<a href="http://www.thinkeatsave.org">http://www.thinkeatsave.org</a>
	<b>Global Food Banking Network</b>	<a href="http://www.foodbanking.org">http://www.foodbanking.org</a>
	<b>OECD Food Chain Analysis Network</b>	<a href="http://www.oecd.org/site/agrfcn">http://www.oecd.org/site/agrfcn</a>
Regional	<b>FUSIONS</b>	<a href="http://www.eu-fusions.org">http://www.eu-fusions.org</a>
	<b>Programs in Africa, Asia and the Middle East</b>	<a href="http://www.aphlis.net">http://www.aphlis.net</a>
National	<b>WRAP UK</b>	<a href="http://www.wrap.org.uk">http://www.wrap.org.uk</a>

Source: Lipinski, B. et al. (2013), pp.32-33. Retrieved from <http://www.worldresourcesreport.org>

Table no.2

*No More Food to Waste: Global action to stop food losses and food waste*

<b>Case Studies</b>
<b>1. A Loss-reducing Rice Thresher in Six West African Countries</b>
<b>2. Drying Fish Fast For Under US\$30 in India</b>
<b>3. Milking the Demand for Dairy in Kenya</b>
<b>4. An Innovative Fish Processing Technology in Senegal</b>
<b>5. Analyzing the Banana Supply Chain in Kenya Leads To</b>
<b>6. Partnerships and Investment</b>
<b>7. Mapping the Production System of Black Gram in India</b>
<b>8. Promoting Andean Crops through Markets and Agribusiness</b>
<b>9. Development</b>
<b>10. Implementing A National Food Waste Prevention in South Africa</b>
<b>11. Working Towards A 30% Reduction of Food Waste in Europe</b>
<b>12. Improving Resource Efficiency in the Netherlands</b>

Source: synthesized by the author based on the information provided by Dijkma, S. (2015), pp. 11-22.  
Retrieved from <https://www.nomorefoodtowaste.nl/conference/documents/publications/2015/06/12/no-more-food-to-waste-case-study>

Table no.3

*The 7th Environment Action Programme (EAP) - key objectives*

<b>The 7th Environment Action Programme - key objectives</b>
<b>1. to protect, conserve and enhance the Union's natural capital;</b>
<b>2. to turn the Union into a resource-efficient, green and competitive low-carbon economy;</b>
<b>3. to safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing;</b>
<b>4. better implementation of legislation;</b>
<b>5. better information by improving the knowledge base;</b>
<b>6. more and wiser investment for environment and climate policy;</b>
<b>7. full integration of environmental requirements and considerations into other policies;</b>
<b>8. to make the Union's cities more sustainable;</b>
<b>9. to help the Union address international environmental and climate challenges more effectively.</b>

Source: synthesized by the author based on the information provided by Comisia Europeană in *Al șaptelea PAM – Programul general al Uniunii de acțiune pentru mediu până în 2020*, p.2 [7th EAP — The new general Union Environment Action Programme to 2020].

Retrieved from: <http://ec.europa.eu/environment/pubs/pdf/factsheets/7eap/ro.pdf>