Save Food. Waste less.
Τέρμα στη σπατάλη τροφίμων!

Project:

Awareness – raising campaign to prevent and manage food waste among consumers, the food and hospitality industries.

PSC Parpounas Sustainability Consultants

November 2020

PROJECT BASELINE REPORT

LIFE19 GIE/CY/001166

FOODprint project is co-funded by the LIFE Programme of the European Union

@foodprintcy

List of Abbreviation

FAO Food and Agricultural Organization

WFD Waste Framework Directive

MSW Municipal Solid Waste

DDG Sustainable Development Goal

CEP Circular Economy Package

GHG Green House Gasses

SDG Sustainable Development Goal

FWL Food Losses and Food Waste

MBT Mechanical Biological Treatment

Executive Summary

According to various sources of information globally, roughly a third of all food produced for human consumption is lost or wasted- approximately 1.9 billion tonnes. Food losses and waste amounts to roughly US$ 680 billion in industrialized countries and US$ 310 billion in developing countries.

About 60 % of bio-waste is food waste. Reducing the demand for food by preventing food waste can decrease the environmental impacts of producing, processing and transporting food. The benefits from reducing such upstream impacts are much higher than any environmental benefits from recycling food waste. Food waste does not only mean that valuable and often scarce resources such as water, soil, and energy are being lost, it also contributes to climate change. According to the UN's Food and Agricultural Organization (FAO), food waste has a global carbon footprint of about 8% of all global greenhouse gas emissions caused by humans. For every kilo of food produced, 4.5 kilos of CO2 are released into the atmosphere.

The distribution of food waste differs between industrial and developing countries. In developing countries, over 40% of food losses happen after harvest and during processing, while in industrialised countries, over 40% occurs at retail and consumer level. Tackling the food waste challenge in different countries should reflect these facts.

There are many factors with potential to contribute to food waste (Insufficient shopping and meal planning, stock management issues for manufacturers and retailers, overproduction or lack of demand for certain products at certain times of the year, inadequate storage/ transport at all stages of the food chain etc.), yet underlying all these problems is an overall lack of awareness, by many actors, of the sheer scale of the problem, the possible solutions and the benefits that come from reducing food waste. Furthermore, international research reveals that the food waste problem is underestimated. Globally, people perceive that the food waste problem is smaller than it actually is.

Bio-waste represents an important share of European municipal waste generation. In 2017, the EU-28 (28 EU Member States) generated 249 million tonnes of municipal solid waste, of which about 34 %, or 86 million tonnes, was bio-waste. Because of the bio-waste considerable volume, the EU's common objectives for waste management cannot be met without addressing the bio-waste stream. If not managed well, this voluminous waste stream poses significant environmental and economic threats. For example, biodegradable waste, including bio-waste, is a key source of greenhouse gas emissions from landfill sites, corresponding to about 3 % of total EU greenhouse gas emissions. Addressing municipal bio-waste is also crucial for moving towards the new targets defined in the 2018 revised Waste Framework Directive. This directive introduces new targets regarding recycling and preparation for reuse of Municipal Solid Waste: by weight, at least 55 % by 2025, 60 % by 2030 and 65 % by 2035.

Bio-waste accounts for more than 34% of the municipal solid waste generated, amounting to 86 million tons in 2017 in the EU-28 (28 EU Member States for the period 2013-2020). Recycling bio-waste is therefore crucial for meeting the EU target to recycle 65% of municipal waste by 2035.

European circular economy and waste policies, including the recent EU Green Deal, increasingly address bio-waste as one of several key waste streams. These include new targets for the recycling and preparing for reuse of municipal waste and an obligation for separate collection for bio-waste. Moreover, EU Member States are required to monitor food waste generation and to have a food waste prevention programme, supporting Sustainable Development Goal 12.3 — to halve food waste by 2030.

The Sustainable Development Goals' target of halving food waste by 2030 has helped to put preventing food waste high on the policy agenda in most European countries. Although the share of municipal waste composted and digested was 17 % in 2018 — up from 11 % in 2004 — a high proportion of bio-waste still ends up in the mixed waste that is landfilled or incinerated, even in many countries with well-established separate collection systems.

Food waste is an important component of the municipal bio-waste stream. It can be divided into avoidable and non-avoidable food waste. Preventing avoidable food waste is perceived as an ethical responsibility, because it is associated with the misappropriation of economic resources and their resulting negative environmental externalities. For this reason, the European Commission's bio economy strategy has started to focus on food systems. Generally, in the majority of European countries, food waste stands out as a priority in waste prevention policies. The most common policy actions to address food waste are awareness-raising and information campaigns. Other common measures are food redistribution platforms and increasing promotion of retailers' second-class food sales. Most recently, a forthcoming EU 'Farm to fork' strategy was announced, which is intended to address all stages of the food chain, including food waste.

In many countries, action on waste prevention gives high priority to food waste prevention. Countries are implementing policy measures ranging from Eco labelling, through improving consumer awareness, to increasing the responsibilities of producers and distributors. The new reporting requirement on food waste generation introduced under the WFD will for the first time enable tracking of the progress of such policies across Europe in a harmonised way.

In the EU, around 88 million tonnes of food waste (equivalent to 173 kilos per person) are generated annually (an estimated 20% of the total food produced each year is lost or wasted) with associated costs estimated at 143 billion euros. At the same time, latest Eurostat data (2018) indicate that 43 million people cannot afford a quality meal (including meat, chicken, fish or vegetarian equivalent) every 2nd day. Not only is this a waste of resources, it also contributes to climate change. It is estimated that greenhouse gas emissions related to food losses and wastes in the EU-28 are responsible for 15-22 % of the total life-cycle emissions of the food consumed. Scherhaufer et al. (2018) also estimated that a global warming potential of 186 million tonnes of carbon dioxide equivalent (Mt CO2e) can be attributed to food waste in Europe, or on average about 2.1 tonnes of CO2e per tonne of food waste.

Due to the fact that food waste has only rather recently become an important issue in terms of waste management policies (even in the EU), the statistics found on quantities of food waste are rather limited. The fact that in most countries' food waste is not collected separately, but as part of Municipal Solid Waste, limits the access to quantitative data on food waste. What is apparent from Eurostat data, roughly in half of the EU countries, Municipal Solid Waste production per capita has decreased between 2005 and 2018, while in the rest it has increased. In the majority of the countries though, the differences between the two years are small. Despite the fact there is no clear picture of what happened with food waste (as part of the MSW) during the same years, it can be assumed that the production of food waste followed a similar pattern in each of the countries. So, we can roughly estimate that in half of the EU countries the food waste has been decreasing and, in the rest, it has been increasing. In a similar way we can assume that the differences over time are small. Regarding the treatment of waste, the results show during these years, a significant shift away from landfill which has been steadily decreasing over time, while the waste has been diverted to material recycling, incineration and composting. There are of course significant differences between countries of the EU. Composting has increased over time.

Data and analysis on food waste in the EU and by country are not as readily available as for the MSW, as there was no specific requirement to collect such data. Until now, data on food waste generation have usually been based on ad hoc studies. The situation will improve with the obligations of the revised Waste Framework Directive, as it has become a requirement for EU Member States to measure and report food waste generation annually, starting in 2020, and to adopt specific food waste prevention programmes.

Regarding treatment of bio-waste, landfilling of bio-waste has very high negative environmental impacts. In landfills, biodegradable waste decomposes and produces gas that mainly consists of methane, a powerful greenhouse gas, and landfilling of separately collected bio-waste or of bio-waste within residual municipal waste without pre-treatment is not allowed in the EU according to the WFD and the Landfill Directive. Treatment of separately collected bio-waste is dominated by composting, but anaerobic digestion, with biogas production, is increasing. The level of separate bio-waste collection differs considerably across Europe. Many countries are far from capturing bio-waste's full potential.

Because most of the environmental impacts of bio-waste come from food production, food waste prevention at all stages of the food value chain is highly relevant. If demand for food is reduced by preventing food waste, the environmental impacts of producing, processing and transporting food

decrease. Preventing food waste in households and in the hospitality sector has the greatest indirect effect in mitigating environmental pressures.

In the majority of European countries, food waste stands out as a priority fraction in waste prevention policies. The WFD requires all EU Member States to develop specific food waste prevention programmes. Although the development of such programmes is still under way, analysis of 32 national and regional waste prevention programmes shows that measures on food waste are already included in the prevention programmes of 28 countries and regions. Such measures include, for example, awareness-raising and information campaigns and programmes to reduce food waste, economic and financial measures, regulatory measures, voluntary agreements, targets, food redistribution platforms etc. These measures target either the consumer or the industry.

The availability of local statistics generally on biodegradable waste and more specifically on food waste in Cyprus, is low. Food waste in 2017, can be roughly estimated to be about 155,000 tonnes in Cyprus, representing 28,2% of total municipal solid waste generated for the same year. Consequently, almost one third of the infrastructure and operational cost for waste management in Cyprus, is expensed to deal with food waste.

According to the analysis so far, there is international and EU data on the types and quantities of food produced and lost at various stages of the life cycle, from production to consumption. There is also a clear picture of the damage caused both socially and economically by food waste. To a certain extent, some of the root causes of food waste that are related to public behaviours, are also known. However, we know less of the public opinion and the habits of people in Cyprus regarding food waste. To design an effective communication campaign, it is imperative to have a better baseline of the existing opinions and behaviours of people. At the same time, this baseline will serve as a base for the measurement of the effectiveness of the campaign to be deployed in the next months.

It is necessary to understand the extent of the food waste problem in Cyprus, the reasons causing it, the rates at which food waste is produced and where this happens most intensely. Understanding and recording any negative habits and mentalities of the public, as well as any possible disincentives for the proper food waste management is important and will be utilised for the design of an effective communication campaign with the aim to positively influence the public opinion and habits and facilitate the prevention and treatment of food waste.

To facilitate the design of the Life Footprint project baseline, two quantitative surveys were conducted during October and early November 2020. The main survey was based on structured questionnaires (Annex 1) and a stratified sample of 554 people over the age of 18, run in the period 21 – 23 October 2020. The second, was a shorter online questionnaire (Annex 2) via the Dias group websites with a larger sample (total 1828 participants, out of which 1104 with complete answers) and participation from other countries (Greece, UK, other).

As can be seen from the surveys, the vast majority of Cypriot consumers buy more than the necessary quantities of food on a regular basis. This is done mainly for two reasons, to satisfy the different preferences of family members, and to maintain a sense of security and adequacy. Even more the percentage that indicates that during every meal, there are leftovers is high. In most cases they are consumed in the next few days, or given for pet food, but there are many cases in which the extra food is simply thrown away. This is the second challenge beyond the excessive food purchases. The poor management of food stocks results in about one in four cases, to surplus food simply ending up in the trash.

The main reason for wasting food by consumers, is because they do not consume it before the expiration date, which means poor planning of stocks. This, couples with the excessive purchase of food, also shows limited knowledge of food storage and preservation techniques and poor refrigeration and food management practices. Another point that deserves attention is that the greatest contributors to food waste are the youngest people, the upper social classes, the people who shop more often and the people who more often order ready-made food.

It is also remarkable that consumers do not consider the wasting of food as a serious environmental problem. Instead, they feel guilty when they waste food (possibly because they throw food away while

others do not have the necessary food) and also that they waste their money. So financial concerns and charity feelings prevail when food is wasted and much less the environmental concerns.

From the research, some issues are more striking and will be used to design an effective campaign for the public, the main of which are:

• People are wasting almost a third of the food they buy

• They buy more than needed and they though much of that away (they do not manage it)

• The younger people waste more than older people

• More effluent consumers waste more

• Consumers buy more mostly for security reasons (to feel safe)

• They do not consume at the same rate they buy (over-consumerism)

• Consumers are having difficulties to manage their food (freezing, storing etc.) and consequently they throw more food away

• More than 70% of people throw their food waste in the trash and less than 10% compost it

• There is a fallacy that people plan their purchases and manage their food properly, but real behaviours do not support that

• There are good intentions to manage the food, but little action to do so

• Consumers do not consider food waste a serious environmental problem

• Consumers feel guilty when they waste food (possibly because they throw food away while others do not have the necessary food) and also that they waste their money (financial and charity feelings prevail)

• There is poor utilisation of food expiration labelling

• There is poor knowledge or limited attention to methods to prevent food waste

• Consumers are not used to share their food left-overs and instead they throw them in trash.

Introduction

This report is an integral part of the work for the project FOODprint – "Awareness – raising campaign to prevent and manage food waste among consumers, the food and hospitality industries", co-funded by the Life Programme of the European Union (LIFE19 GIE/CY/001166). The report is intended to serve as the baseline for the project and provide material and findings that will be used to properly design the awareness raising campaign to prevent and manage food waste among consumers, the food and hospitality industry, which is the main tool to be developed under this project.

In this context, the collection and analysis of data is deployed in the following levels:

- International food waste data and initiatives
- EU food waste data and initiatives
- Cyprus food waste data and initiatives
- Primary research in Cyprus to identify existing public opinions and public habits

The combination of these information will be utilized to develop the campaign of the project, while some of the data collected from the EU and the international markets, can serve as benchmarks to gauge the success of our initiatives in this project. To measure the impact of the project interventions, two additional primary research surveys will be performed, one in the middle and one towards the end of the project duration, while a number of additional web surveys will be performed throughout the duration of the project.

Table of Contents

Table of Figures

List of Tables

1. Global Perspective

Bio-waste — mainly food and garden waste — is a key waste stream with a high potential for contributing to a more circular economy, delivering valuable soil-improving material and fertiliser as well as biogas, a source of renewable energy (Bio-waste in Europe — turning challenges into opportunities - EEA Report No 04/2020)

About 60 % of bio-waste is food waste (Bio-waste in Europe — turning challenges into opportunities - EEA Report No 04/2020). Reducing the demand for food by preventing food waste can decrease the environmental impacts of producing, processing and transporting food. The benefits from reducing such upstream impacts are much higher than any environmental benefits from recycling food waste.

Globally, roughly a third of all food produced for human consumption is lost or wasted- approximately 1.9 billion tonnes. Food losses and waste amounts to roughly US$ 680 billion in industrialized countries and US$ 310 billion in developing countries (https://stopwastingfoodmovement.org/food-waste/food-waste-facts/).

Food waste does not only mean that valuable and often scarce resources such as water, soil, and energy are being lost, it also contributes to climate change. According to the UN's Food and Agricultural Organization (FAO), food waste has a global carbon footprint of about 8% of all global greenhouse gas emissions caused by humans. For every kilo of food produced, 4.5 kilos of CO2 are released into the atmosphere (www.fao.org).

There is also the ethical aspect: FAO says about 793 million people in the world are malnourished. According to Eurostat, 55 million people (9.6% of the EU's population), were unable to afford a quality meal every second day in 2014 (www.fao.org).

Food loss and waste in industrialised countries has a different distribution than in developing countries (https://ec.europa.eu/food/safety/food_waste/stop_en):

- In developing countries, over 40% of food losses happen after harvest and during processing;
- In industrialised countries, over 40% occurs at retail and consumer level.

Food loss is also higher in industrialized countries (affluent) compared to developing countries.

Figure 1 below is indicative of the increased food waste production in affluent countries.

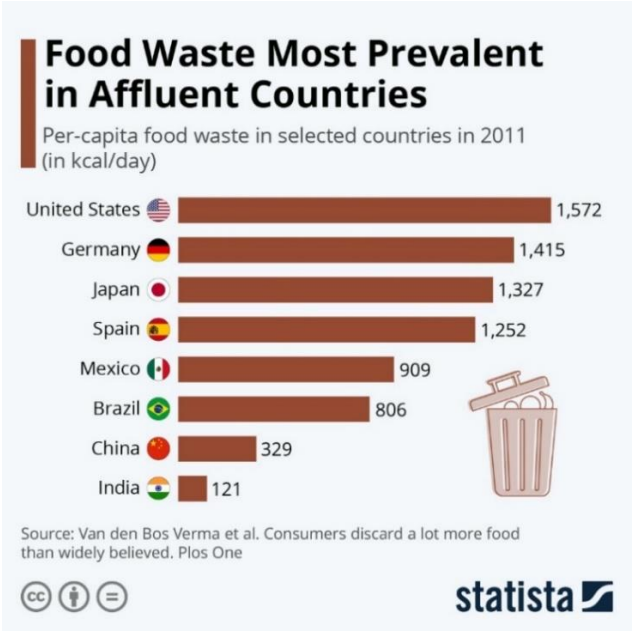

Figure 1: Food Waste Most Prevalent in Affluent Countries (2011) - Statista (https://www.statista.com/)

About 14 percent of the world's food is lost before it even reaches retail. This is the conclusion of a report released recently by the UN Food and Agriculture Organization (FAO) (The State of Food and Agriculture 2020 - http://www.fao.org/documents/card/en/c/cb1447en). Figure 2 below includes the breakdown of losses by food type.

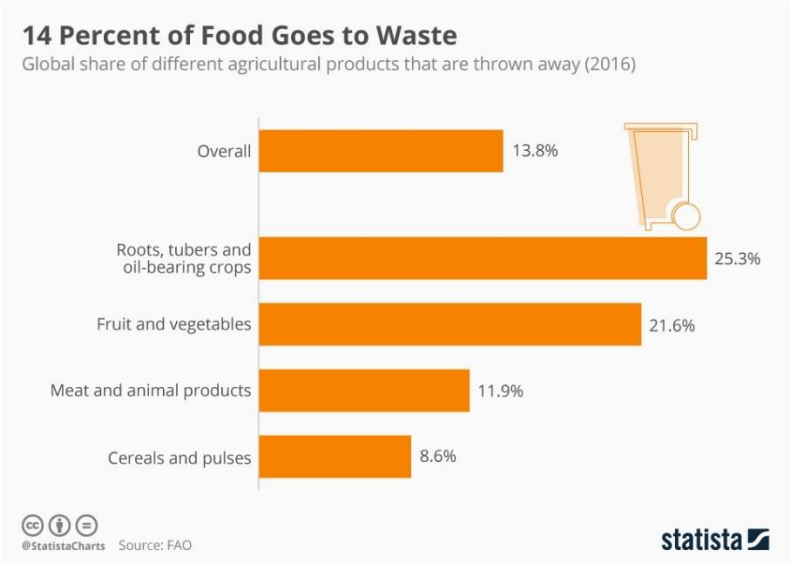

Figure 2: Percent of Food Goes to Waste- Statista (https://www.statista.com/)

According to the report, the losses occur due to incorrect harvesting times, climatic conditions, incorrect harvesting techniques, poor storage and improper transport. Countries in Central and South Asia are particularly affected by food losses (20.7%). But North America and Europe (15.7%) also lose food at a rate that is above the world average (13.8%). Regions savvier about food waste are Australia and New Zealand (5.8%), the rest of Oceania (8.9%) as well as Eastern and Southeast Asia (7.8%). (The State of Food and Agriculture 2020 - http://www.fao.org/documents/card/en/c/cb1447en).

Food losses or food wasting unfortunately happnes **along the whole food supply chain**: on the farm, in processing and manufacture, in shops, in restaurants and canteens and in the home. The most important losses happen at the household level. The reasons for food waste vary widely and can be sector-specific.

1.1 Factors contributing to food waste

There are many factors with potential to contribute to the food waste issue, some of which are (General website European Commission on Food waste: http://ec.europa.eu/food/safety/food_waste/stop/index_en.htm):

- Insufficient shopping and meal planning and promotions like "buy one get one free" leading to too much food being purchased or prepared
- Misunderstandings about the meaning of "best before" and "use by" date labels leading to edible foods being thrown away
- Standardised portion sizes in restaurants and canteens
- Difficulty in anticipating the number of customers (a problem for catering services);
- Stock management issues for manufacturers and retailers
- High quality standards (e.g. for produce sold at retail)
- Overproduction or lack of demand for certain products at certain times of the year; product and packaging damage (farmers and food manufacturing)
- Inadequate storage/transport at all stages of the food chain

Underneath these obvious problems there are underlying facts like the sheer underestimate of the scale of the problem, limited awareness of the solution and potential benefits from food waste reduction. Following is an analysis of the challenges and opportunities at different levels.

Consumers

Everyone can play a role in reducing food waste. Often with minimal effort, food waste can be reduced, saving money and helping to protect the environment. There are many resources on ways and means to minimise food waste at the household level and this is critical due to the high contribution of the households to the creation of the problem. The most recent estimates of European food waste levels (FUSIONS, 2016), reveal that 70% of EU food waste arises in the household (47 million tonnes), food service and retail sectors, with production and processing sectors contributing the remaining 30% (https://ec.europa.eu/food/safety/food_waste/stop_en).

There are various steps that consumers can take to limit food waste, among which are the following (https://www.europarl.europa.eu/news/en/headlines/society/20170505STO73528):

- Compile shopping lists
- Check the dates and be aware of the meaning of date labelling
- Store food in accordance with the instructions on the packaging
- Put new food at the back of your fridge and cupboards
- Use up leftovers
- Freeze food

Industry

Companies which implement food waste reduction initiatives in their daily operations are bound to reap the financial benefits of their actions (https://ec.europa.eu/food/safety/food_waste/stop_en). After evaluating cost and benefit data for 1,200 business sites across 700 companies in 17 countries, researchers from the World Resources Institute (WRI) and the Waste & Resources Action Programme (WRAP) found that for most companies, **for every $1 invested in reducing food waste, they saved $14 or more**. *The Business Case for Reducing Food Loss and Waste* report by WRI and WRAP can be accessed at (https://champions123.org/publication/business-case-reducing-food-loss-and-waste).

Governments

Governments are expected to create enabling policy environments that promote food waste prevention and reduction initiatives**,** including economic incentives for application of the waste hierarchy (e.g. fiscal incentives for food donation). Food waste is a cross-cutting issue affecting different policy areas; therefore, **relevant public services should coordinate efforts and develop integrated action plans in order to tackle food waste effectively**. Strengthening collaboration between all actors of the food supply chain is crucial; governments can facilitate such synergies in view of achieving more sustainable food systems (https://ec.europa.eu/food/safety/food_waste/stop_en).

1.2 The food waste problem is underestimated

International research reveals that the food waste problem is underestimated. Globally, people perceive that the food waste problem is smaller than it actually is. Figure 3 below is indicative of this fallacy at the level of the households.

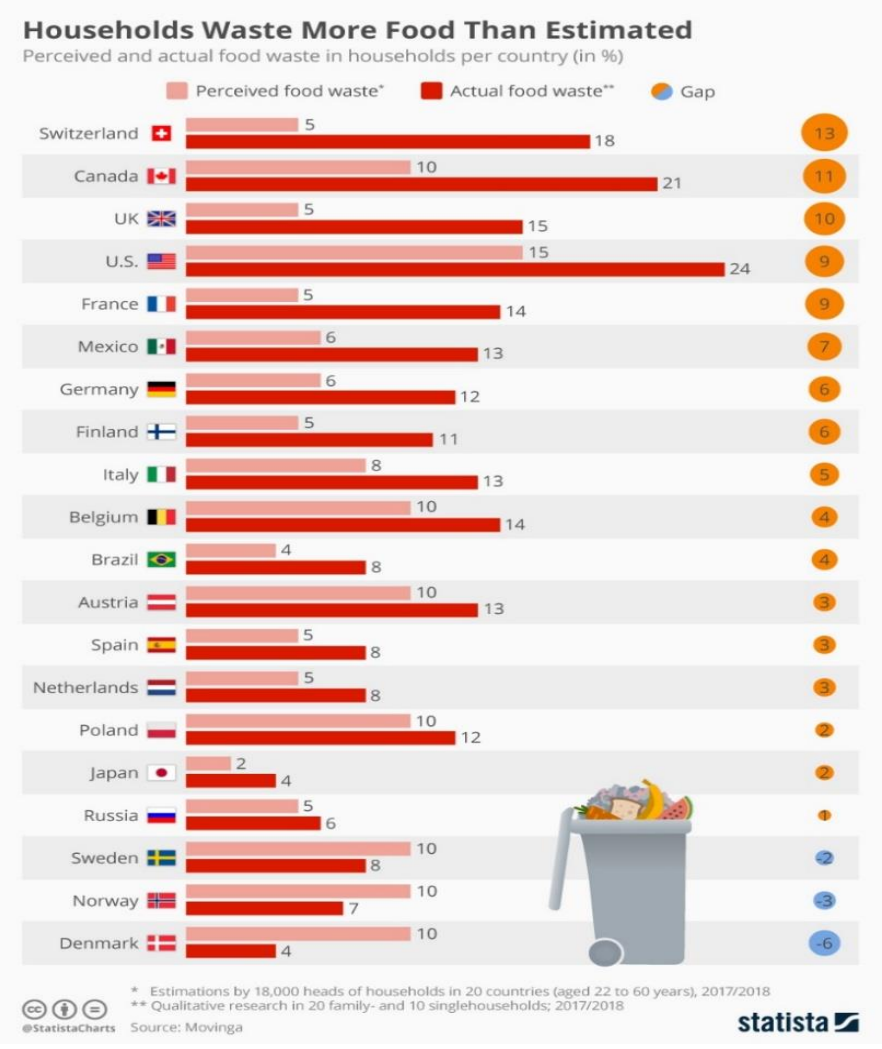

Figure 3: Households Waste More Food Than Estimated (2017/2018)- Statista (https://www.statista.com/)

Consumers are also often unaware of the issue or its causes. According to a Eurobarometer survey, date markings on food products is poorly understood, even though nearly six out of 10 Europeans say they always check “best before” and “use by” labels.

2. EU perspective

Bio-waste represents an important share of European municipal waste generation. In 2017, the EU-28 (28 EU Member States) generated 249 million tonnes of municipal solid waste (Eurostat, 2019), of which about 34 %, or 86 million tonnes, was bio-waste (Figure 4: Per Capita Production). This includes both bio-waste that is separately collected and bio-waste collected together with mixed (residual) waste but excludes home-composted bio-waste.

The bio-waste definition in the EU Waste Framework Directive's is: bio-waste comprises 'biodegradable garden and park waste, food and kitchen waste from households, offices, restaurants, wholesale, canteens, caterers and retail premises and comparable waste from food-processing plants'. Food waste, a key component of bio-waste, can be edible (e.g. food purchased but not eaten, leftovers from meals) or non-edible (e.g. banana peel or bones). The edible part is targeted by food waste prevention measures. Apart from bio-waste, there are other biodegradable wastes, for example paper and cardboard waste, wood waste and natural fibres in textiles. However, these are outside the definition of bio-waste (EU, 2018b, Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste).

Because of the bio-waste volume, the EU's common objectives for waste management cannot be met without addressing the bio-waste stream. If not managed well, this voluminous waste stream poses significant environmental and economic threats (Pubule et al., 2015). For example, biodegradable waste, including bio-waste, is a key source of greenhouse gas emissions from landfill sites, corresponding to about 3 % of total EU greenhouse gas emissions (EEA, 2019a). Addressing municipal bio-waste is also crucial for moving towards the new targets defined in the 2018 revised Waste Framework Directive. This directive introduces new targets regarding recycling and preparation for reuse of Municipal Solid Waste: by weight, at least 55 % by 2025, 60 % by 2030 and 65 % by 2035.

Recently revised waste legislation within the EU's circular economy strategy has introduced a number of targets and provisions that will drive both the prevention and the sustainable management of bio-waste. About 60 % of bio-waste is food waste. Reducing the demand for food by preventing food waste can decrease the environmental impacts of producing, processing and transporting food (https://www.biocycle.net/turning-biowaste-challenges-into-opportunities). The Sustainable Development Goals' target of halving food waste by 2030 has helped to put preventing food waste high on the policy agenda in most European countries. Although the share of municipal waste composted and digested was 17 % in 2018 — up from 11 % in 2004 — a high proportion of bio-waste still ends up in the mixed waste that is landfilled or incinerated, even in many countries with well-established separate collection systems. To enable bio-waste to be used as a source of high-quality fertiliser and soil improver, it needs to be collected separately at source while keeping impurity levels low (HALVING FOOD LOSS AND WASTE IN THE EU BY 2030: THE MAJOR STEPS NEEDED TO ACCELERATE PROGRESS – Report 2020, WWF and WRAP).

Bio-waste accounts for more than 34% of the municipal solid waste generated, amounting to 86 million tons in 2017 in the EU-28 (28 EU Member States for the period 2013-2020). Recycling bio-waste is therefore crucial for meeting the EU target to recycle 65% of municipal waste by 2035 (https://www.compostnetwork.info/policy/biowaste-in-europe/).

European circular economy and waste policies increasingly address bio-waste as one of several key waste streams. These include new targets for the recycling and preparing for reuse of municipal waste and an obligation for separate collection for bio-waste. Moreover, EU Member States are required to monitor food waste generation and to have a food waste prevention programme,

supporting Sustainable Development Goal 12.3 — to halve food waste by 2030 (Bio-waste in Europe — turning challenges into opportunities - EEA Report No 04/2020).

2.1 Food waste in the EU

The European Union has recently been very active in dealing with food and food waste. Food waste is an increasing concern in Europe. The production, distribution and storage of food use natural resources and generate environmental impacts. Discarding food that is still edible increases these impacts and causes financial loss for consumers and the economy (Combating Food Waste: an opportunity for the EU to improve the resource-efficiency of the food supply chain – 2016).

Food waste is an important component of the municipal bio-waste stream. It can be divided into avoidable and non-avoidable food waste. Preventing avoidable food waste is perceived as an ethical responsibility, because it is associated with the misappropriation of economic resources and their resulting negative environmental externalities (Philippidis et al., 2019). For this reason, the European Commission's bio economy strategy has started to focus on food systems. More than other waste types, preventing food waste is perceived as an ethical responsibility for society. Generally, in the majority of European countries, food waste stands out as a priority in waste prevention policies. The most common policy actions to address food waste are awareness-raising and information campaigns. Other common measures are food redistribution platforms and increasing promotion of retailers' second-class food sales (Bio-waste in Europe — turning challenges into opportunities - EEA Report No 04/2020).

Most recently, a forthcoming EU 'Farm to fork' strategy was announced, which is intended to address all stages of the food chain, including food waste (EC, 2019a).

Food waste represents 60% of the total municipal bio-waste in the EU-28 and garden waste accounts for 35%, while the remaining 5% of municipal bio-waste is classified as 'other'. On average in 2017, 43% of municipal bio-waste was collected separately, while 57% of bio-waste ended up in mixed municipal waste and was thus lost for recycling (Bio-waste in Europe — turning challenges into opportunities - EEA Report No 04/2020).

In many countries, action on waste prevention gives high priority to food waste prevention. Countries are implementing policy measures ranging from Eco labelling, through improving consumer awareness, to increasing the responsibilities of producers and distributors. The new reporting requirement on food waste generation introduced under the WFD will for the first time enable tracking of the progress of such policies across Europe in a harmonised way.

2.2 The Challenge at EU level

In the EU, around 88 million tonnes of food waste (equivalent to 173 kilos per person) are generated annually (an estimated 20% of the total food produced each year is lost or wasted) with associated costs estimated at 143 billion euros (FUSIONS, 2016). At the same time, latest Eurostat data (2018) indicate that 43 million people cannot afford a quality meal (including meat, chicken, fish or vegetarian equivalent) every 2nd day. Not only is this a waste of resources, it also contributes to climate change.

It is estimated that greenhouse gas emissions related to food losses and wastes in the EU-28 are responsible for 15-22 % of the total life-cycle emissions of the food consumed (Scherhaufer et al., 2015, 2018). Scherhaufer et al. (2018) also estimated that a global warming potential of 186 million tonnes of carbon dioxide equivalent (Mt CO2e) can be attributed to food waste in Europe, or on average about 2.1 tonnes of CO2e per tonne of food waste.

Food that is produced and sold but not consumed causes unnecessary environmental pressures along its whole value chain. Most of the environmental pressures related to food waste are generated in the production phase of the food. 73% of food waste-related greenhouse gas emissions are derived from food production, 6% from food processing, 7% from retail and distribution and 8% from food preparation and consumption, with the disposal of food waste contributing just 6%. Meat and dairy products make the highest contribution to the overall environmental impacts of food waste in terms of global warming potential, acidification potential and eutrophication potential (Scherhaufer et al., 2018).

Food is lost and wasted along the whole supply chain from farms to processing and manufacturing to shops, restaurants and at home. However, most of the food in the EU is wasted by households with 53% and processing with 19%.

The infographic in figure 4 summarises some of the basic parameters of the food waste problem in the EU.

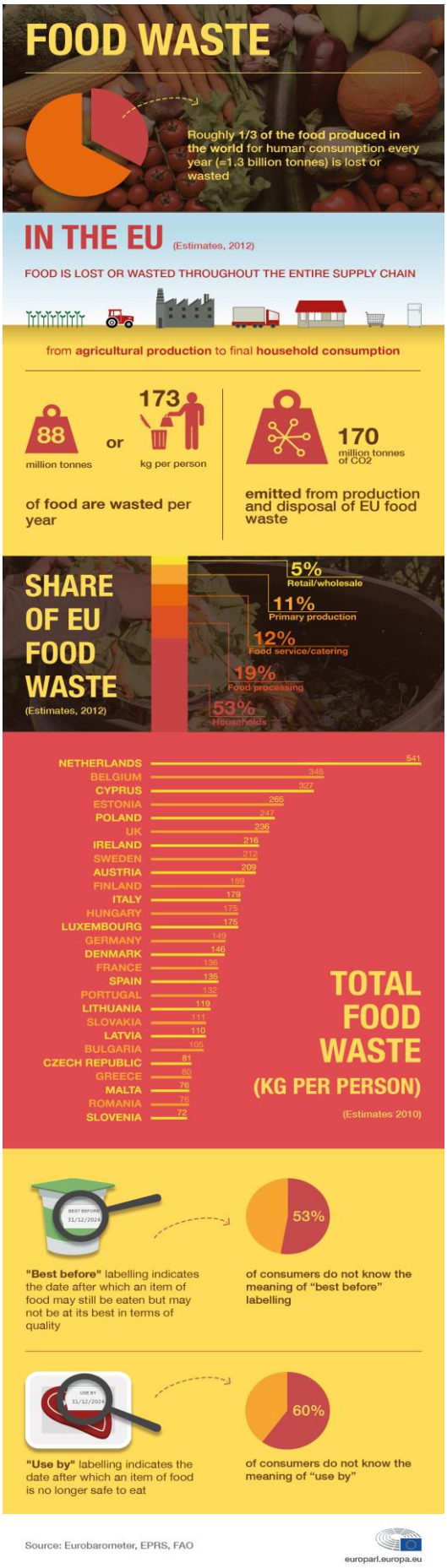

Figure 4: Per Capita Production - EU- ***(https://www.europarl.europa.eu/news/en/headlines/society/20170505STO73528/food-waste-the-problem-in-the-eu-in-numbers-infographic)***

What is obvious from the infographic among other things, is that the per capita production of food waste widely differs between members states. Cyprus is among the top food waste producers in the EU. To a certain extent, this is attributed to the touristic nature of the country. Cyprus used to accept (prior to the pandemic), close to 4 million tourists per year, a very high number compared to the 850,000 of the local population. These tourists have a definite impact on the total food waste production; hence the calculation of the per capita production is inflated.

The EU and its Member States are committed to meeting Sustainable Development Goal (SDG) 12.3 to halve per capita food waste at the retail and consumer level by 2030 and reduce food losses along the food production and supply chains.

Wasting food is not only an ethical and economic issue but it also depletes the environment of limited natural resources. By reducing food losses and waste to help achieve Sustainable Development Goals, we can also:

- Support the fight against climate change (food waste alone generates about 8% of Global Greenhouse Gas Emissions)
- Save nutritious food for redistribution to those in need, helping to eradicate hunger and malnutrition
- Save money for farmers, companies and households.

The central goal of EU food safety policy is to protect both human and animal health. EU cannot compromise on these standards but, in co-operation with Member States and stakeholders, are **looking for every opportunity to prevent food waste** and **strengthen sustainability of the food system.** (https://ec.europa.eu/food/safety/food_waste_en)

2.3 EU Legislative Action on Food and Food Waste

EU legislative action with regard to food waste has been consistent but has intensified in the last few years. There has been a significant shift towards dealing with the management of food waste especially after the introduction of the Circular Economy Package in 2018. While older versions of the EU waste legislation concentrated on the management of waste steams like packaging, batteries, waste electrical and electronic equipment, end of life vehicles, waste oils, other hazardous waste etc., the latest revisions of the legislation depict a clear shift to dealing with biodegradable and food waste. We now have clear statements of the need to collect food waste separately and divert them away from landfilling. This shift becomes very obvious when we consider the revision of the Waste Framework Directive (2008/98/EC) in 2018, as a result of the provisions of the Circular Economy Package. While we had a minimum reference to food waste in the original Directive, (food waste is mostly dealt with as part of the biodegradable waste that needs to be diverted from landfilling as per the Landfill Directive (1999/31/EC)), the revision of the WFD highlights the issue of food waste (not any more an integration of food waste with other biodegradables in the municipal solid waste stream) and focuses clearly on the prevention of food waste. References to both the original Directives (WFD and Landfill Directive) and the 2018 revisions, are found below.

2.4 Directives

2.4.1 Landfill Directive - 1999/31/EC of 16 July 1999

According to the original Landfill Directive:

1. Member states shall set-up a national strategy for the implementation of the reduction of biodegradable waste going to landfills, not later than two years after the date laid down in Article 18(1) (hence by 16/7/2003) and notify the commission of this strategy. This strategy should include measures to achieve the targets set out in paragraph 2 by means of in particular, recycling, composting, biogas production of materials/energy recovery.

Within 30 months from the date laid down in Article 18(1) the Commission shall provide the European Parliament and the Council with a report drawing together the national strategies.

2. This strategy shall ensure that:

(a) not later than five years after the date laid down in Article 18(1), biodegradable municipal waste going to landfills must be reduced to 75 % of the total amount (by weight) of biodegradable municipal waste produced in 1995 or the latest year before 1995 for which standardised Eurostat data is available

(b) not later than eight years after the date laid down in Article 18(1), biodegradable municipal waste going to landfills must be reduced to 50 % of the total amount (by weight) of biodegradable municipal waste produced in 1995 or the latest year before 1995 for which standardised Eurostat data is available;

(c) not later than 15 years after the date laid down in Article 18(1), biodegradable municipal waste going to landfills must be reduced to 35 % of the total amount (by weight) of biodegradable municipal waste produced in 1995 or the latest year before 1995 for which standardised Eurostat data is available.

Two years before the date referred to in paragraph (c) the Council shall re-examine the above target, on the basis of a report from the Commission on the practical experience gained by Member

States in the pursuance of the targets laid down in paragraphs (a) and (b) accompanied, if appropriate, by a proposal with a view to confirming or amending this target in order to ensure a high level of environmental protection.

2.4.2 Waste Framework Directive 2008/98/EC of 19 November 2008

According to the original Waste Framework Directive:

'bio-waste' means biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants;

Waste management plans shall conform to the waste planning requirements laid down in Article 14 of Directive 94/62/EC and the strategy for the implementation of the reduction of biodegradable waste going to landfills, referred to in Article 5 of Directive 1999/31/EC.

Directives Amended as per the Circular Economy Package

2.4.3 Directive (EU) 2018/850 of 30 May 2018, amending Directive 1999/31/EC on the landfill of waste

According to the revised Landfill Directive:

Biodegradable municipal waste accounts for a large proportion of municipal waste. Landfilling of untreated biodegradable waste poses significant negative environmental effects in terms of greenhouse gas emissions and pollution of surface water, groundwater, soil and air. Although Directive 1999/31/EC already sets landfill diversion targets for biodegradable waste, it is appropriate to put in place further restrictions on the landfilling of biodegradable waste by prohibiting the landfilling of biodegradable waste that has been separately collected for recycling in accordance with Directive 2008/98/EC.

2.4.4 Directive (EU) 2018/851 of 30 May 2018, amending Directive 2008/98/EC on waste

According to the revised Waste Framework Directive:

The revision of the WFD (2008/98/EC), as a result of the introduction of the CEP, proposes new measures to promote prevention, including measures for food waste, and its re-use.

Member States should take measures to promote prevention and reduction of food waste in line with the 2030 Agenda for Sustainable Development, adopted by the United Nations (UN) General Assembly on 25 September 2015, and in particular its target of halving per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses, by 2030. Those measures should aim to prevent and reduce food waste in primary production, in processing and manufacturing, in retail and other distribution of food, in restaurants and food services as well as in households. In order to contribute and ensure to be on track towards the attainment of the UN Sustainable Development Goal, Member States should aim to achieve an indicative Union-wide food waste reduction target of 30 % by 2025 and 50 % by 2030. Having regard to the environmental, social and economic benefits of preventing food waste, Member States should establish specific food waste prevention measures, including awareness campaigns to demonstrate how to prevent food waste, in their waste prevention

programs. Member States should measure progress made in the reduction of food waste. To measure that progress and to facilitate the exchange of good practices across the Union both between Member States and between food business operators, a common methodology for such measurement should be established. Based on those methodologies, reporting on food waste levels should take place on an annual basis.

In order to prevent food waste, Member States should provide incentives for the collection of unsold food products at all stages of the food supply chain and for their safe redistribution, including to charitable organizations. Consumer awareness of the meaning of 'use-by' and 'best-before' dates should also be improved in order to reduce food waste.

In order to contribute to achieving the objectives laid down in Directive 2008/98/EC, Member States should make use of economic instruments and other measures to provide incentives for the application of the waste hierarchy such as those indicated in Annex IVa, which includes, inter alia, landfill and incineration charges, pay-as-you-throw schemes, extended producer responsibility schemes, facilitation of food donation, and incentives for local authorities, or other appropriate instruments and measures.

2.4.5 Prevention of waste

1. Member States shall take measures to prevent waste generation. These measures shall:

a. Reduce the generation of food waste in primary production, in processing and manufacturing, in retail and other distribution of food, in restaurants and food services as well as in households.

b. Encourage food donation and other redistribution for human consumption, prioritizing human use over animal feed and the reprocessing into non-food products.

2. Member States shall monitor and assess the implementation of their food waste prevention measures by measuring the levels of food waste on the basis of the methodology established by the delegated act referred to in paragraph 8, as from the first full calendar year after the adoption of that delegated act.

3. An obligation for all EU Member States to collect bio-waste separately or ensure recycling at source from the end of 2023 onwards;

4. By 31 December 2023, the Commission shall examine the data on food waste provided by Member States in accordance with Article 37(3) with a view to considering the feasibility of establishing a Union-wide food waste reduction target to be met by 2030 on the basis of the data reported by Member States in accordance with the common methodology established pursuant to paragraph 8 of this Article. To that end, the Commission shall submit a report to the European Parliament and to the Council, accompanied, if appropriate, by a legislative proposal.

5. By 31 March 2019, the Commission shall adopt, on the basis of the outcome of the work of the EU Platform on Food Losses and Food Waste, a delegated act in accordance with Article 38a to supplement this Directive by establishing a common methodology and minimum quality requirements for the uniform measurement of levels of food waste.

The Directive also provides plant-based substances from the agro-food industry and food of non-animal origin no longer intended for human consumption which are destined for oral animal feeding should, in order to avoid duplication of rules, be excluded from the scope of Directive 2008/98/EC if in full compliance with Union feed legislation.

2.5 EU – Policy Initiatives

In addition to existing Directives and Regulations, the European Union has been working hard to promote a sustainable agenda. The two most important recent policy initiatives towards that direction, have been:

- The Circular Economy Package in 2018, with an aim to boost competitiveness, create jobs and generate sustainable growth
- The EU Green Deal in 2019, a green and inclusive transition to help improve people's well-being and secure a healthy planet for generations to come

2.5.1 Circular Economy Package

According to the Commission, it has adopted an ambitious Circular Economy Package (CEP) to help European businesses and consumers to make the transition to a stronger and more circular economy where resources are used in a more sustainable way. The proposed actions will contribute to "closing the loop" of product lifecycles through greater recycling and re-use and bring benefits for both the environment and the economy. The prevailing philosophy behind this initiative, is the need to ensure better resource efficiency and derive maximum value from the resources we utilise through repeated cycle lives (https://epeaswitzerland.com/en/2015/12/european-commission).

The CEP, aims to drive the EU economy from a linear model (Figure 5):

Figure 5: Linear Economy Package – EU (https://ec.europa.eu/environment/circular-economy/)

To a circular model (Figure 6):

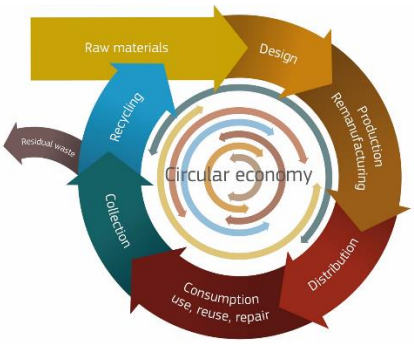

Figure 6: Circular Economy Package – EU (https://ec.europa.eu/environment/circular-economy/)

The circular model promotes initiatives along the entire life cycle of products, targeting for example their design, promoting circular economy processes, fostering sustainable consumption, and aiming to ensure that the resources used are kept in the EU economy for as long as possible (https://ec.europa.eu/eurostat/web/circular-economy). The CEP considers the protection of the environment and the sustenance of the EU competitiveness as integrated targets that need to be pursuit concurrently (Figure 7).

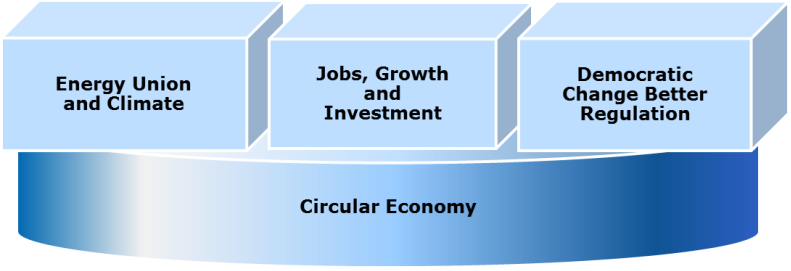

Figure 7: Circular Economy Targets – EU (https://ec.europa.eu/environment/circular-economy/)

The CEP comprises of six strategic pillars (Figure 8):

Figure 8: CEP Strategic Pillars – EU (https://ec.europa.eu/environment/circular-economy/)

What has become famous in the discussion for the circularity in the economies is the Figure 9 below from the *Ellen* MacArthur Foundation. In the Figure, we can see the existing mostly linear routes of biodegradable (green) and non-biodegradable (blue) resources, and the alternative circular practices to maximise the lifecycles of the resources. Clearly, the CEP gives similar attention to the sustainable use of both organic and non-organic resources.

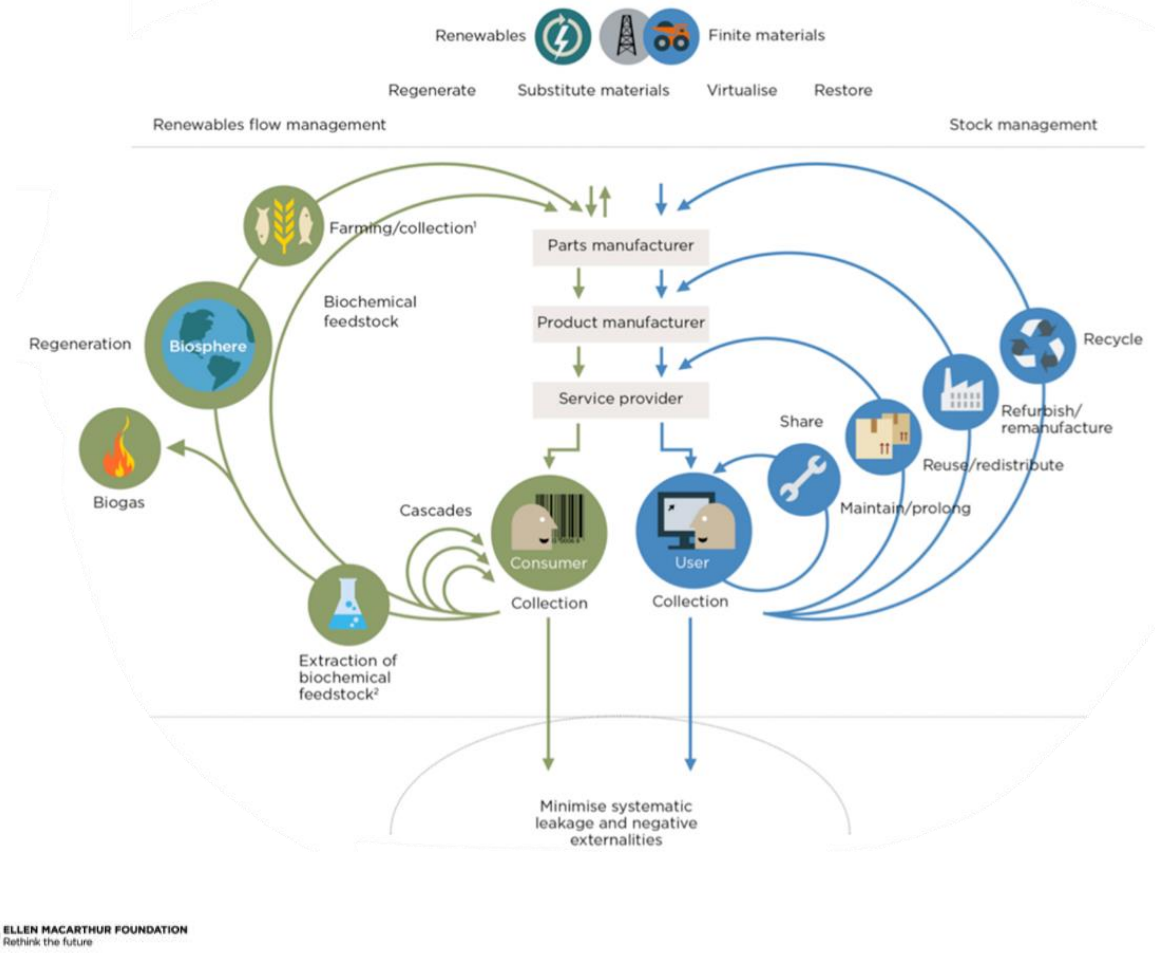

Figure 9: Biodegradable and Non – Biodegradable Resources – Ellen MacArthur Foundation

2.5.1.1 Food Specific Provisions

There are two specific provisions related to food production and food waste in the Circular Economy Package:

- Actions to reduce food waste including a common measurement methodology, improved date marking, and tools to meet the global Sustainable Development Goal to halve food waste by 2030;

-A revised Regulation on fertilizers, to facilitate the recognition of organic and waste-based fertilizers in the single market and support the role of bio-nutrients;

2.5.1.2 Food waste

According to the initiative, food waste is an increasing concern in Europe. The production, distribution and storage of food use natural resources and generate environmental impacts. Discarding food that is still edible increases these impacts and causes financial loss for consumers and the economy.

In order to support the achievement of the Sustainable Development Goal target on food waste and to maximize the contribution of actors in the food supply chain, the Commission will:

- Develop a common EU methodology to measure food waste and define relevant indicators. It will create a platform involving Member States and stakeholders in order to support the achievement of the SDG targets on food waste, through the sharing of best practice and the evaluation of progress made over time.
- Awareness campaigns are needed to change behavior. The Commission supports awareness raising at national, regional and local levels and the dissemination of good practices in food waste prevention.
- Take measures to clarify EU legislation relating to waste, food and feed and facilitate food donation and the use of former foodstuff and by-products from the food chain in feed production without compromising food and feed safety; and
- Examine ways to improve the use of date marking by actors in the food chain and its understanding by consumers, in particular the "best before" label.

2.5.1.3 Fertilizers

The Commission will propose a revised EU regulation on fertilizers, so as to facilitate recognition of organic and waste-based fertilizers in the single market and thus support the role of bio-nutrients in the circular economy.

The CEP initiative fosters innovation and promotes a major initiative to fund innovative projects under the umbrella of the EU's Horizon 2020 research program and targeted action in various areas of interest, including food waste.

The CEP action plan sets out a concrete and ambitious EU mandate to support the transition towards a circular economy. A continued, broader commitment from all levels of government, in

Member States, regions and cities and all stakeholders concerned will also be necessary (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614).

2.5.2 The European Green Deal

The EU Green Deal, released by the Commission in December 2019, resets the Commission's commitment to tackling climate and environmental-related challenges that is this generation's defining task. The atmosphere is warming, and the climate is changing with each passing year. One million of the eight million species on the planet are at risk of being lost. Forests and oceans are being polluted and destroyed (COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS – 11.12.19)

The European Green Deal is a response to these challenges. It is a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:640:FIN)

It also aims to protect, conserve and enhance the EU's natural capital, and protect the health and well-being of citizens from environment-related risks and impacts.

To deliver the European Green Deal, there is a need to rethink policies for clean energy supply across the economy, industry, production and consumption, large-scale infrastructure, transport, food and agriculture and other. For food and agriculture, the Green Deal proposes the strategy from 'Farm to Fork' (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:640:FIN).

From 'Farm to Fork': designing a fair, healthy and environmentally-friendly food system

Figure 10: Farm to Fork- EU (https://ec.europa.eu/food/farm2fork_en)

2.5.2.1 Farm to fork strategy

The Farm to Fork Strategy is at the heart of the European Green Deal aiming to make food systems fair, healthy and environmentally-friendly (https://ec.europa.eu/food/farm2fork).

EU needs to redesign its food systems which today account for nearly one-third of global GHG emissions, consume large amounts of natural resources, result in biodiversity loss and negative health impacts (due to both under- and over-nutrition) and do not allow fair economic returns and livelihoods for all actors, in particular for primary producers (https://euromeatnews.com/Article-New-EU-Farm-to-Fork-Strategy/3881).

Putting EU food systems on a sustainable path also brings new opportunities for operators in the food value chain. New technologies and scientific discoveries, combined with increasing public awareness and demand for sustainable food, will benefit all stakeholders (https://ec.europa.eu/food/farm2fork).

The Farm to Fork Strategy aims to accelerate EU transition to a sustainable food system that should:

- have a neutral or positive environmental impact
- help to mitigate climate change and adapt to its impacts
- reverse the loss of biodiversity
- ensure food security, nutrition and public health, making sure that everyone has access to sufficient, safe, nutritious, sustainable food
- preserve affordability of food while generating fairer economic returns, fostering competitiveness of the EU supply sector and promoting fair trade (https://ec.europa.eu/food/farm2fork).

European food is famous for being safe, nutritious and of high quality. It should now also become the global standard for sustainability. Although the transition to more sustainable systems has started, feeding a fast-growing world population remains a challenge with current production patterns. Food production still results in air, water and soil pollution, contributes to the loss of biodiversity and climate change, and consumes excessive amounts of natural resources, while an important part of food is wasted. At the same time, low quality diets contribute to obesity and diseases such as cancer.

The EU's goals are to reduce the environmental and climate footprint of the EU food system and strengthen its resilience, ensure food security in the face of climate change and biodiversity loss and lead a global transition towards competitive sustainability from farm to fork and tapping into new opportunities (Farm to Fork Strategy – EU 29/7/20). This means:

- ensuring that the food chain, covering food production, transport, distribution, marketing and consumption, has a neutral or positive environmental impact, preserving and restoring the land, freshwater and sea-based resources on which the food system depends; helping to mitigate climate change and adapting to its impacts; protecting land, soil, water, air, plant and animal health and welfare; and reversing the loss of biodiversity;
- ensuring food security, nutrition and public health – making sure that everyone has access to sufficient, nutritious, sustainable food that upholds high standards of safety and quality, plant health, and animal health and welfare, while meeting dietary needs and food preferences; and
- preserving the affordability of food, while generating fairer economic returns in the supply chain, so that ultimately the most sustainable food also becomes the most affordable, fostering the competitiveness of the EU supply sector, promoting fair trade, creating new business opportunities, while ensuring integrity of the single market and occupational health and safety (Farm to Fork Strategy – EU 29/7/20).

There are new opportunities for all operators in the food value chain. New technologies and scientific discoveries, combined with increasing public awareness and demand for sustainable food, will benefit all stakeholders.

Figure 11: Food Value Chain – EU (https://ec.europa.eu/food/farm2fork_en)

Among the pillars of the Farm to Fork Strategy is lastly, to strive to stimulate sustainable food consumption and promote affordable healthy food for all. Imported food that does not comply with relevant EU environmental standards is not allowed on EU markets. The Commission will propose actions to help consumers choose healthy and sustainable diets and reduce food waste. The Commission will explore new ways to give consumers better information, including by digital means, on details such as where the food comes from, its nutritional value, and its environmental footprint. The Farm to Fork strategy will also contain proposals to improve the position of farmers in the value chain.

2.5.3 Reducing food loss and waste

Tackling food loss and waste is key to achieving sustainability. Reducing food waste brings savings for consumers and operators, and the recovery and redistribution of surplus food that would otherwise be wasted has an important social dimension. It also ties in with policies on the recovery of nutrients and secondary raw materials, the production of feed, food safety, biodiversity, bio economy, waste management and renewable energy. The Commission is committed to halving per capita food waste at retail and consumer levels by 2030 (SDG Target 12.3). Using the new methodology for measuring food waste and the data expected from Member States in 2022, it will set a baseline and propose legally binding targets to reduce food waste across the EU. The Commission will integrate food loss and waste prevention in other EU policies. Misunderstanding and misuse of date marking ('use by' and 'best before' dates) lead to food waste. The Commission will revise EU rules to take account of consumer research. In addition to quantifying food waste levels, the Commission will investigate food losses at the production stage and explore ways of preventing them. Coordinating action at EU level will reinforce action at national level, and the recommendations of the EU Platform on Food Losses and Food Waste will help show the way forward for all actors.

2.5.4 Research and innovation (R&I)

Research and innovation are key drivers in accelerating the transition to sustainable, healthy and inclusive food systems from primary production to consumption. Under Horizon 2020, the Commission is preparing an additional call for proposals for Green Deal priorities in 2020 for a total of around EUR 1 billion. Under Horizon Europe, it proposes to spend EUR 10 billion on R&I on food, bio economy, natural resources, agriculture, fisheries, aquaculture and the environment as well as the use of digital technologies and nature-based solutions for agro-food.

A new Horizon Europe partnership for "Safe and sustainable food systems for people, planet and climate" will put in place an R&I governance mechanism engaging Member States and food systems actors from farm-to-fork, to deliver innovative solutions providing co-benefits for nutrition, quality of food, climate, circularity and communities (https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0381).

3. Food Waste – in Numbers

Due to the fact that food waste has only rather recently become an important issue in terms of waste management policies (even in the EU), the statistics found on quantities of food waste are rather limited. The fact that in most countries' food waste is not collected separately, but as part of Municipal Solid Waste, limits the access to quantitative data on food waste.

3.1 Waste data in the EU

According to Eurostat, the evolution in the production of Municipal waste in the EU countries is analysed as below (period 1995-2018):

Municipal waste generated, in selected years, 1995-2018

(kg per capita)

	1995	2000	2005	2012	2018	Change 2018/1995 (%)
EU-27	*467*	*513*	*506*	*488*	*492*	*5.4*
Belgium	455	471	482	445	411	-9.7
Bulgaria	694	612	588	460	407	-41.4
Czechia	302	335	289	308	351	16.2
Denmark	*521*	664	736	806	814	*56.2*
Germany	*623*	*642*	565	619	*615*	*-1.3*
Estonia	371	453	433	280	405	9.2
Ireland	512	599	731	585	:	:
Greece	303	412	442	495	:	:
Spain	505	653	588	468	*475*	*-5.9*
France	475	514	529	*527*	*527*	*10.9*
Croatia	:	*262*	*336*	391	432	:
Italy	454	509	546	504	499	9.9
Cyprus	595	628	688	657	:	:
Latvia	*264*	*271*	320	323	407	54.2
Lithuania	426	365	387	445	464	8.9
Luxembourg	587	654	672	652	*610*	*3.9*
Hungary	460	446	461	402	381	-17.2
Malta	387	533	623	590	640	65.4
Netherlands	539	598	599	549	511	-5.2
Austria	437	580	575	579	579	32.5
Poland	285	320	*319*	*317*	329	15.4
Portugal	352	457	452	453	508	44.3
Romania	342	*355*	*383*	251	272	-20.5
Slovenia	596	*513*	494	362	486	-18.5
Slovakia	295	254	273	306	414	40.3
Finland	413	502	478	506	551	33.4
Sweden	386	425	479	454	434	12.4
United Kingdom	498	577	581	477	463	-7.0
Iceland	426	462	516	511	:	:
Norway	624	613	426	477	739	18.4
Switzerland	600	656	661	694	703	17.2
Montenegro	:	:	:	494	530	:
North Macedonia	:	:	:	381	301	:
Albania	:	:	:	:	462	:
Serbia	:	:	:	364	319	:
Turkey	441	*465*	*458*	410	*424*	*-3.9*
Bosnia and Herzegovina	:	:	:	340	356	:
Kosovo (')	:	:	:	:	226	:

(:) data not available

Note: data presented in italic are estimated.

(') This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo Declaration of Independence

Source: Eurostat (online data code: env_wasmun)

eurostat

Table 1: Municipal Waste generated in selected years, 1995 – 2018 - Eurostat

In a graphic form, the differences in the Municipal waste production between 2005 and 2018 is as follows:

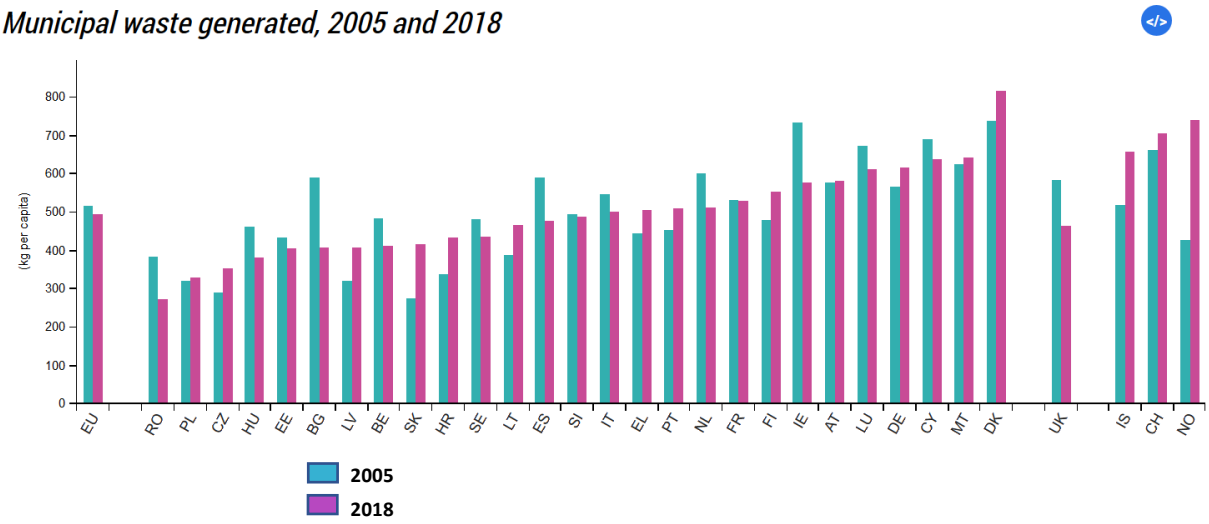

Figure 12: Municipal Waste Generated, 2005 and 2018- Eurostat

What is apparent from the graph is that roughly in half of the EU countries, Municipal Solid Waste production per capita has decreased between 2005 and 2018, while in the rest it has increased. In the majority of the countries though, the differences between the two years are small. Despite the fact there is no clear picture of what happened with food waste (as part of the MSW) during the same years, it can be assumed that the production of food waste followed a similar pattern in each of the countries. So, we can roughly estimate that in half of the EU countries the food waste has been decreasing and, in the rest, it has been increasing. In a similar way we can assume that the differences over time are small.

The next important issue is the way the Municipal Solid Waste is treated. EU has strived to become a recycling society. Recently, the efforts have been intensified with the introduction of the Circular Economy Package in 2018. The results of these efforts are shown below in Table 2 and Figure 13:

Municipal waste landfilled, incinerated, recycled and composted, EU-27, 1995-2018

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Change 2018/1995 (%)
	million tonnes																								
Landfill	121	117	117	114	113	112	107	104	99	93	88	88	87	83	82	79	74	67	63	59	57	54	53	52	-57
Incineration	29	30	33	33	34	36	37	39	39	41	45	48	49	51	52	53	55	54	55	56	56	58	59	58	101
Material Recycling	23	26	30	32	37	38	40	43	43	43	46	47	52	53	54	55	56	58	56	59	63	65	66	67	190
Composting	14	16	17	18	19	23	23	24	24	26	26	27	28	30	30	29	29	30	31	33	33	36	37	37	163
Other	10	13	12	11	12	11	12	12	12	13	16	13	11	10	7	6	6	6	5	5	5	5	5	5	-51
	kg per capita																								
Landfill	286	276	276	266	263	262	250	241	229	215	202	202	199	190	186	178	167	153	142	134	127	121	118	117	-59
Incineration	34	36	39	39	79	84	87	90	90	95	103	111	112	116	117	121	125	122	125	126	127	130	132	131	285
Material Recycling	54	62	69	75	85	87	92	100	100	100	105	109	119	120	123	125	128	130	128	134	141	145	147	150	178
Composting	33	38	41	42	45	53	54	57	57	59	59	61	64	69	67	66	66	69	71	73	75	81	83	83	152
Other	60	66	66	65	28	27	26	27	26	31	37	30	23	23	17	13	13	14	12	11	10	11	11	11	-82

Note: estimated by Eurostat.

Source: Eurostat (online data code: env_wasmun)

eurostat

Table 2: Municipal Waste Landfilled, Incinerated, Recycled and Composted, EU, 1995 - 2018 - Eurostat

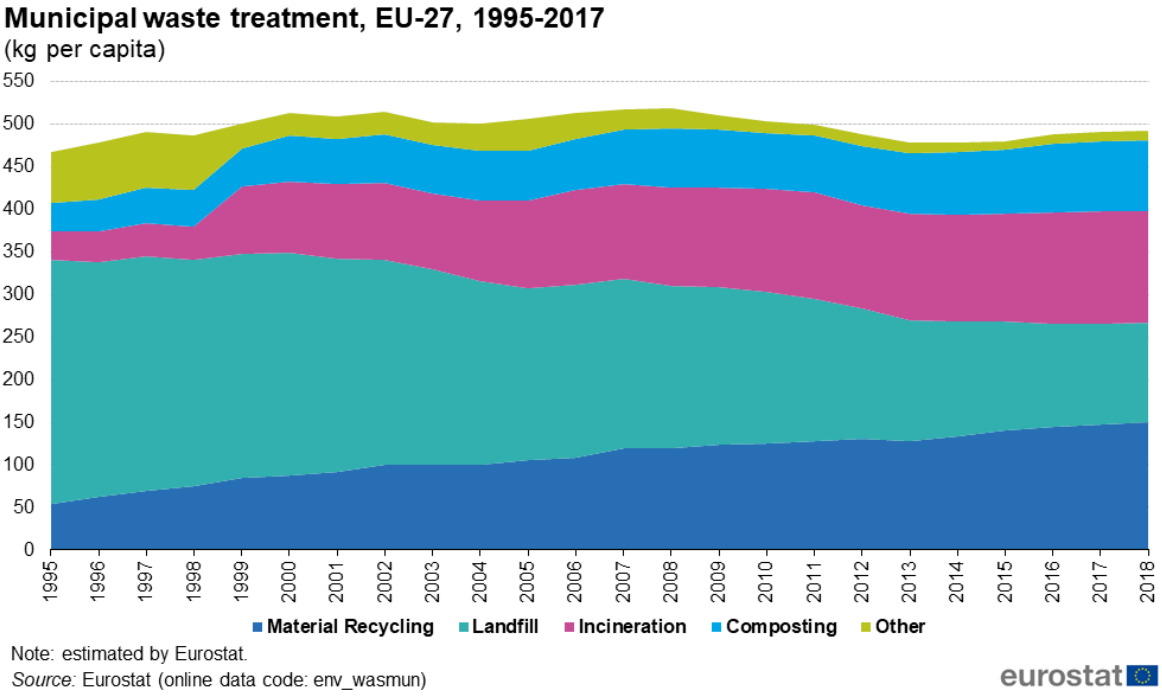

Figure 13: Municipal Waste Treatment, EU-27, 1995 – 2017 - Eurostat

The results show during these years, a significant shift away from landfill which has been steadily decreasing over time, while the waste has been diverted to material recycling, incineration and composting. There are of course significant differences between countries of the EU. A few countries have almost abandoned landfilling, while others are still landfilling a significant proportion of their waste. Composting has also increased over time.

3.2 Food waste Data

Data and analysis on food waste in the EU and by country are not as readily available as for the MSW, as there was no specific requirement to collect such data. Until now, data on food waste generation have usually been based on ad hoc studies. The situation will improve with the obligations of the revised Waste Framework Directive, as it has become a requirement for EU Member States to measure and report food waste generation annually, starting in 2020, and to adopt specific food waste prevention programmes. In the future, this will enable the comparison of the potential impact of different policy mixes for preventing food waste adopted in European countries. The availability of food waste data at national level, will help to assess the effectiveness of prevention initiatives conducted at national level; nevertheless, there is a wealth of initiatives conducted at smaller scales (e.g. city/neighbourhood level), which cannot be precisely monitored with national-level tools.

Figure 14 below presents the composition of bio-waste in European Countries.

Composition of municipal bio-waste for 32 EEA member and cooperating countries, 2017

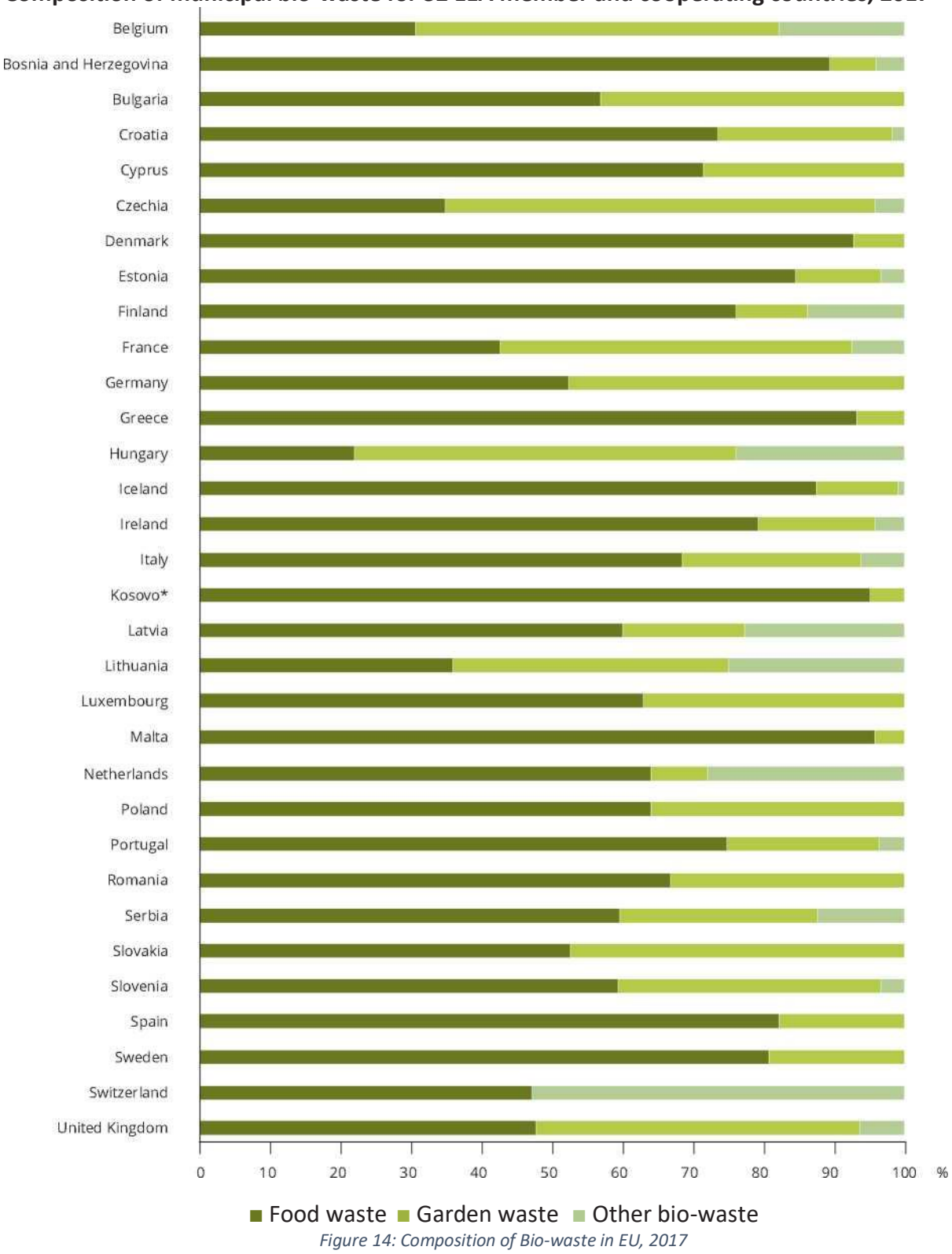

Figure 14: Composition of Bio-waste in EU, 2017

Notes: *Kosovo under UN Security Council Resolution 1244/99.

'Other bio-waste' may include mixed food and garden waste.

Source: ETC/WMGE compilation based on data provided by the European Environment Information and Observation Network (Eionet) through an EEA and European Topic Centre on Waste and Materials in a Green Economy (ETC/WMGE) survey (ETC/WMGE, 2019a), Eurostat (2020), and the European Reference Model on Municipal Waste (ETC/WMGE, 2019b) for Belgium, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Germany, Greece, Italy, Lithuania, Luxembourg, Malta, Poland, Spain and the United Kingdom.

Separate collection is a prerequisite for using bio-waste as a resource in a circular way. Collecting bio-waste separately from other municipal waste keeps the levels of impurities and contamination down as far as possible and enables its use as valuable secondary resources such as soil improvers, organic fertilisers and biogas (Xevgenos et al., 2015; Fricke et al., 2017). The European Commission will propose to harmonise separate waste collection systems (EC, 2020b).

Consolidated data on the trends in the separate collection of bio-waste across Europe are not available. However, the amount of municipal waste that is composted or anaerobically digested — which might include some mixed municipal waste treated in mechanical-biological treatment plants — increased by 52% in the period 2004-2018 (Eurostat, 2020). Collection of data on separately collected bio-waste is needed for monitoring the effectiveness of bio-waste management.

Figure 15 presents separate bio-waste collection rates in 32 European countries in 2017. About 50% of the municipal bio-waste generated is collected separately in the countries that provided data (weighted average). The remaining 50% of municipal bio-waste is collected with residual (mixed) waste. The separate collection rates vary from 80% or more in Austria and Slovenia to less than 10% in Bosnia-Herzegovina, Cyprus, North Macedonia, Portugal, Spain and Turkey, demonstrating that, at an individual country level there remains ample room for improvement. Malta recently introduced separate collection of bio-waste across the country but data on quantities were not available.

Bio-waste collected separately as a share of bio-waste generated (bio-waste capture rate), by country for 32 EEA member and cooperating countries, 2017

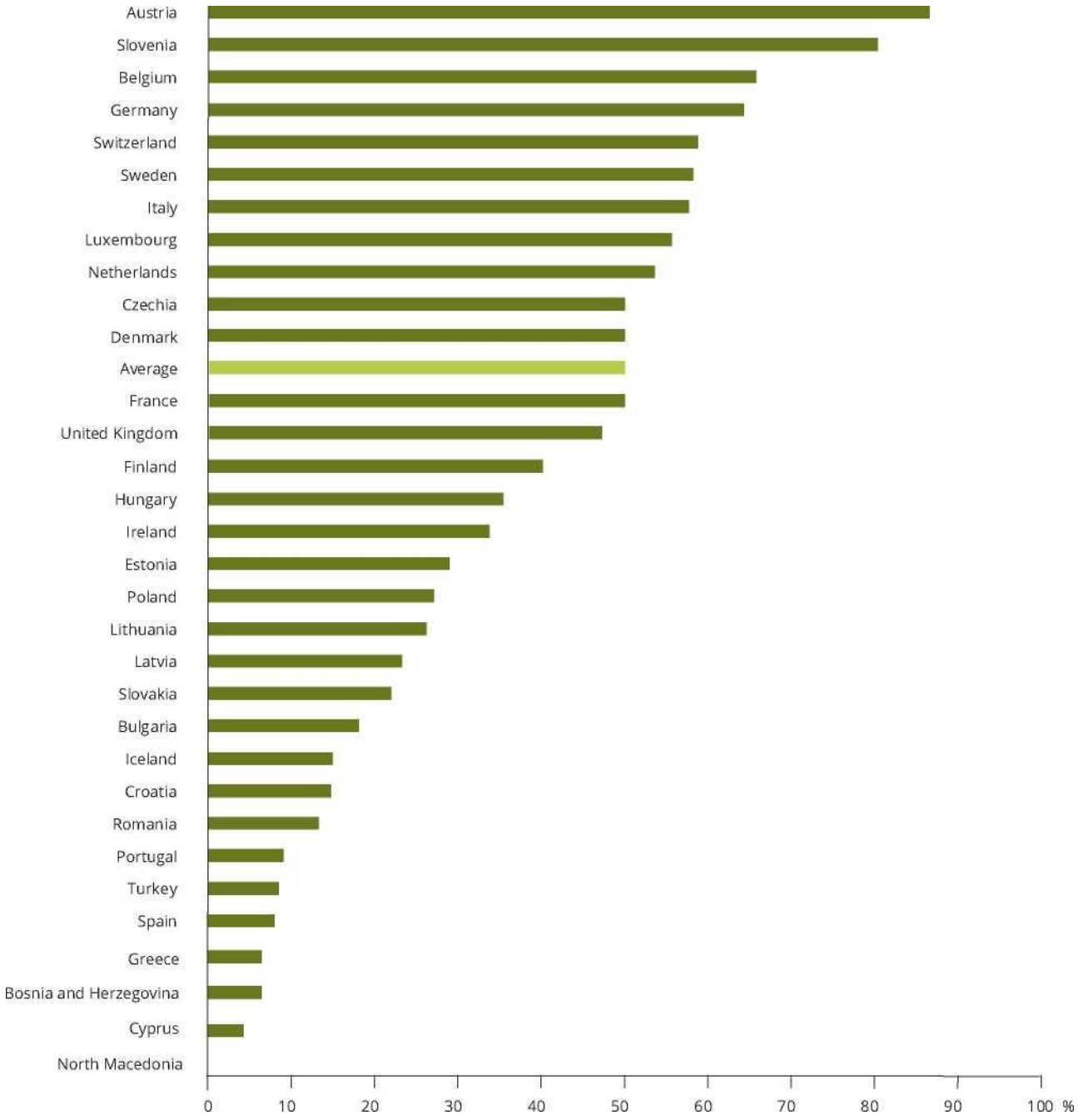

Figure 15: Bio-waste capture rate by country for 32 EEA member and cooperating countries, 2017

Notes: Excluding Albania, Kosovo, Liechtenstein, Malta, Montenegro, Norway and Serbia due to a lack of data. Data exclude bio-waste composted at home. Austrian data include a considerable share of park and garden waste.

Source: ETC/WMGE compilation based on data provided by Eionet through an EEA and ETC/WMGE survey (ETC/WMGE, 2019a), Eurostat (2020), and the European Reference Model on Municipal Waste (ETC/WMGE, 2019b) for Belgium, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Germany, Greece, Italy, Lithuania, Luxembourg, Poland, Spain and the United Kingdom.

3.3 Treatment of Bio-waste

The revised WFD introduced a new requirement for bio-waste separation. By 31 December 2023, bio-waste must either be separated and recycled at source or collected separately and not mixed with other types of waste (EU, 2018b). In addition, as from 2027, compost derived from mixed municipal waste will no longer count towards achieving compliance with the recycling targets for municipal waste.

Landfilling of bio-waste has very high negative environmental impacts. In landfills, biodegradable waste decomposes and produces gas that mainly consists of methane, a powerful greenhouse gas, and landfilling of separately collected bio-waste or of bio-waste within residual municipal waste without pre-treatment is not allowed in the EU according to the WFD and the Landfill Directive (EC, 2008).

Treatment of separately collected bio-waste is dominated by composting, but anaerobic digestion, with biogas production, is increasing. Biogas is a source of renewable energy. Research and innovation increasingly explore the opportunities for using bio-waste, mainly from food processing, as a new source of higher value products such as volatile fatty acids and biofuels, but many challenges remain. Typically, countries do not exclusively opt for one bio-waste treatment path. Instead they choose a combination of techniques, as this enables them to target different types of bio-waste from multiple sources (Bio-waste in Europe — turning challenges into opportunities - EEA Report No 04/2020).

The level of separate bio-waste collection differs considerably across Europe. Many countries are far from capturing bio-waste's full potential. Implementing a separate bio-waste collection system is a sometimes lengthy and always complex process. It needs a comprehensive and coordinated policy framework embedding a bio-waste strategy into broader waste and circular economy strategies. Targets or pay-as-you-throw schemes will create clear incentives to divert bio-waste from residual waste. Awareness-raising activities, providing good information to consumers and matching treatment capacity to the volume of separately collected bio-waste are other crucial factors (Bio-waste in Europe — turning challenges into opportunities - EEA Report No 04/2020). Figure 16 below presents how bio-waste should circulate in a circular economy.

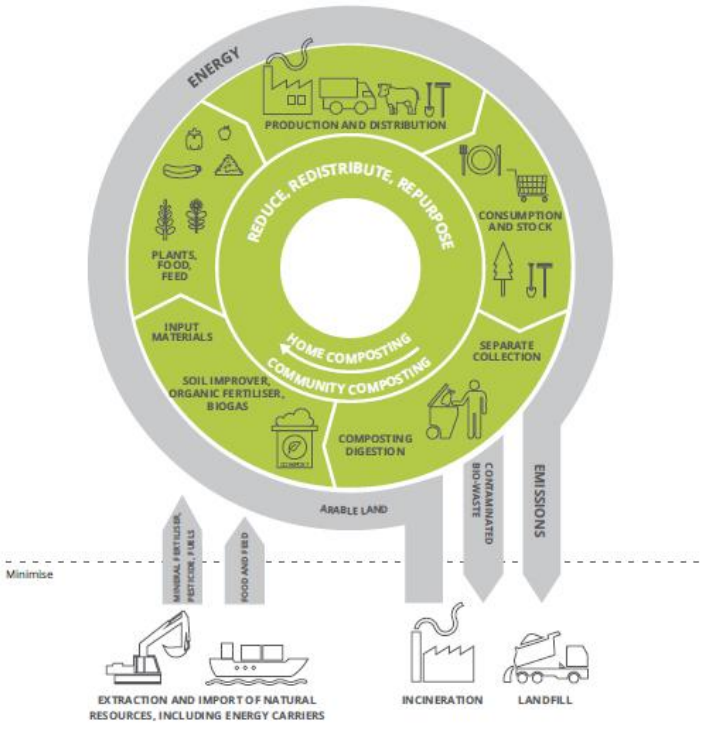

Figure 16: Bio – Waste in Circular Economy

Composting (treatment in the presence of oxygen) and anaerobic digestion (treatment in the absence of oxygen) are currently the two most widely applied treatment techniques. The preferred treatment technique depends on the composition of the bio-waste and the properties of the separate collection system, but anaerobic digestion tends to deliver higher environmental benefits.

The capacity of the installed bio-waste treatment infrastructure varies considerably across the 21 European countries that provided data on this. The treatment capacities vary between 356 kg of bio-waste per person and close to zero.

The 2018 WFD requires the separate collection of bio-waste or recycling at source (home composting) by December 2023. This new obligation, in combination with the new requirements for municipal waste recycling, is expected to push more bio-waste in the direction of anaerobic digestion and composting, and hence also to increase the installed capacity of these treatment techniques.

Linking treatment capacity, which might not only be used to treat municipal bio-waste, to municipal bio-waste generation and separate collection provides some valuable insights, bearing in mind that the conclusions drawn from these insights are restricted by the previously mentioned limitations. However, the countries for which treatment capacity data are available can be broadly categorised into three groups:

• Sufficient treatment capacity for all municipal bio-waste generated: Austria, France, the Netherlands, Slovenia, Sweden and the United Kingdom.

• Treatment capacity is available for the separately collected municipal bio-waste but not for all of the municipal bio-waste generated: Belgium, Cyprus, Hungary, and Italy (although its treatment capacity is very close to the volume of bio-waste generated), Latvia, Poland, Portugal, Romania, Slovakia and Spain.

• Insufficient treatment capacity for the separately collected municipal bio-waste: Estonia, Greece, North Macedonia and Turkey. These countries are currently not able to (theoretically) treat the volume of bio-waste generated, nor are they able to treat all separately collected bio-waste. However, bio-waste might be treated in mechanical-biological treatment plants or in anaerobic digestion plants that mainly treat agricultural waste, and this capacity might not be included in the reported capacities. Extending separate collection of bio-waste will require the installation of new treatment capacity.

On average, in the 21 countries that provided information, composting facilities currently account for 53% of the bio-waste treatment capacity, while anaerobic digestion accounts for 47%; no data are available on the volume of home composting (Bio-waste in Europe — turning challenges into opportunities - EEA Report No 04/2020).

Bio-waste generation and treatment capacities for 21 EEA member and cooperating countries, 2017

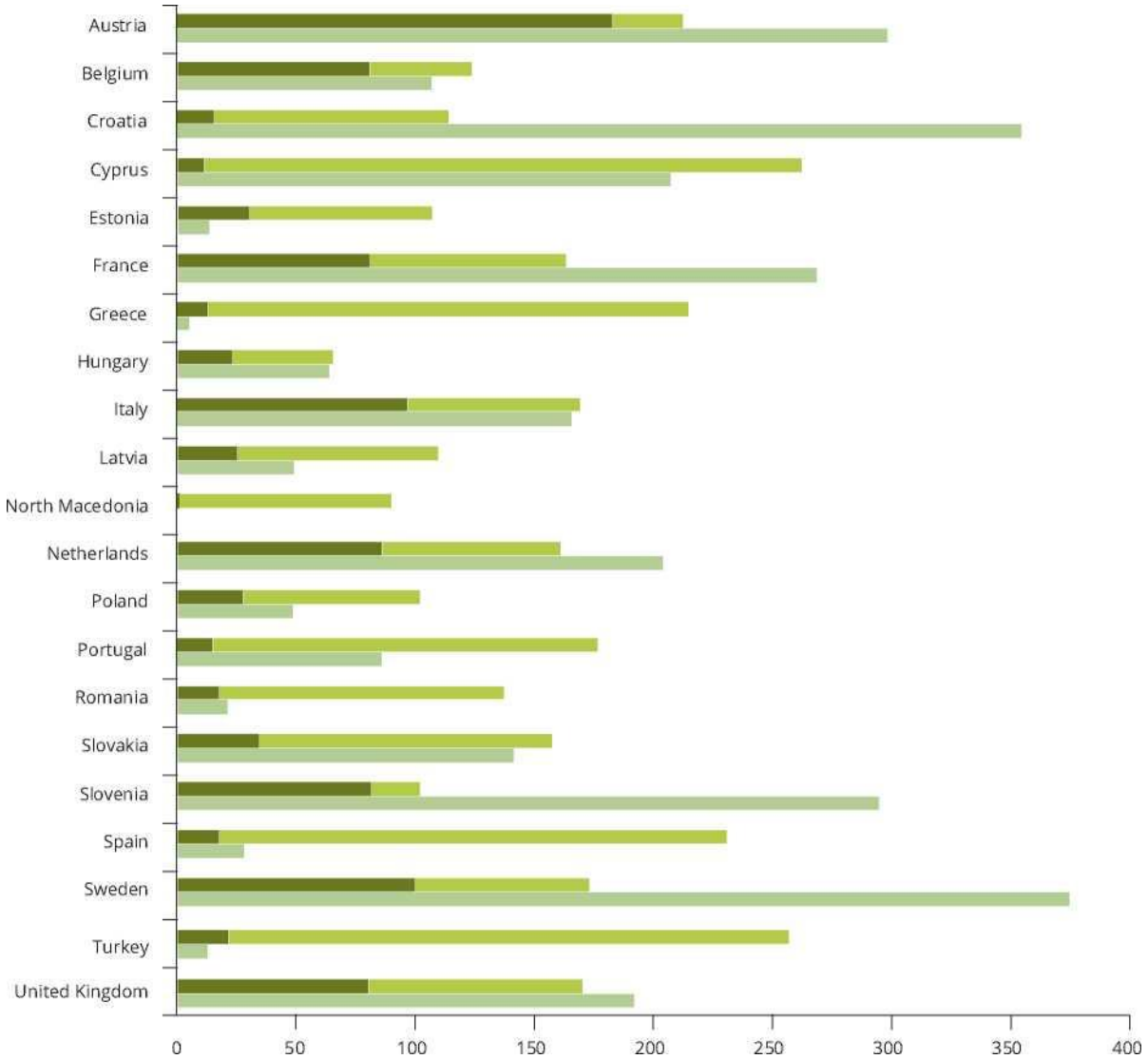

Figure 17: Bio-waste generation and treatment capacities for 21 EEA member and cooperating countries, 2017

Note: Home composting is not included because of a lack of data. Data refer to 2017 or latest available data.

Source: ETC/WMGE compilation based on data provided by Eionet through an EEA and ETC/WMGE survey (ETC/WMGE, 2019a), Eurostat (2020), and the European Reference Model on Municipal Waste (ETC/WMGE, 2019b) for Belgium, Croatia, Cyprus, Estonia, Germany, Greece, Italy, Poland, Spain and the United Kingdom.

At country level, however, there are significant differences in their composting infrastructure for municipal bio-waste. In Austria, Belgium, Cyprus, Italy, the Netherlands, Slovakia and Spain, composting is the dominant treatment route. Only in a few countries, especially Croatia, Poland, Portugal, Slovenia, Sweden and Turkey, do anaerobic digestion capacities exceed those for composting.

The uptake of anaerobic digestion can be affected by environmental regulations such as the Renewable Energy Directive (EU, 2009, 2018c; Achinas et al., 2017; Araya, 2018). The directive requires EU Member States to ensure that at least 10% of their transport fuels come from renewable sources by 2020 and establishes renewable energy targets for the EU of at least 20% by 2020 and 32% by 2030.

Shares of treatment capacities for bio-waste for 22 EEA member and cooperating countries, 2017

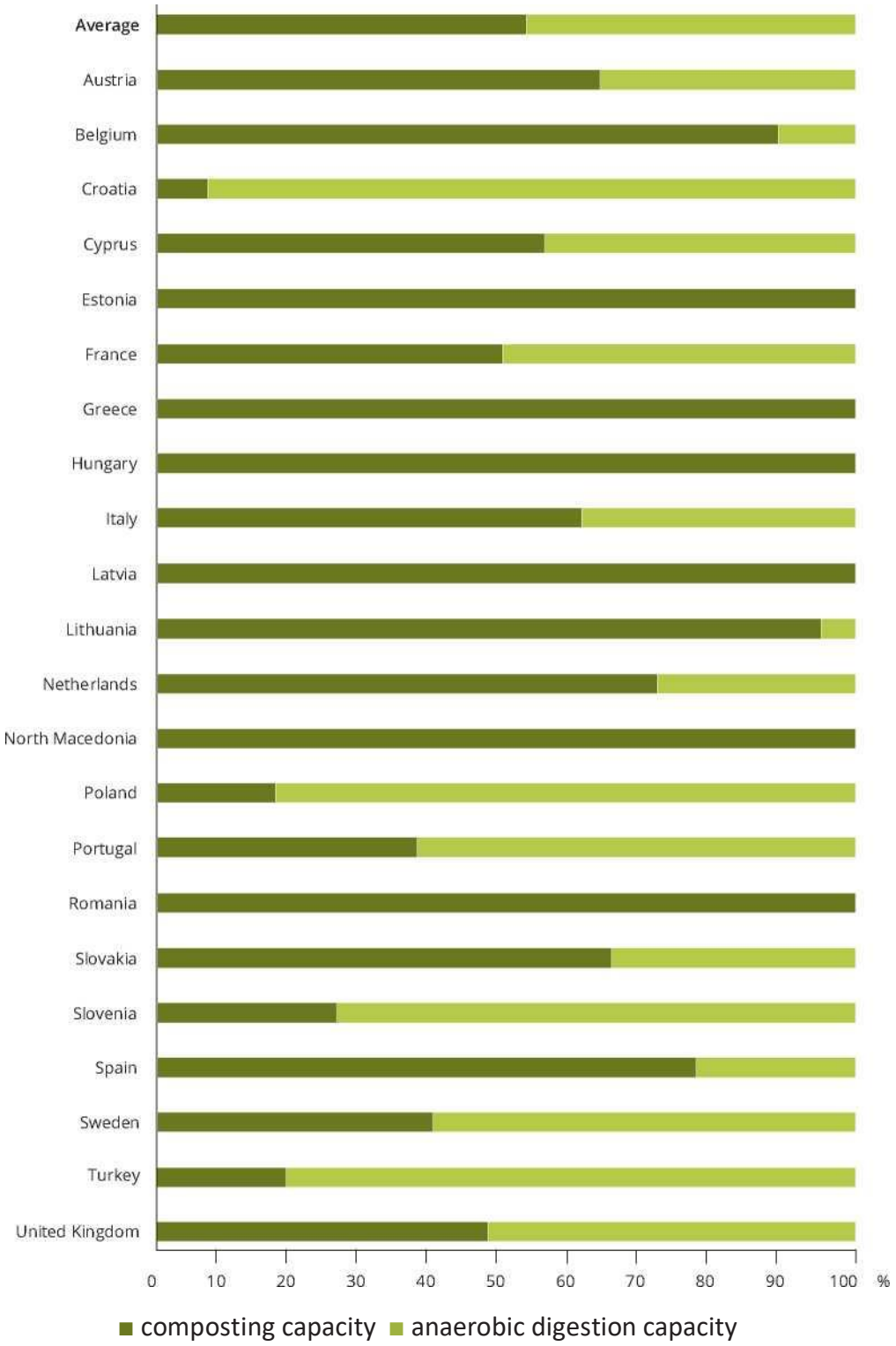

Figure 18: Shares of Treatment Capacities for bio-waste for 22 EEA member and Cooperating Countries, 2017

Note: The average refers to the weighted average across the 22 countries for which data are available. Home composting is not included because of a lack of data. Data refer to 2017 or latest available data.

Source: ETC WMGE compilation based on data provided by Eionet through an EEA and ETC/WMGE survey (ETC/WMGE, 2019a) complemented with data provided by the European Reference Model on Municipal Waste (ETC/WMGE, 2019b)

3.4 Food Waste Prevention

About 60% of bio-waste is food waste, and a considerable share of this waste is avoidable. The Waste Framework Directive (WFD; 2008/98/EC) established the waste hierarchy as the overarching principle guiding waste policies in the EU. According to this hierarchy, waste prevention has the highest priority, followed by recovery, and disposal is the least desirable option. For food waste, the waste hierarchy could be interpreted as shown in below Figure 19.

The food waste hierarchy

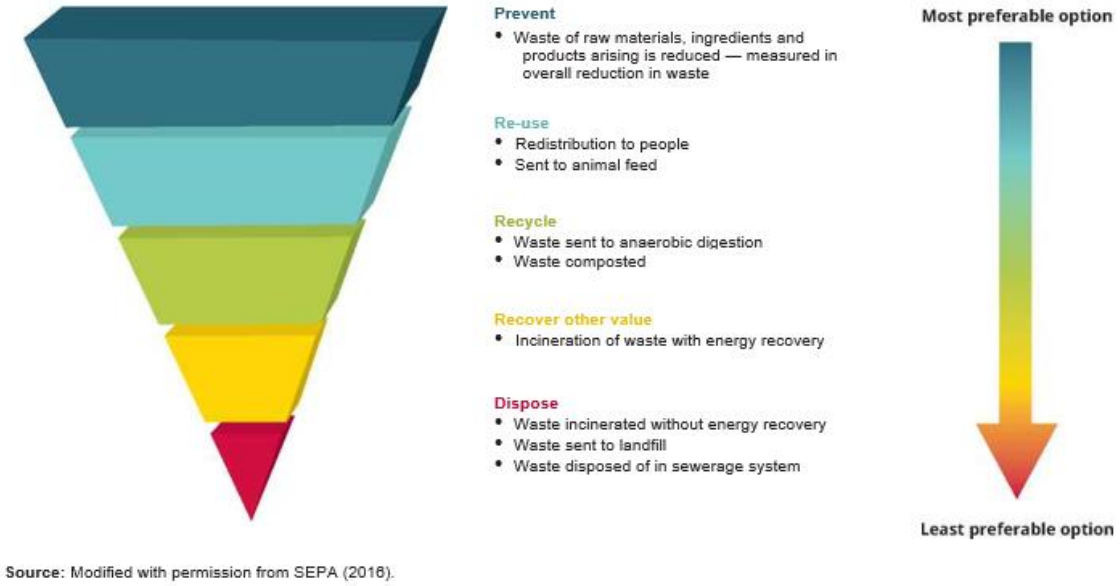

Figure 19: Food Waste Hierarchy

This hierarchy poses an intrinsic dilemma. If capacity is created for bio-waste treatment, there might be less incentive to prevent food waste (which remains the preferred option). However, not all food waste will be prevented, so investments in treatment capacity remain necessary.

Because most of the environmental impacts of bio-waste come from food production, food waste prevention at all stages of the food value chain is highly relevant. If demand for food is reduced by preventing food waste, the environmental impacts of producing, processing and transporting food decrease. Preventing food waste in households and in the hospitality sector has the greatest indirect effect in mitigating environmental pressures. This is, first, because of the high share of potentially avoidable food waste at the household and food service sector levels in terms of weight and, second, because the environmental impacts at the consumer stage include all the accumulated impacts from earlier stages of the supply chain (Scherhaufer et al., 2018). However, responsibility for preventing food waste lies with all stages of the food value chain.

In the context of waste prevention, food waste is recognised as comprising both avoidable (edible) and unavoidable (inedible) components (Shaw et al., 2018). Banana peel, eggshells and meat bones are examples of inedible and unavoidable food waste. In contrast, avoidable food waste is food and beverages that are thrown away despite still being edible, including, for example, slices of bread, apples and meat. When prevention is considered, only the avoidable fractions generated in each sector (see Figure 20 below) are considered preventable and monitored in accordance with the common methodology laid out in

Commission Delegated Decision (EU) 2019/1597. Losses generated in the retail sector and by households are a particular concern, especially at the household level where individual behaviour and cultural differences are critical (Thyberg and Tonjes, 2016). Households are identified as the sector contributing the most to food waste.

3.5 Food waste generation by sector, EU, 2012

Figure 20 below presents the distribution of food waste generation by the different contributing sectors.

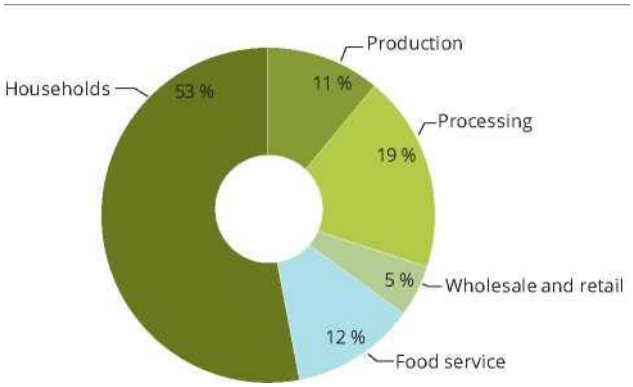

Figure 20: Food Waste Generation by Sector, EU, 2012

Note: Includes food and inedible parts associated with food.
The production sector includes harvested crops leaving the field/cultivation and intended for the food chain and mature crops not harvested, for example for economic reasons. Again, manure and gleanings are not counted as food waste. A detailed definition of the sectors is given in Tostivin et al. (2016).

Source: Stenmarck et al. (2016).

The avoidable component of household food waste is substantial. Estimates suggest that, across the EU, 50-60% of losses and waste in the food supply chain are generated by households and the retail sector (DEFRA, 2012; Stenmarck et al., 2016; Hebrok and Boks, 2017). The European Fusions project reported that about 60% of waste generated by consumers (equivalent to 32% of all food waste) consists of avoidable waste. Waste generation in Greece, 30% avoidable, and in Sweden, 35% avoidable, fall into this range (Abeliotis et al., 2015; Bernstad Saraiva Schott and Andersson, 2015). Estimates, however, vary: for example, in Germany avoidable food waste has been estimated to account for around 65% of the total food waste from households (Braun, 2012).

However, Schanes et al. (2018) point out that food waste generation in households cannot be seen in isolation from other parties in the food chain — from the production to the consumption stages. This is because food waste in households can arise from action taken further back in the food chain - through, for example, incomprehensible date labels, packaging that is not resalable, and sales strategies such as bulk packaging and special multi-offers.

Different food categories generate substantially different environmental impacts per kilogram across their life-cycle. For example, meat has a large impact on climate change per kilogram, while coffee, cocoa and some fruit, such as citrus fruit, have relatively greater impacts on biodiversity. Therefore, although food waste contains only about 5-12% meat, this

fraction contributes 25-55% of the climate impacts of food waste. In contrast, the larger amount of bread and starch, around 20 % of all food waste, contributes less than 10% of the climate impacts (Scherhaufer et al., 2018; Beretta and Hellweg, 2019). Consequently, a reduction in meat products in food waste would significantly reduce the life-cycle impacts of food waste on climate change.

Nevertheless, a strategy to minimise food waste would result in lower greenhouse gas emissions than in the current situation. Most studies have pointed out that, although modern alternatives for treating food waste can avoid greenhouse gas emissions through nutrient and energy recovery, preventing food waste yields far greater life-cycle savings of greenhouse gas emissions than incineration and anaerobic digestion (Bernstad Saraiva Schott and Andersson, 2015).

A wide analysis of the environmental impact of food waste (Scherhaufer et al., 2018) also concluded that the production phase accounts for almost three quarters of the greenhouse gas emissions associated with food waste and that the effects of food waste treatment and disposal are not the main cause of food waste-related impacts.

The value of avoidable food waste has been estimated in a number of European countries and ranges between EUR 3.2 and EUR 6.1 per kilogram of waste. Moreover, the European Commission's Joint Research Centre has developed a calculator to quantify the environmental and economic savings that can be achieved through preventing food waste (EC, 2020a).

The figures are higher for the upper end of the food chain, that is, the catering and household sectors. Across the whole food supply chain, two thirds of the cost is associated with food wasted by households. The cost of food waste in the EU in 2012 are estimated at around EUR 143 billion, of which around EUR 98 billion is attributed to household food waste. This is due to households generating more avoidable food waste than any other sector and the fact that the costs associated with a tonne of food, for processing, packaging and retailing, for example, accumulate along the supply chain (Stenmarck et al., 2016).

3.6 Policies applied in the EU to reduce food waste

In the majority of European countries, food waste stands out as a priority fraction in waste prevention policies. The WFD requires all EU Member States to develop specific food waste prevention programmes. Although the development of such programmes is still under way, analysis of 32 national and regional waste prevention programmes (EEA, 2019b) shows that measures on food waste are already included in the prevention programmes of 28 countries and regions (Wilts and Schinkel, 2018). Such measures include, for example, awareness-raising and information campaigns and programmes to reduce food waste. These measures typically target the consumer.

In a recent survey, countries reported a total of 91 examples of new waste prevention measures, among which information-based measures, 60 measures, were mentioned most frequently (Figure 23: Number of Food Waste by 32 EEA member and Cooperating countries, 2019). Other measures reported included food redistribution platforms, voluntary agreements, economic/financial measures, regulatory measures and monitoring food waste.

Figure 24: Number of Countries reporting New Food Waste for 32 EEA member and cooperating countries, 2019, presents the number of countries reporting new activities to prevent food waste. Various information-based measures/activities were mentioned by 23 countries, while food distribution platforms have been set up in seven countries. Five countries have monitoring systems in place for measuring food waste, while seven countries mentioned ongoing analyses and/or the development of monitoring systems, 12 in total. In addition, five countries, Croatia, Estonia, Greece, Latvia and Switzerland, mentioned having dedicated plans and measures in preparation for preventing food waste.

Number of food waste prevention measures not included in waste prevention programmes reported by 32 EEA member and cooperating countries, 2019

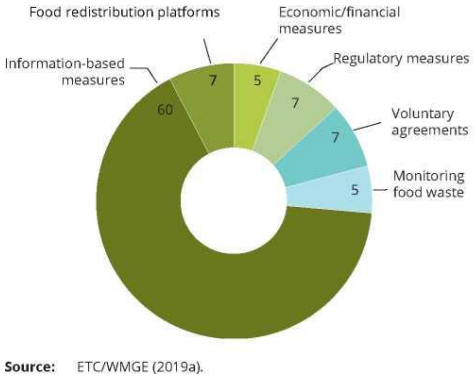

Figure 21: Number of Food Waste by 32 EEA member and Cooperating countries, 2019

Number of countries reporting new food waste prevention measures not included in waste prevention programmes for 32 EEA member and cooperating countries, 2019

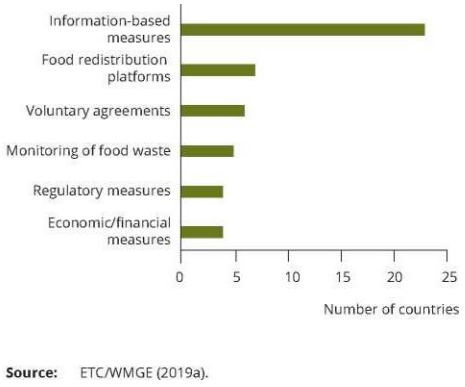

Figure 22: Number of Countries reporting New Food Waste for 32 EEA member and cooperating countries, 2019

3.6.1 Information-based measures

Awareness raising is the dominant policy option. Although consumers are mentioned as the most targeted group, measures targeting the catering industry, mentioned by 12 countries in total (from the countries reviewed in the report "Biowaste in Europe – turning challenges into opportunities" of the European Environment Agency), also stand out and include general awareness raising, training, technical support and Eco labelling. Education on preventing food waste has also been taken up by primary schools and kindergartens in seven countries. Cooperation with industry was mentioned by five countries and included sharing best practice.

3.6.2 Economic/financial measures

Economic measures aim to reduce food waste through incentives or other market signals (Fusions, 2016). They comprise fees, taxes and subsidies and are considered a powerful tool for shifting consumption patterns towards more sustainable food practices (Schanes et al., 2018). The assumption is that, if the real cost of using natural resources is reflected in prices, consumers would be more likely to prevent food waste. Reported economic and financial measures principally include subsidies and grants and/or tax credit schemes. Subsidies and grants have been directed at food banks (Czech Republic and at research into and developing

food waste prevention measures. Reductions in value-added tax (VAT) have been implemented, for example in Italy, on sales of leftover food.

3.6.3 Regulatory measures

Regulatory measures were mentioned by four countries: Czech France, Italy, and Poland. Since 2016, the destruction of unsold consumables has been forbidden in France — large supermarkets are obliged to donate unsold but edible food to social institutions or alternatively to use it as animal feed or compost it. Redistribution requires formal agreements with charitable institutions. There are, however, no rules on the proportion of food to be donated, which means that it is sufficient for a store to sign an agreement to donate 1 % of its unsold food. France also obliges restaurants providing more than 180 meals a day to allow customers to take leftover food home, providing them with a container if requested. In Italy, a law was passed in 2016 that facilitates and clarifies the conditions for the redistribution of surplus products, including food, for charitable purposes. There are no penalties in Italy — companies are exempted from paying VAT and income tax on their donations and passing on surplus food is facilitated (Azzurro et al., 2016).

In Czech, an amendment to the Food Act, aiming to reduce food waste that came into effect in 2018 requires all supermarkets larger than 400 m^2 to donate unsold but still consumable food to charities. According to the Czech Federation of Food Banks, approximately 1 900 tonnes of food were collected in 2017, which were then redistributed to 70 000 people in need. Thanks to the new regulation, the amount of food donated to charity increased fivefold. In Poland a new act to counteract food waste entered into force in September 2019. It regulates the obligations of food sellers and organisations distributing food for public benefit (Sejm, 2019).

3.6.4 Voluntary agreements

Voluntary agreements are typically a form of cooperation between public administrations and participating stakeholders, usually businesses. In the survey, seven countries reported on voluntary agreements targeting food waste produced by catering business and retailers. Ireland's Food Waste Charter, launched by the Minister for Communications, Climate Action and Environment in 2017, and is based on voluntary commitments by companies to reduce their food waste. Five of the six major supermarket chains in Ireland have signed the charter and, as a first step, have committed to measuring and reporting their food waste. Austria's Federal Ministry of Agriculture, Forestry, Environment and Water Management has a voluntary agreement (Vereinbarung 2017-2030) that involves both retailers and food producers in halving food waste by 2030. The document includes lists of measures by means of which the partners can contribute to achieving the goal.

3.6.5 Targets

Six countries specifically mentioned having set targets for reducing food waste, which are generally in line with the target of SDG 12.3 of halving retail and consumer food waste per person by 2030. France, however, has a National Pact against Food Waste that aims to reduce food waste by 50 % as soon as 2025.

3.6.6 Food redistribution platforms

Food redistribution and donation platforms have recently been set up in several European countries, largely to complement regulations and voluntary agreements involving retailers

and catering companies in donating leftover and second-class food and food products. The impact of such measures on food waste generation is direct and can be easily monitored.

Experience shows, however, that to be effective distribution platforms need to be complemented with proper support, which traditionally has been provided on a non-profit and/or voluntary basis (e.g. Gram-Hanssen et al., 2016). Insufficient logistical resources and storage can easily lead to a situation in which only a minor part of the redistributed food actually reaches its proper destination. In a pilot project, the Federation of Polish Food Banks started using cooling devices and cooled transport, allowing more fresh food to be donated (Eionet, 2019). Nevertheless, relying on donations as the main channel for reducing food waste implies that, if charities' need for donated food declines, the problem of excess food will return, as its underlying causes have not been adequately tackled.

3.6.7 EU Platform on Food Losses and Food Waste

To support achieving the EU goals, the EU Platform on Food Losses and Food Waste was established in 2016, bringing together EU institutions, experts from the EU Member States and relevant stakeholders. The platform aims to support all stakeholders in defining measures needed to prevent food waste, sharing best practice and evaluating progress made over time, and it aids the European Commission in identifying appropriate policies at EU level (EC, 2019c).

The EU and the EU countries are committed to meeting Sustainable Development Goal (SDG) 12.3, adopted in September 2015, which targets to reduce food waste in the EU by 30% by 2025 and by 50% by 2030 compared to the 2014 baseline, and also to reduce food losses along the food production and supply chains.

According to the EU parliament, the European Union, as one of the richest and most prosperous communities in the world, hence, it has a moral and political obligation to reduce huge quantities of food wasted every year.

In order to support achievement of the SDG 12.3 target on food waste and maximise the contribution of all actors, the Communication on Circular Economy calls on the Commission to establish a Platform dedicated to food waste prevention. The Commission said it was fighting food waste at the European level by elaborating a common methodology to measure waste, creating a platform to define measures against waste, facilitate cooperation, and share best practices, and improve the way food products are marked, in particular, the "best before sell date". Thus, the EU Platform on Food Losses and Food Waste (FLW) was established in 2016, bringing together EU institutions, experts from the EU countries and relevant stakeholders selected through an open call for applications. The Platform aims to support all actors in defining measures needed to prevent food waste; sharing best practice; and evaluating progress made over time (https://ec.europa.eu/food/safety/food_waste/eu_actions/eu-platform_en).

In addition to plenary meetings, the Platform also operates in sub-groups to examine specific aspects and/or questions related to food waste prevention. Four such subgroups have been established to date:

- Sub-group on food donation
- Sub-group on food waste measurement

- Sub-group on action and implementation
- Sub-group on date marking and food waste prevention

The mandate of the Platform, initially foreseen to end on 31 October 2019, has been extended until the end of 2021 in order to allow this expert group to pursue its work and on-going projects over a 5-year period.

4. Food Waste in Cyprus

The Cypriot production of household waste per capita is among the highest in Europe. According to the Statistical Service of the Republic of Cyprus in 2017 the waste generation reached 636 kg per capita, placing Cyprus second only to Denmark which generates 781 kg. Overall European Union averages to 486 kg per capita, a third of which (i.e. 88 million tons) is Food Waste. This also means that one third of food produced for human consumption in the world is lost or wasted, while one out of nine people globally is undernourished.

4.1 Municipal Solid Waste to Landfills

In Cyprus, the waste challenge is above Europe's average. According to Cyprus Statistical Service, more than 76% of municipal solid waste is still (latest data 2017) disposed to landfills.

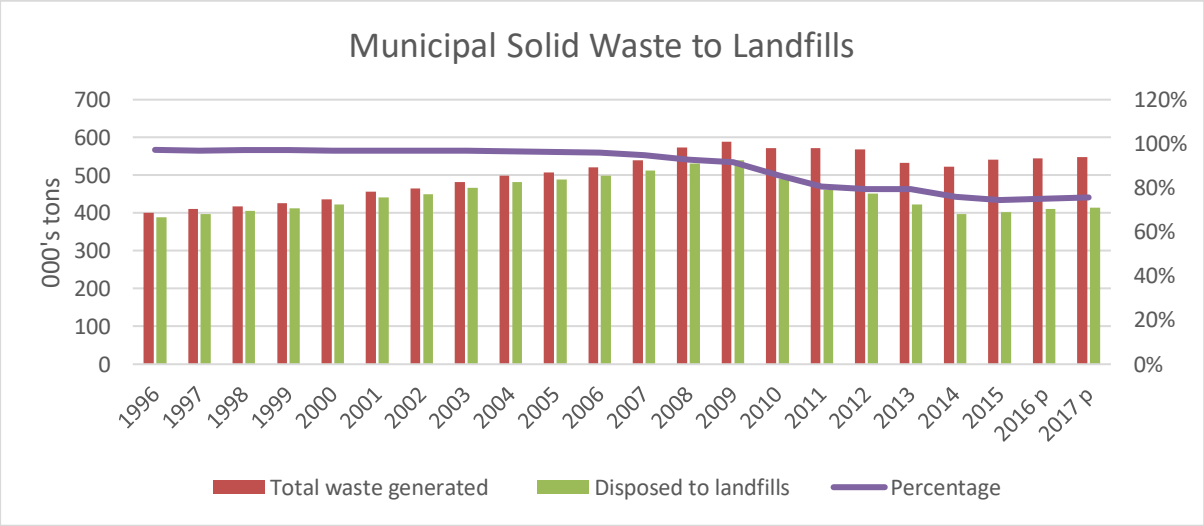

Figure 23: Municipal Solid Waste to Landfills – Cyprus Statistical Service (1996 – 2017)

At the same time, not even 10% of biodegradable solid waste is sorted.

Sorting of Bio-waste out of Municipal Solid Waste

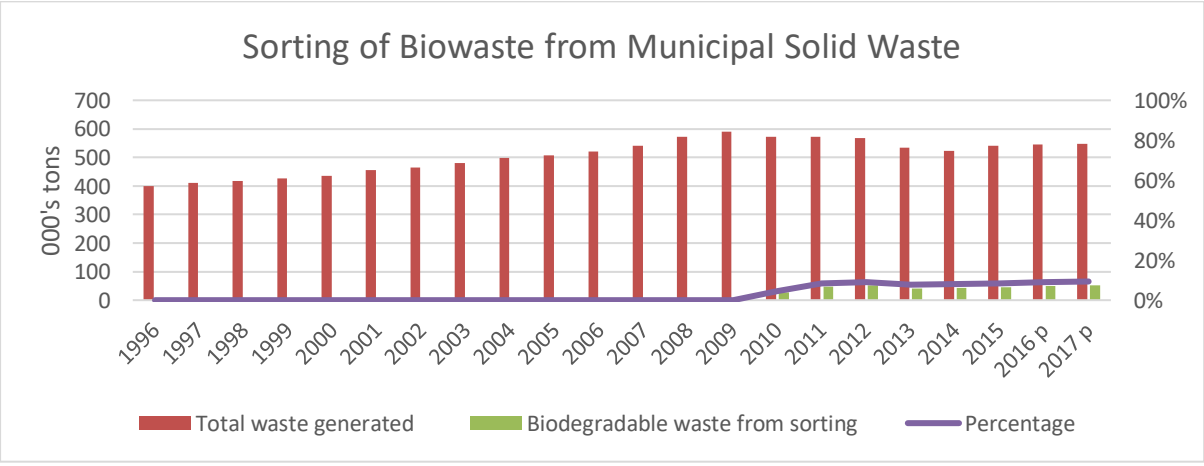

Figure 24: Sorting of Bio - Waste out of Municipal Solid Waste – Cyprus Statistical Service (1996 – 2017)

The availability of local statistics generally on biodegradable waste and more specifically on food waste in Cyprus, is low. According to the Cyprus Department of Environment, the organic waste ended up in Koshi MBT plant between 2011 and 2018 reached on average almost 42% of total waste.

Organics in Koshi MBT plant

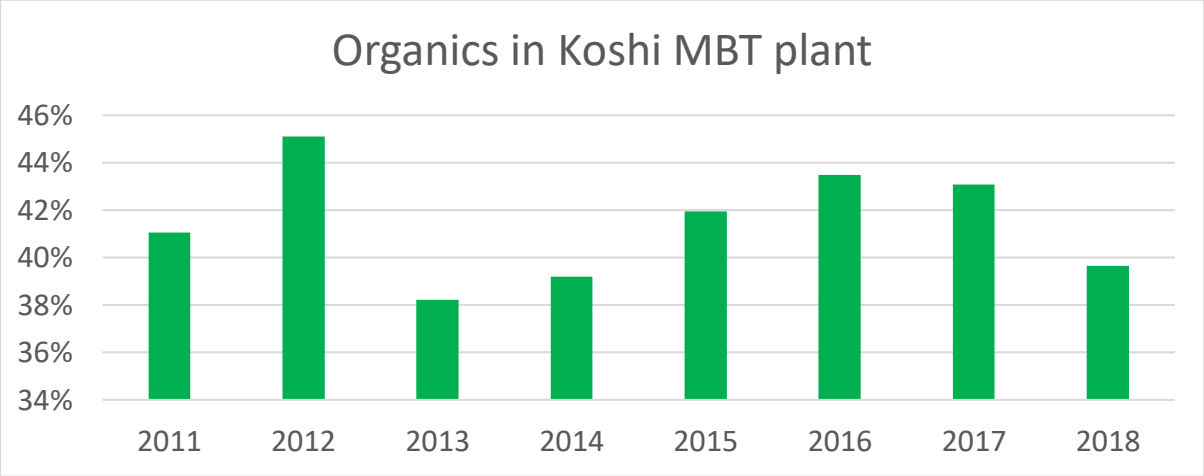

Figure 25: Organics in Koshi MBT Plant – Cyprus Environment Department

The results from the second MBT plant of the island in Pentakomo (Limassol area), indicate that during 2018 the organics share of total waste was almost 40% on average.

Organics in Limassol MBT plant

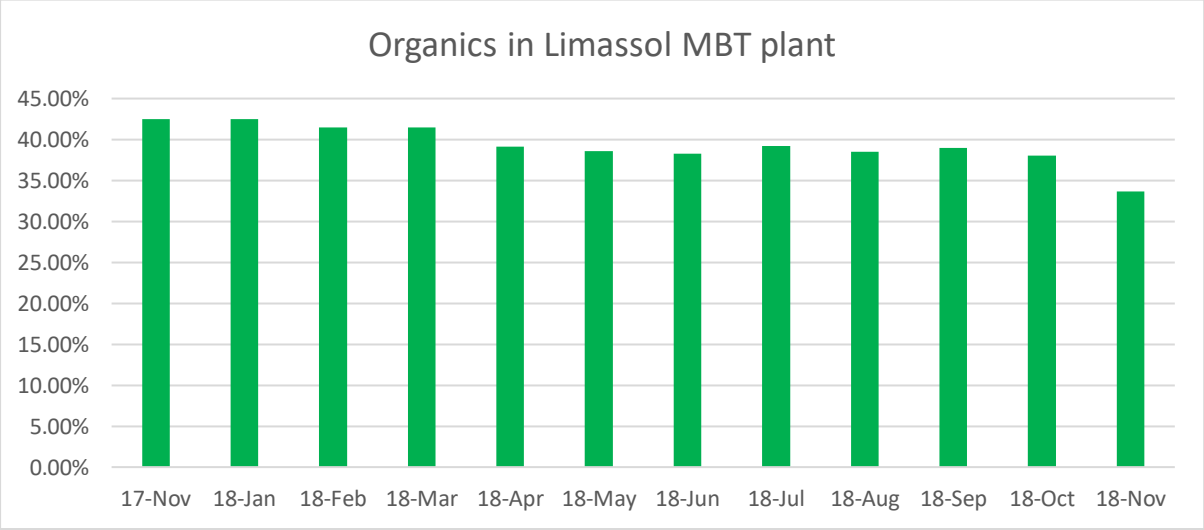

Figure 26: Organics in Limassol MBT Plant– Cyprus Environment Department

4.2 Food Waste Data

The latest official data in Cyprus refer to 42% of organic kitchen waste (2016–2017). A latest measure by the Aglantzia Municipality (May 2019) found a higher amount of organic kitchen waste, at 52%.

Another rather recent study on the quantitative and qualitative analysis of solid municipal waste in the two largest geographical and by population cities of the island, Nicosia and Limassol, showed that kitchen and restaurant waste exceeds 50% of the composition of municipal solid waste (IACO 2016).

Based on the above, we consider that it is safe to assume that organic waste should be around 47% of municipal solid waste in Cyprus. Figure 27 presents this share of biowaste based on the MSW production in the period 1996 – 2017.

Bio-waste portion in total Municipal Solid Waste

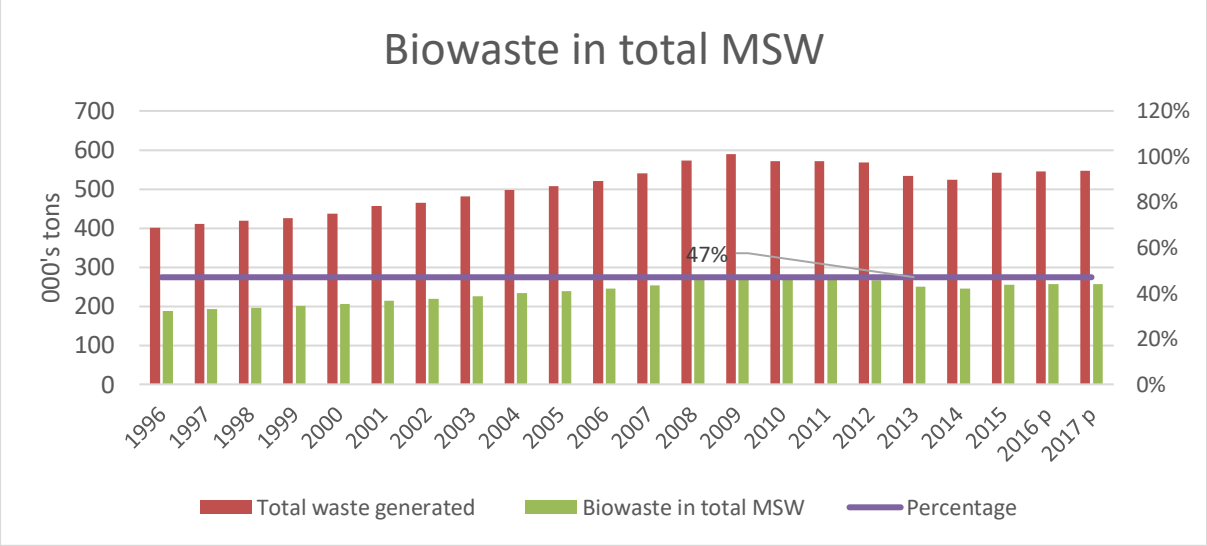

Figure 27: Bio - Waste in Total MSW – Cyprus Environment Department

Based on the 2017 total waste generation data, the 47% percentage translates into 257,260 tonnes of organic waste. However, from the organic waste generated only 20% or 51,190 tonnes of organic waste were sorted and treated (including compost-like output from MBT plants). Figure 28 presents this share of sorted biowaste Vs the total production of MSW in the period 1996 – 2017.

Sorted Bio-waste VS Total Bio-waste in Municipal Solid Waste (inc. Compost-like output)

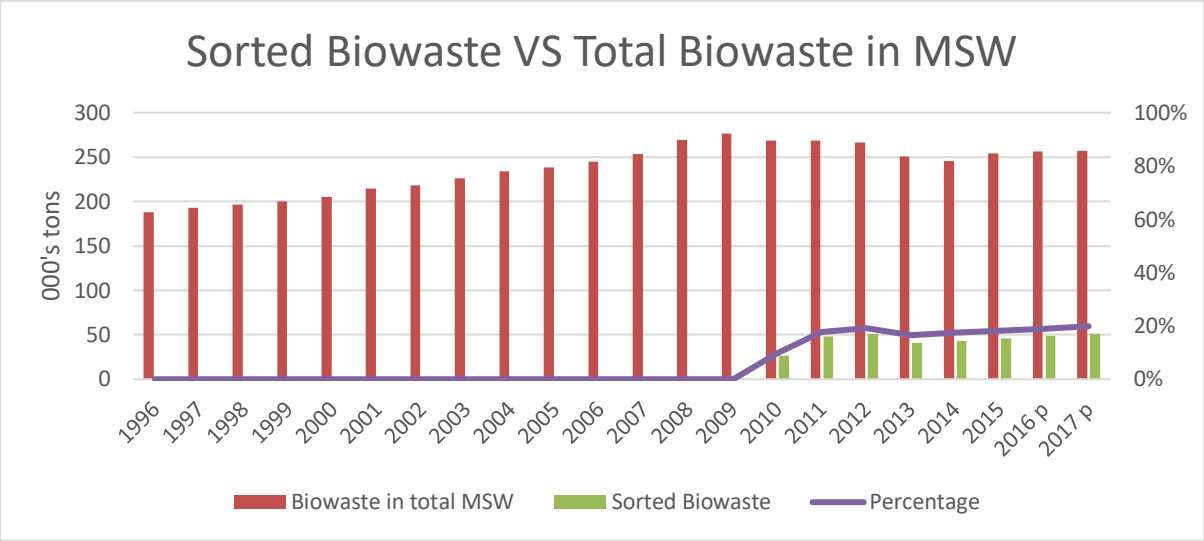

Figure 28: Sorted Bio - Waste Vs Total Bio-waste in MSW – Cyprus Environment Department

Based on the data above and considering that 60% of biodegradable waste is estimated to be food waste, we can estimate that in 2017 about 155,000 tonnes of food waste was generated in Cyprus, representing 28,2% of total municipal solid waste generated for the same year.

Consequently, almost one third of the infrastructure and operational cost for waste management in Cyprus, is expensed to deal with food waste. Wasting food is not only an ethical and economic issue but also depletes the environment of limited natural resources. In Cyprus, it is estimated that the solid waste in general contributes around 14% of the Cyprus GHG emissions (National Plan for Energy & Climate 2021-2030). Therefore, minimizing food waste will have an important positive impact on GHG emissions.

Food waste represents one of the main targets of the EU for the period 2018–2030, with focus on separate collection and reduction by 50% by 2030. Different waste plans such as the Cyprus waste prevention plan 2015–2021 include a variety of measures aiming to tackle organic waste, however, Cyprus lacks a specific national Food waste strategy. Starting in 2020, the Municipal Waste Management Strategy and Prevention Plan will be revised through EU technical assistance and are expected to include revised actions on food waste. Hence the Life Footprint project shall contribute to policy development and implementation on a local, national and EU level.

There are around 10,400 food-related businesses in Cyprus operating in the primary (9%), secondary (23%) and tertiary (63%) sector (OEB, 2020). Enterprises in the primary and secondary sectors are related to food loss, whereas enterprises in the tertiary sector are mainly related to food waste. Companies implementing food waste reduction initiatives are bound to reap the financial benefits. In Cyprus there are not many initiatives on food waste awareness or in the form of 'best use before they become waste' at a national level, but some scattered ones from local authorities and private entities.

4.3 Environmental Policy

The absence of a comprehensive and coherent policy, dispersed responsibilities, and political expediency favouring financial interests at the expense of environmental protection, place

Cyprus very low on many relevant EU ratings. The country is failing its EU obligations, despite warnings from Brussels and pressure from local and international organizations.

Awareness-raising efforts and pressure from environmental groups since the late 1980s have failed to convince the authorities to halt projects with a destructive environmental impact. Politicians and representatives from both public and private institutions are persistently seeking from the authorities to relax environment protection rules. The country's response to demands for climate protection remains insufficient in many respects.

Along with gas emissions, water management and forest protection, the reduction and eventual abandonment of landfilling (as per the EU Directives), is a major challenge. Despite the Commission warnings and eventually threat for sanctions against the country, the waste management problem remains unresolved or only very slightly improved. The subject was also addressed in a report by the auditor general in late 2017. Furthermore, in 2018, Cyprus received warnings from Brussels for failing to integrate EU directives on the environment into national laws, failing to meet recycling targets, and failing to efficiently manage waste. At the same time, the 2018 EU Early Warning Report for Cyprus, highlighted the biggest challenges and proposed specific measures for improvement (install PAYT schemes, sorting of organic waste at source, install landfill tax etc.). However, the authorities continue to use the economic crisis as a pretext as they proceed in relaxing or cancelling environmental protection rules. Warnings by experts and the existing EU rules are often ignored and new projects are approved with additional negative effects on ecosystems.

4.4 National Regulatory Framework

The Cypriot policy on waste management is based mainly on the well-known EU waste hierarchy (prevention, reuse, recycling, recovery, and disposal) and the correct environmental handling of waste. The aim is to protect the environment and human health. This is achieved through the reduction/elimination of the negative effects of the generation and management of waste, the promotion of reuse, recycling and recovery and generally the environmentally sound management in order to reduce waste disposal in landfills and improve the use of resources by improving the efficiency and effectiveness of their use.

4.4.1 ΚΔΠ 562/2003

According to ΚΔΠ 562/2003, derived from Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste the targets are:
(a) no later than June 15, 2010, landfill of biodegradable municipal waste should be reduced to 75% of the total by weight of biodegradable municipal waste generated in 1995, or the last year before 1995 for which standard Eurostat data are available;
(b) no later than 15 June 2012, landfill of biodegradable municipal waste should be reduced to 50% of the total by weight of biodegradable municipal waste generated in 1995, or in the last year before 1995 for which standard Eurostat data are available; and
(c) no later than 15 July 2016, landfill of biodegradable municipal waste should be reduced to 35% of the total by weight of biodegradable municipal waste generated in 1995 or the last year before 1995 for which standard Eurostat data are available;

4.4.2 Municipal Waste Management Strategy 2015-2021

The waste management in Cyprus is based on the Waste Law of 2011 (L.185(I)/2011), a series of Regulations under the waste law and the Packaging and Packaging Waste Law of 2002 (L.32(I)/2002). The national legislation is derived from the EU relevant directives.

In accordance with article 28 of Directive 2008/98/EC (corresponding to article 35 of the Cyprus Waste Law L.185(I)/2011), Member States shall establish one or more waste management plans, which define the framework, directions, activities, procedures and measures for the protection of the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste, using the EU waste hierarchy.

In the above context the Department of Environment has developed the 2012 Management Plan for Household and Similar Type of Waste which, after public consultation (2012) and new political decisions, was changed into the 2015-2021 Municipal Waste Management Plan. At the same time, a summary description of the Municipal Waste Management Plan entitled "Municipal Waste Management Strategy" was prepared for the period 2015-2021. The Strategy and Plan for municipal waste has been developed following wide consultation with all interested parties as well as consultation with the European Commission.

The main axes of the strategy, upon which the Plan is developed, are the following: compliance with the obligations arising from the European Directives on waste management, full utilization of existing private and State waste management infrastructure, maintaining the waste management hierarchy, with emphasis on prevention and sorting of waste and the adoption of best practices with the lowest cost.

Within this context, qualitative and quantitative objectives have been set. The main quantitative objectives are the following: (a) 40% separate collection of municipal solid waste by 2021, and 50% and 2027 (up from 20% in 2012), (b) 50% of recyclable materials (paper, plastic, metal, glass) in municipal waste to be prepared for reuse by 2020, (c) 15% of municipal organic waste to be collected separately by 2021, (d) the amount of biodegradable waste that is directed to landfilling, not to exceed 95,000 tonnes after processing (compared to 459,940 tonnes of waste that were sent to landfills in 2011) and (e) the achievement of the objectives of the European Directives on packaging waste, electrical and electronic equipment waste generated from the residential sector and other sources that are similar in type to those of the domestic sector and waste from household batteries and accumulators.

According to estimates by the Cyprus Statistical Service, the total amount of municipal solid waste produced in Cyprus amounted to 547,000 tons in 2017 compared to 545,000 tons in 2016, recording a small increase of 0.36%.

Of the 521,000 tons managed in 2017, 79.5% ended up in landfills, 15.0% was separated for recycling, 2.0% was composted, 3.2% was used for backfilling and 0.3% was incinerated for energy recovery purposes.

To achieve the objectives and fulfil the obligations arising from the European Directives, it is imperative to obtain the active involvement of local authorities, the introduction of plans and programmes for the promotion of separate collection, the reduction of the volume and the recycling of municipal waste.

4.4.3 National Waste Prevention Programme

In accordance with Article 29 of Directive 2008/98 /EC (corresponding to article 36 of L.185(I)/2011) on waste, Member States (MS) shall establish waste prevention programmes not later than 12 December 2013. In these programmes, specific waste streams are targeted for prevention. The main objective of these programmes is to take measures to decouple economic growth from the environmental impact associated with the generation of waste.

In compliance with the above obligations, the Department of Environment of the Ministry of Agriculture, Rural Development and Environment has prepared an independent waste prevention Programme for the period 2015 – 2021, which addresses the requirements of article 29 of the Directive. The Waste Prevention Programme has been extensively discussed with all stakeholders and the European Commission. This programme among others, (a) establishes quality objectives which focus on changing the consumption patterns associated with the generation of waste, limiting the generation of certain waste streams, the promotion of re-use, the reduction of organic waste for landfilling and reducing the generation of hazardous municipal waste, (b) sets out the waste prevention measures for organic waste streams.

5. Public Opinion Surveys

According to the analysis so far, there is international and EU data on the types and quantities of food produced and lost at various stages of the life cycle, from production to consumption. There is also a clear picture of the damage caused both socially and economically by food waste. To a certain extent, some of the root causes of food waste that are related to public behaviours, are also known. However, we know less of the public opinion and the habits of people in Cyprus regarding food waste. To design an effective communication campaign, it is imperative to have a better baseline of the existing opinions and behaviours of people. At the same time, this baseline will serve as a base for the measurement of the effectiveness of the campaign to be deployed in the next months.

It is necessary to understand the extent of the food waste problem in Cyprus, the reasons causing it, the rates at which food waste is produced and where this happens most intensely. Understanding and recording any negative habits and mentalities of the public, as well as any possible disincentives for the proper food waste management is important and will be utilised for the design of an effective communication campaign with the aim to positively influence the public opinion and habits and facilitate the prevention and treatment of food waste.

To facilitate the design of the Life Footprint project baseline, two quantitative surveys were conducted during October and early November 2020. The main survey was based on structured questionnaires (Annex 1) and a stratified sample of 554 people over the age of 18, run in the period 21 – 23 October 2020. The second, was a shorter online questionnaire (Annex 2) via the Dias group websites with a larger sample (total 1828 participants, out of which 1104 with complete answers) and participation from other countries (Greece, UK, other).

5.1 Main Quantitative research (Oct 2020)

The research covered 554 people aged 18 and over, who are either responsible for household shopping or household food preparation. The methodology used was the Computer Aided Web Interviewing (CAWI) and the Sample was selected from a panel of participants in online surveys. The Data collection was between 21- 23/10/2020. The geographical distribution of the sample was proportional to the actual distribution of the population. The data was not weighted during processing. Details of the sample are found in Annex 1.

The main body of the questions in this survey (any exceptions will be evaluated in due course), can be repeated in the second and third waves of the research of this project to measure potential changes in attitudes and behaviours of the public due to the project interventions and other exogenous influences. For example, the first wave has been performed during a period of lockdowns due to the COVID 19 pandemic, and hopefully the second and third wave will be executed after the pandemic is dealt with and life will return to normal for most people. This is expected to potentially influence the results and the second wave will be executed early in 2022 (March 2022) and the third early in 2023 (April 2023). In any case, the repeated waves of similar research questions can allow us to track some changes in the attitudes and behaviours of the public. The main results of the first wave of research and the derived conclusions are presented below.

Food purchase frequency

Half of consumers buy food 2-3 times a week. Two out of ten are more frequent buyers (daily, 4-5 times a week), while three out of ten are more sparse buyers (once a week). On average, each household goes shopping 2.5 times a week.

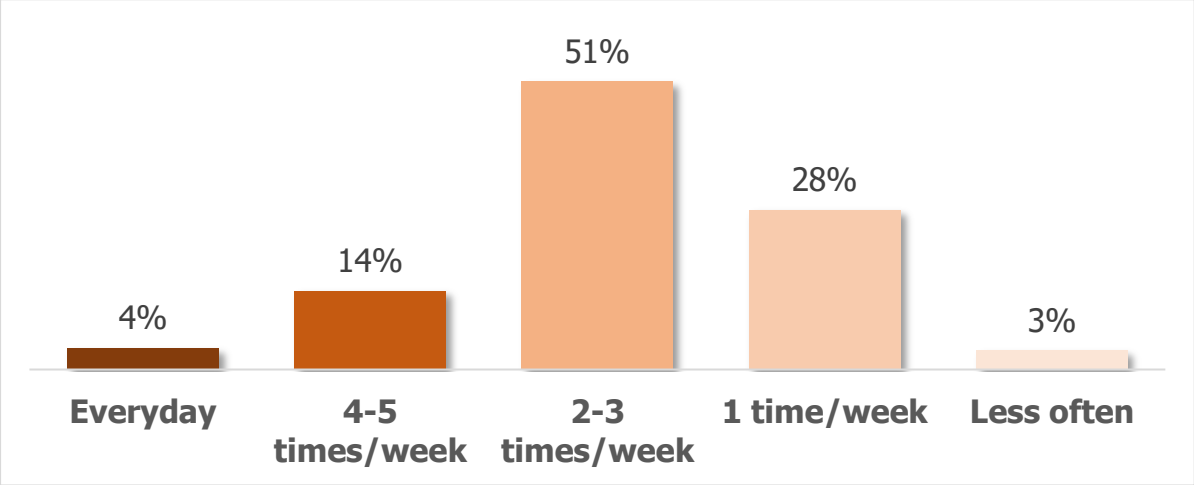

Figure 29: Food Purchase Frequency

Food preparation frequency

Half of the households cook daily, while three out of ten cook 4-5 times a week. More rarely (2-3 times a week) they cook two out of ten, while a low percentage (6%) cook once a week or less often. On average, each household cooks 5 times a week.

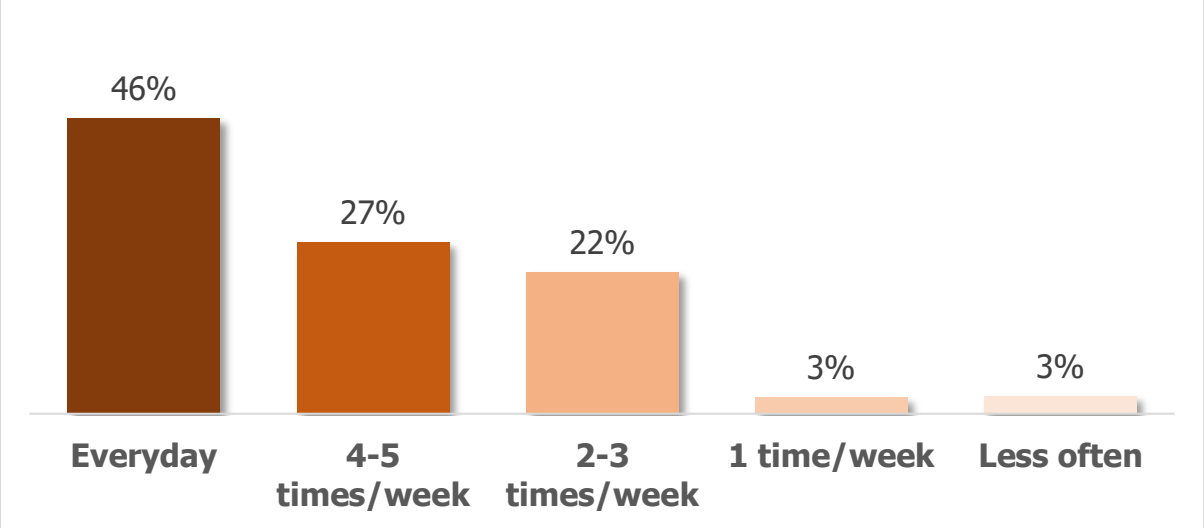

Figure 30: Food Preparation Frequency

Ready meals purchase frequency

A quarter of respondents are regular buyers of ready meals (2-3 times a week or more often), while a third buy ready meals on a weekly basis. The rest (43%) buy ready-made food more sparsely, 2-3 times a month once a week. On average, each household buys ready-made food 1.2 times a week.

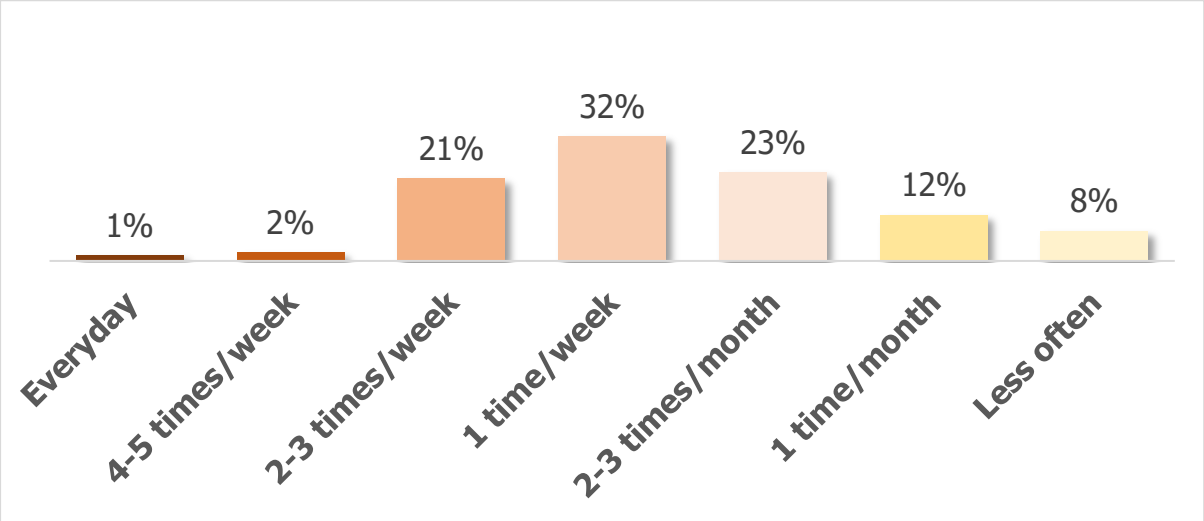

Figure 31: Ready Meals Purchase Frequency

Buying more food than needed

Seven out of ten consumers tend to buy more than the required quantities of food. This habit roots into issues of security. They want to maintain stocks in case of emergencies (40%) and be prepared for visitors at home (30%), while keeping enough food at home gives the feeling of security (29%). Other reasons for buying more than the required quantities are related to the different food preferences of family members (29%) and the inability to calculate the amount of food needed for the family.

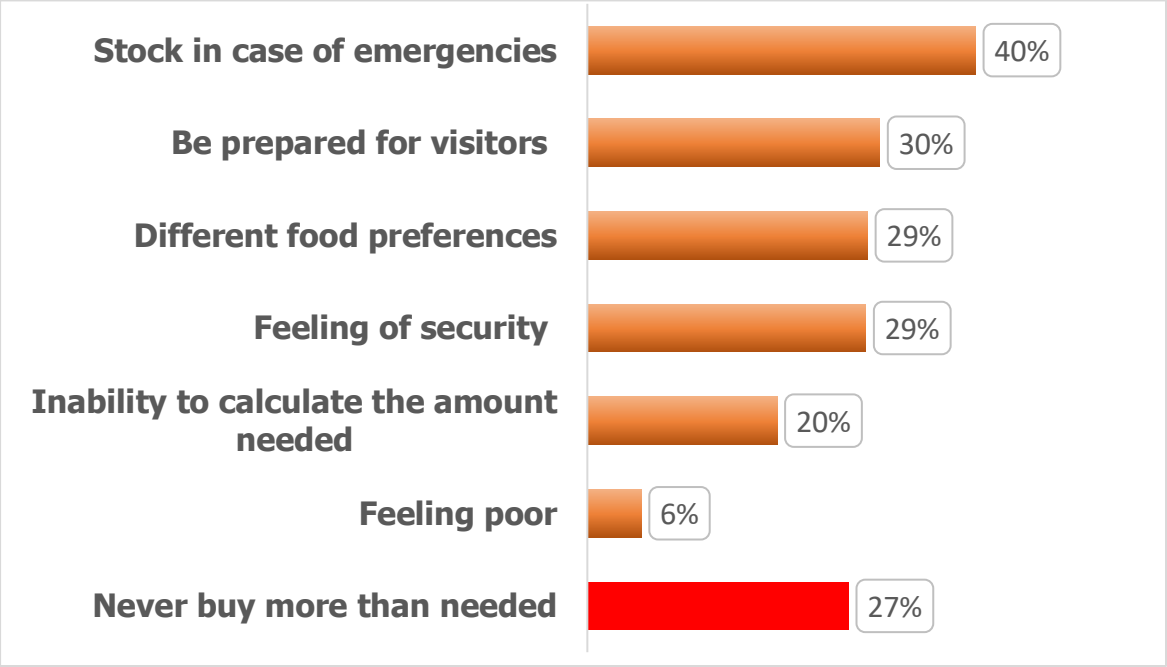

Figure 32: Buying more Food than Needed

Food surplus frequency

In most households, when food is prepared or ordered, there is a surplus of food that is not consumed. In two out of ten households this happens most of the time, while in almost seven out of ten, sometimes. Only 14% of households almost never have leftovers.

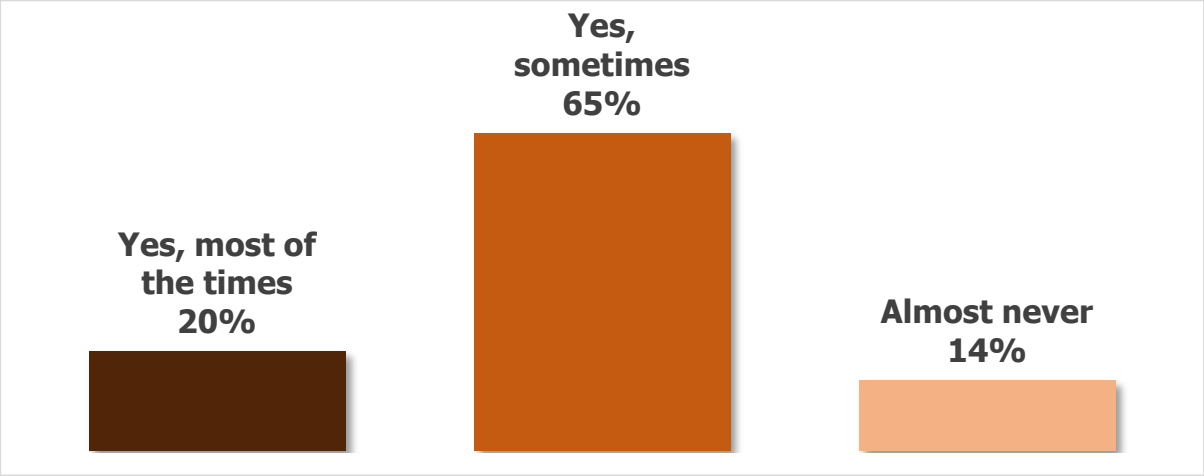

Figure 33: Food Surplus Frequency

Surplus food management

Two-thirds consume surplus food in the following days, while one-third tend to give leftover food to pets. In rural areas, it is much more common to use food that is left over as livestock feed (33% in rural areas vs. 10% in urban areas).

One in six households, quite often or always throws surplus food in the trash. 23% keeps the surplus food that often / always occurs in the freezer, while 18% uses it in the preparation of other foods. Of the various actions considered, the rarest action was using surplus food for composting (9%).

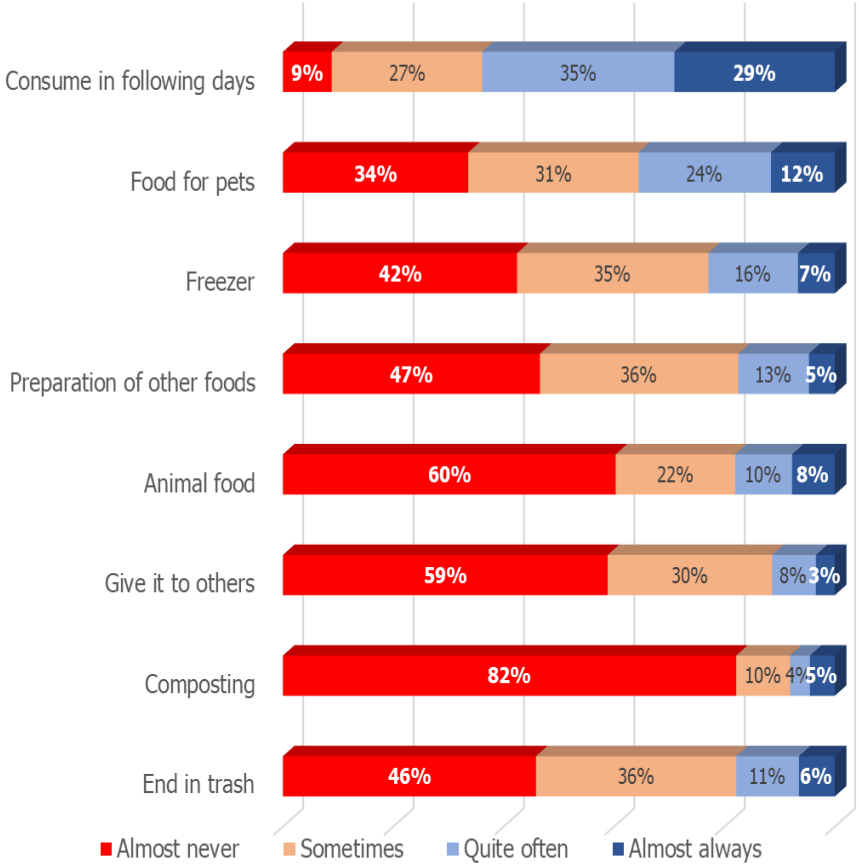

Figure 34: Surplus Food Management

Reasons to throw food away

Two-thirds of those who throw away surplus food, do so because they worry food is going to become inedible.

Half of households that throw away food do so because family members do not want to eat it again: they always want it fresh (23%), family members do not like it (23%), it is not considered tasty (20%).

Other reasons that lead to throwing away surplus food, to a much lesser extent, though, are the lack of storage space 18% and the perception that its nutritional value is reduced (16%).

Almost two out of ten throw away food without any particular reason, mainly because this is how they are used.

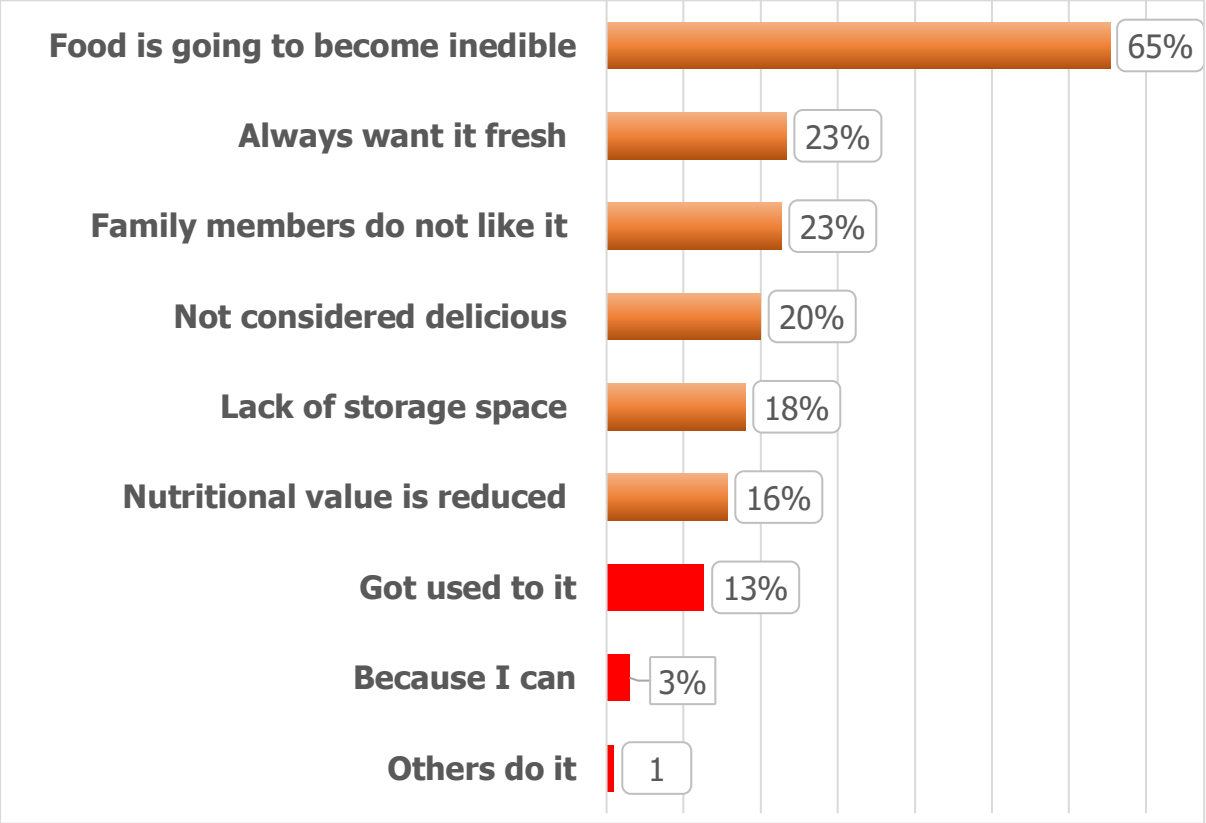

Figure 35: Reasons to Throw Food Away

Frequency of food waste generation by category

Vegetables and fruits are the food categories that are most often thrown away. 59% of consumers throw vegetables at least once a week, while the corresponding percentage for fruit is 47%.

Pasta and bakery items are thrown away at least once a week by 41%, meat by 36% and dairy by 31%.

Fish and sweets are thrown away more rarely (respectively 17% and 25% at least once a week).

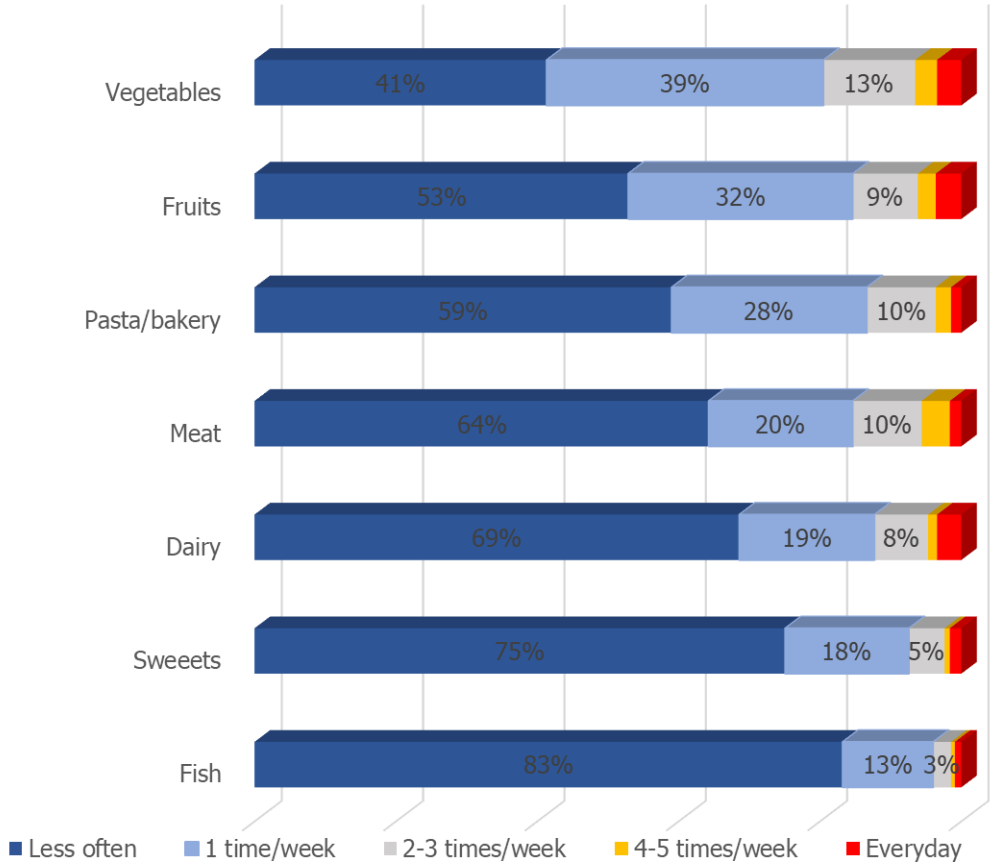

Figure 36: Frequency of Food Waste Generation by Category

Food waste generation reasons

The main reason that food waste is generated is because it is not consumed at the expected rate, which is reported to a much greater extent by all participants in the research. To a lesser extent, consumers report that they forget to consume food and that they buy more than they need.

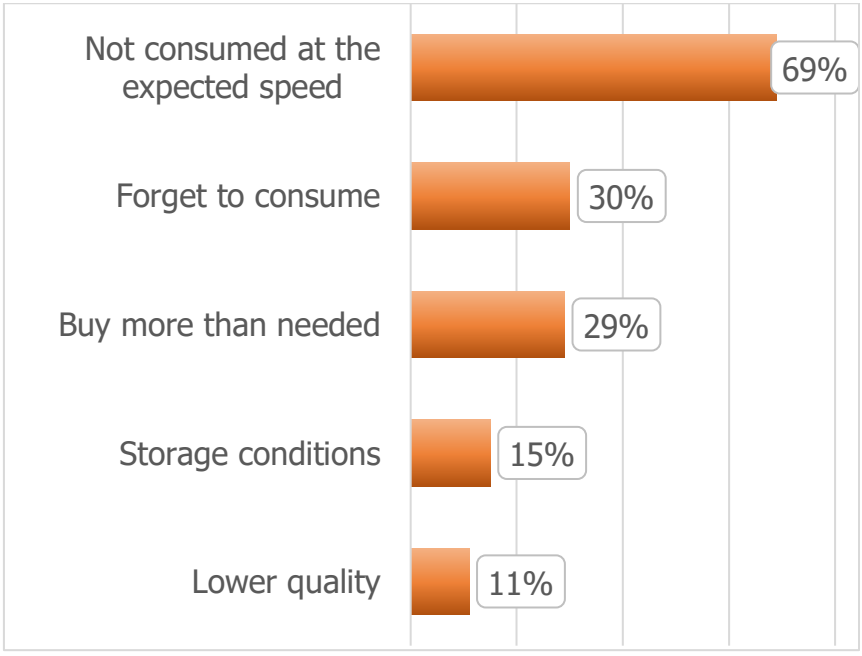

Figure 37: Food Waste Generation Reasons

Food waste management

Most consumers throw away the food they consider unsuitable for consumption (72%). Three out of ten give this food to pets, while to a much lower degree some report that they compost it.

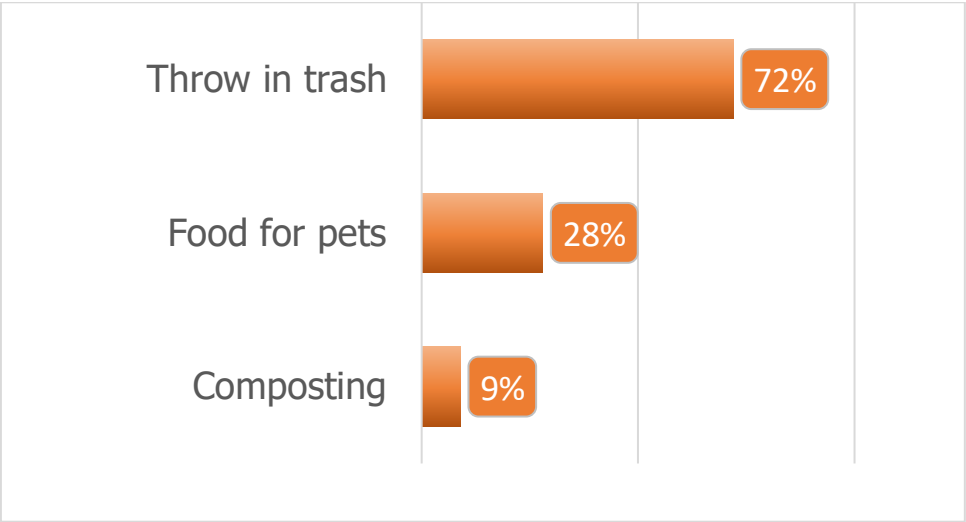

Figure 38: Food Waste Management

Household food waste percentage

The majority of consumers (81%) state that they throw away 10% -30% of food they buy in a typical week. The average in the whole sample is 23%. That is, almost a quarter of the food purchased, ends up in the trash.

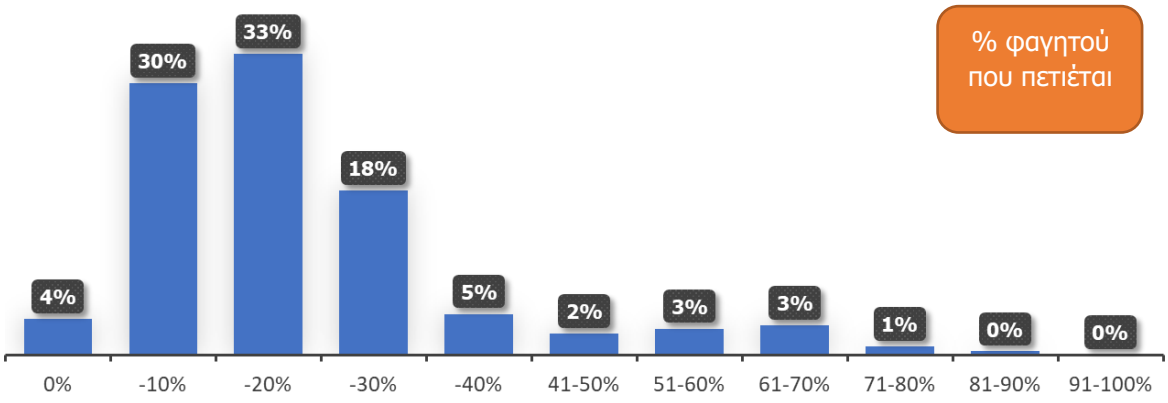

Figure 39: Household Food Waste per percentage

Reasons to throw food away

Consumers throw food in the trash mainly because the expiration date has passed (49%) and because they do not consider leftover food will be safe for consumption (31%).

Similarly, a quarter of consumers report throwing away food either because household members do not consume all of their food, or because they prepare more food than they need, or because they buy more than the household needs.

At the same time, two out of ten are forced to throw away fruits and vegetables due to improper storage.

Only one in ten consumers say they do not throw food away.

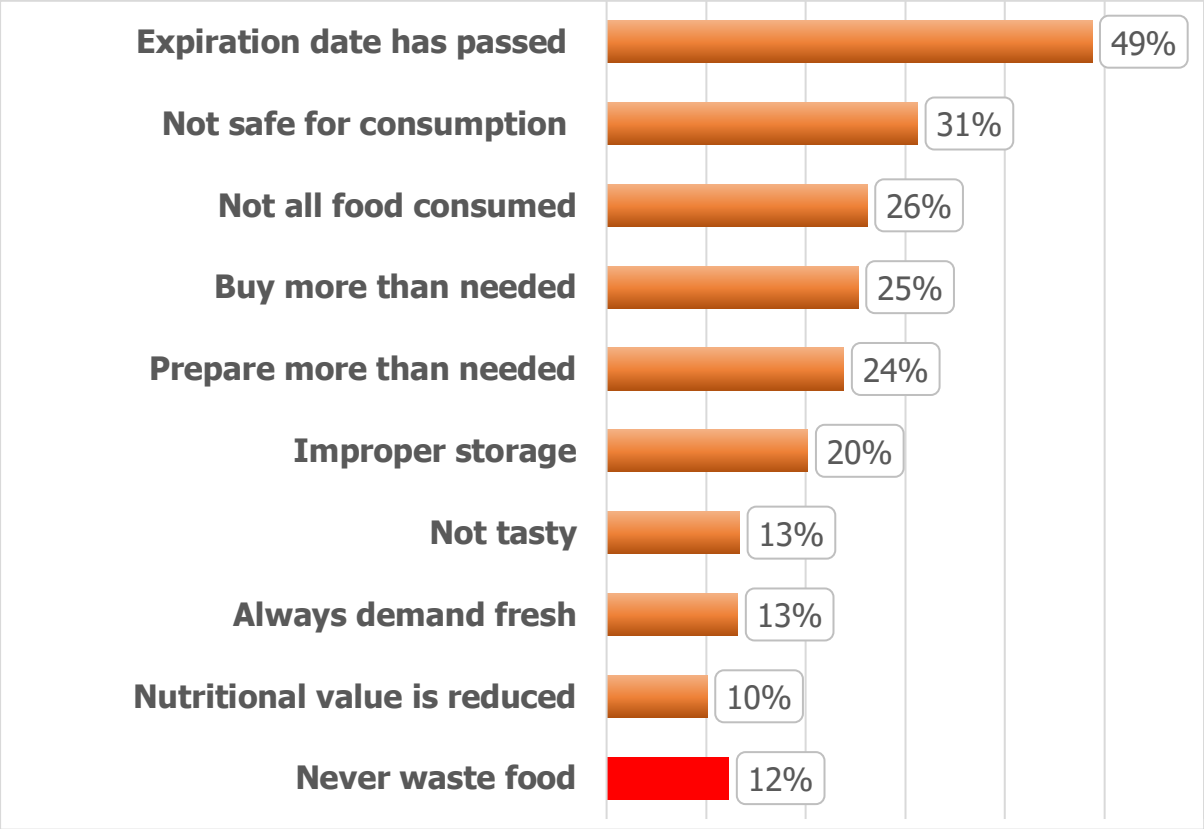

Figure 40: Reasons to Throw Food Away

Purchase and consumption food behavior

The most common consumer's behaviour referred regarding the purchase and consumption of food, is to check the expiration date of food, which is done by almost all consumers.

The following behaviours are also common, reported by 8-9 out of ten consumers:

- Check the food in the refrigerator before purchasing more
- Pay attention to proper food preservation
- Prepare a shopping list
- Cooking planning
- Consumption of surplus food in the following days

Behaviours involving 6-7 out of ten consumers:

- Cooking only the necessary amount
- Buy only what is needed
- Maintaining enough stocks at home
- They do not throw away the old when they have fresh products

Less common behaviours mentioned by 4-5 out of ten consumers:

- They take with them the surplus food after eating out
- Use the leftovers to prepare other foods

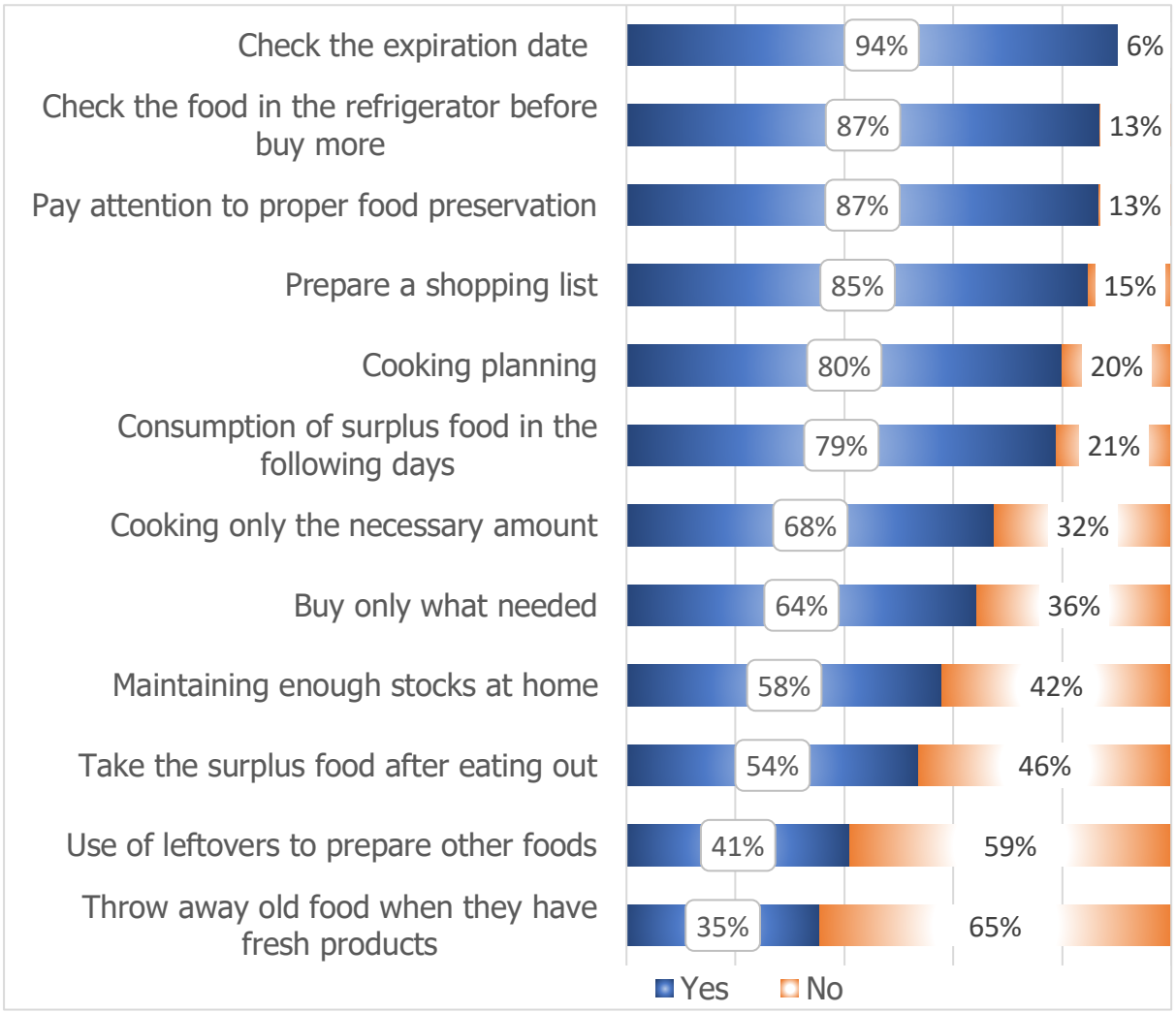

Figure 41: Purchase and Consumption of Food Waste

Feelings when wasting Food

The main feeling mentioned by consumers when they throw food away, is a feeling of guilt (56%) and secondly that of waste of money (46%). Environmental impact is the concerns of only three out of ten consumers. One out of ten is completely indifferent.

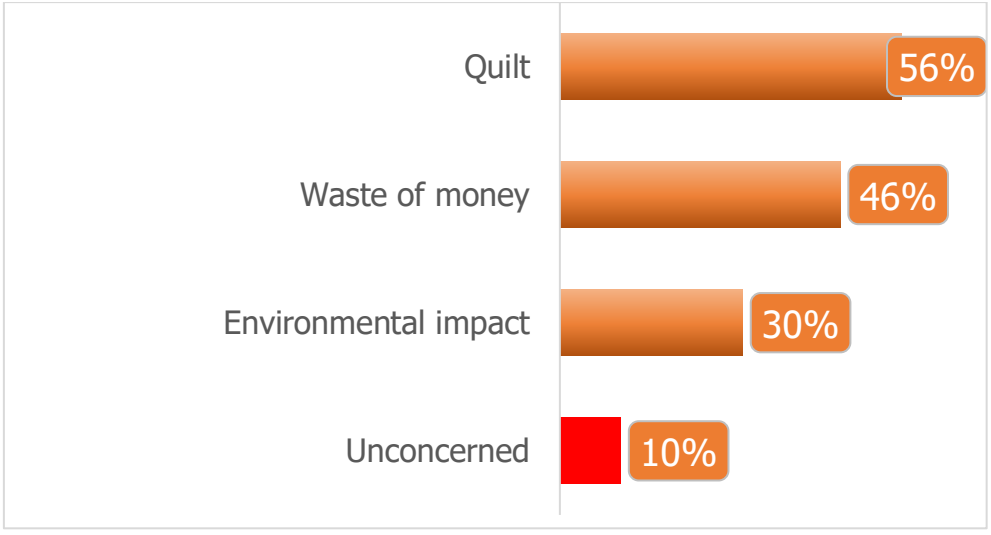

Figure 42: Feelings when Wasting Food

What consists food waste? Public opinion

One of the aims of the research was to discover what consumers consider as food waste. Eight out of ten consumers understand food waste as leftover cooked food and expired cold cuts and cheese, while seven out of ten include spoiled fruits and vegetables in this category.

Peels from fruits and vegetables are considered food waste to a lesser extent (56%).

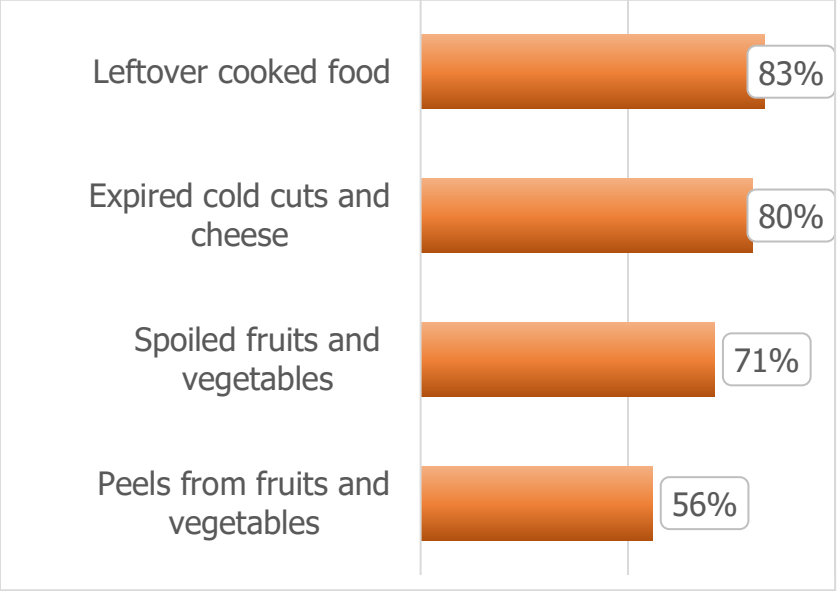

Figure 43: Food Waste Contents

Summarized research Results

The main results of the research can be summarized as follows:

a) Based on cluster analysis, three main profiles of consumers can be derived:
   a. Consumers who order cooked food regularly and cook less (26% of population): younger people, men, upper social classes, more educated, living in cities and living alone
   b. Consumers who cook often, and buy cooked food once a week (38% of population): people of age 35-44, women, middle social classes, living in cities, having kids
   c. Consumers who cook daily and order cook food rarely (35% of population): people of age above 45, women from lower social classes and less educated. Also, highly represented in this group is people living alone and households with more than 5 people.

b) 73% consumers buy more than the necessary quantities of food, to keep stocks at home in case of need, to satisfy the preferences of different family members and to feel more secure.

c) 85% of consumers state that when preparing or ordering food there are leftovers. The most common uses of leftovers are to eat it in the next few days or to use it as pet food. Nevertheless, 17% always or quite often throw leftovers in the trash.

d) The main reasons why surplus food is thrown away, are food spoilage concerns and preferences for eating freshly prepared food.

e) The average household throws away 23% of its weekly purchases of food.

f) Among the categories of food purchased, vegetables and fruits are the items most often thrown in the trash.

g) The main reason that food is spoiled and wasted, are because it's not consumed at the rate expected and the expiration date passes.

h) The youngest people, the upper social classes, the group of people who shop more often and the group of people who order ready-made food more often throw more food in the trash.

i) Regarding shopping, cooking and eating habits:

Almost all consumers mention that they check expiration dates, 8-9 out of 10 check what they have at home before shopping, make a list, watch how they store food, plan what to cook and eat leftovers at a later stage, 6-7 out of 10 buy and cook only the necessary quantities, keep enough supplies at home and do not throw away old products when they buy fresh, while 4-5 out of 10 take leftover food from eateries with them and use leftovers to prepare other meals.

j) When consumers throw food in the trash, they mostly feel guilty (56%) and that they wasted their money (46%). The feeling that this is not good for the environment is less important (30%).

k) Among the participants in the online survey: 65% agree that buying food with a longer shelf life is a very / quite important action for environmental protection (35% find it of limited importance), 79% agree that the subsequent consumption of food that remains after its use for the preparation of other foods is very / quite important action for the protection of the environment (21% find it of limited importance), 65% agree that composting is a very / quite important tool in the protection of the environment (35% find it of limited importance) , 63% agree that taking food left over from outings is a very important action to protect the environment (37% find it of limited importance).

5.2 Quantitative Online Poll via the Dias Media Group websites

This section presents the results of an online survey conducted among visitors to DIAS Group websites (Sigmalive, Sportime.com.cy, I love Style, City.com.cy, Check In, Economy Today, MuCyprusTravel.com), between 5 and 9/11/2020. The survey was designed to complement the questions in the main survey, therefore enriching the findings of the baseline research

Using the Dias websites for the online poll, enabled the participation of people from Cyprus, but also from other countries. This allows the comparison of opinions and behaviours of people residing in different countries (Cyprus, Greece, UK and EU).

Long shelf life food products significance

Almost half of the participants in the online poll mention that buying food with a longer shelf life is a very important action for the protection of the environment (46%). In addition, 19% consider the purchase of food with a longer shelf life to be quite significant.

More than a third of respondents do not believe that buying food with a longer shelf life is important.

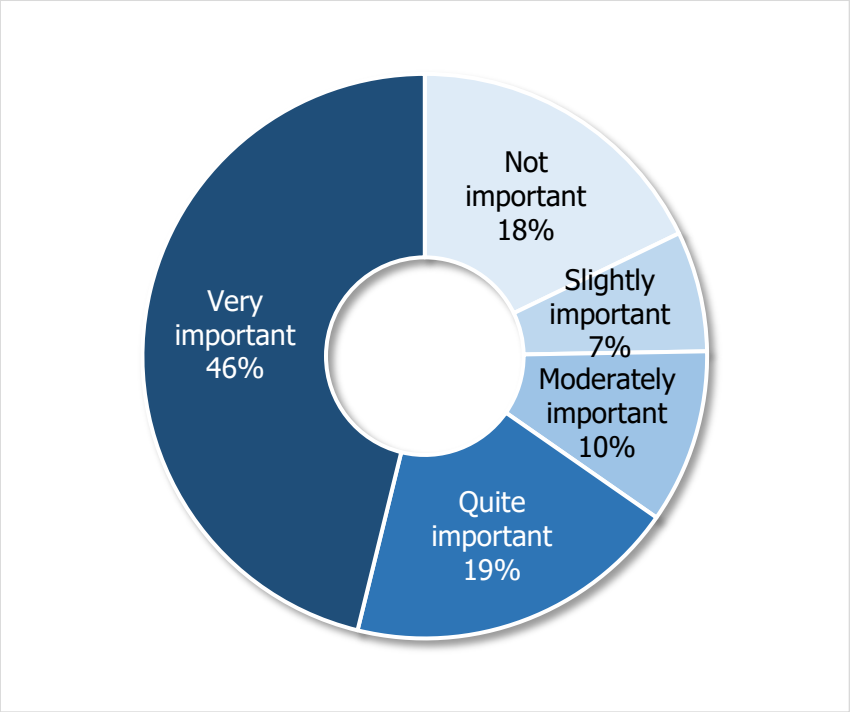

Figure 44: Long shelf Life Food Products Significance

By comparison, respondents from Cyprus give more importance to food products with a longer shelf life for environmental protection (3.80) than participants from Greece (3.19) and participants from other EU countries and the UK (3.51).

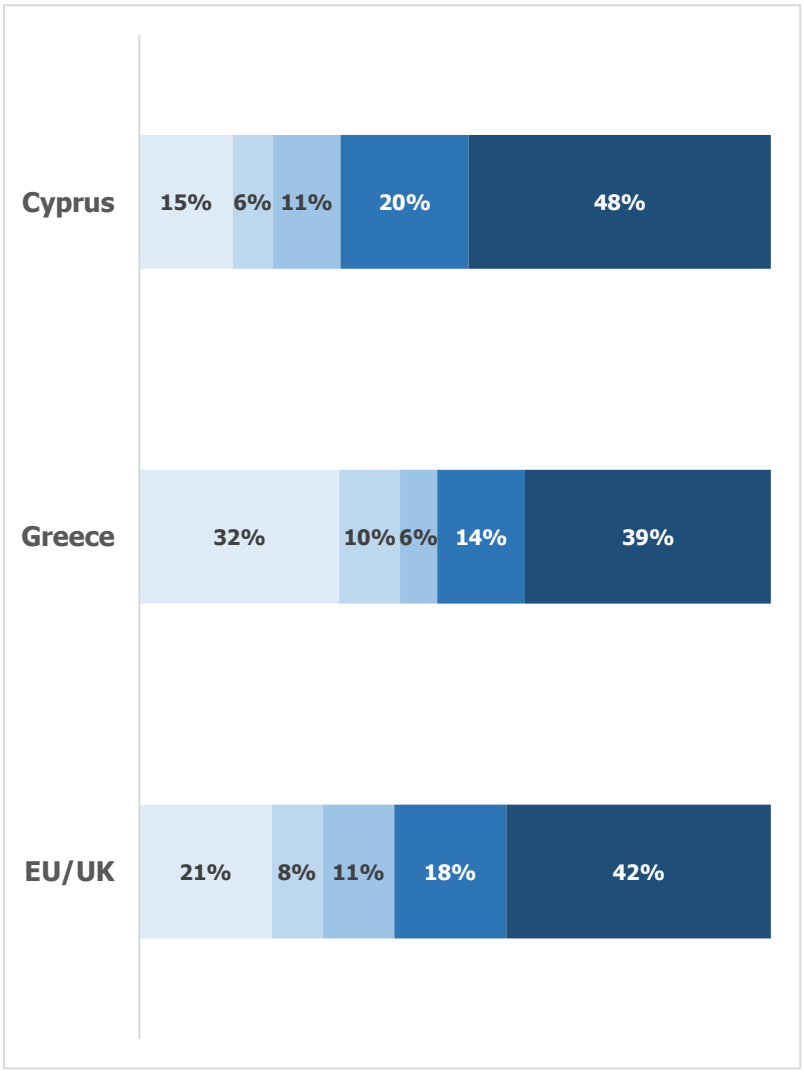

Figure 45: Differences for Long shelf Life Food Products Significance per participants' origin

Importance of surplus food consumption

Nearly six out of ten participants agree that consuming leftover food and using it to prepare other foods is a very important action to protect the environment (57%), while an additional 22% consider this action to be quite important.

One fifth of the participants do not consider the subsequent consumption / use of food waste as a particularly important action to protect the environment.

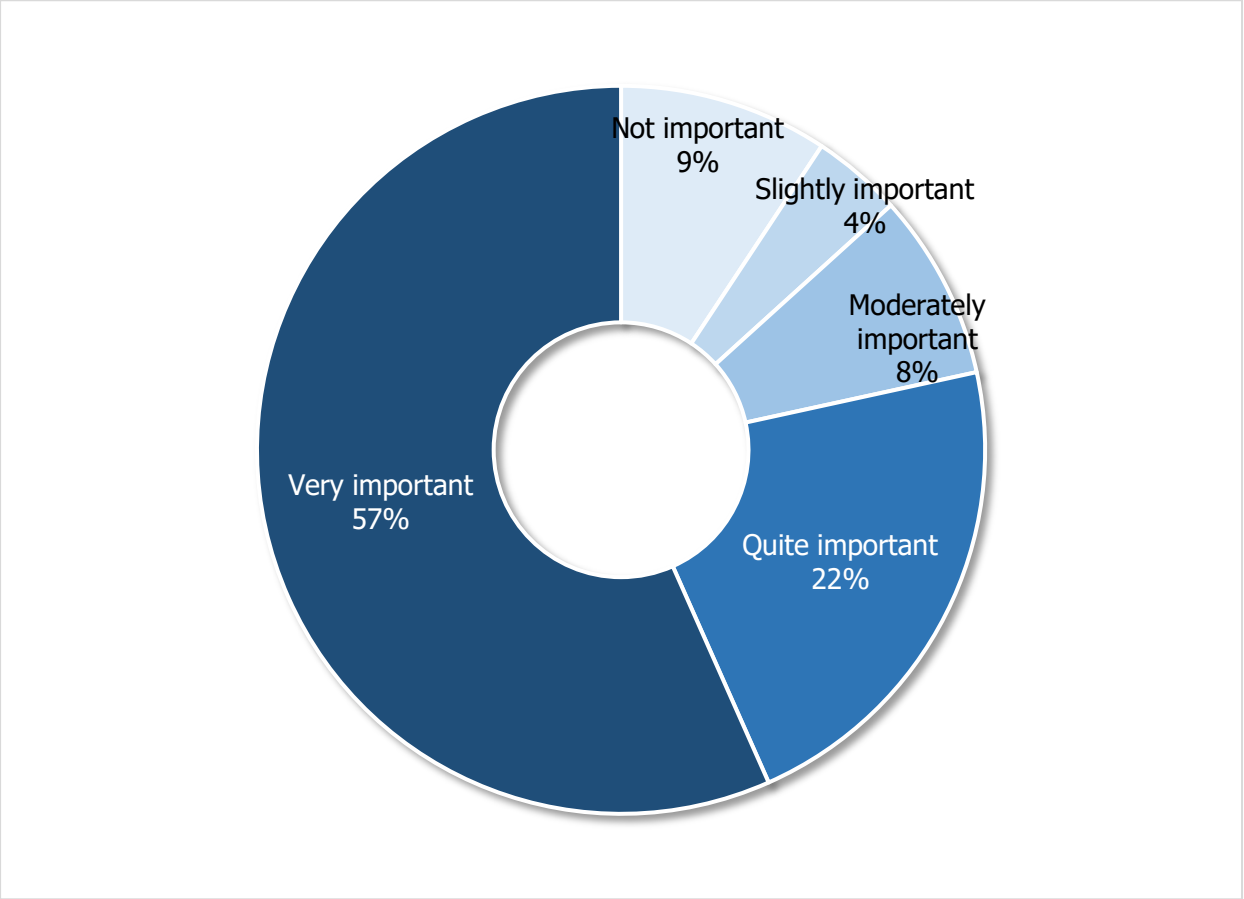

Figure 46: Importance of surplus food consumption

In comparison, the participants from Cyprus consider the subsequent consumption of surplus food and its use in the preparation of other foods as more important (4.21) than the participants from Greece (3.54) and less important than participants from other EU and UK countries (4.38).

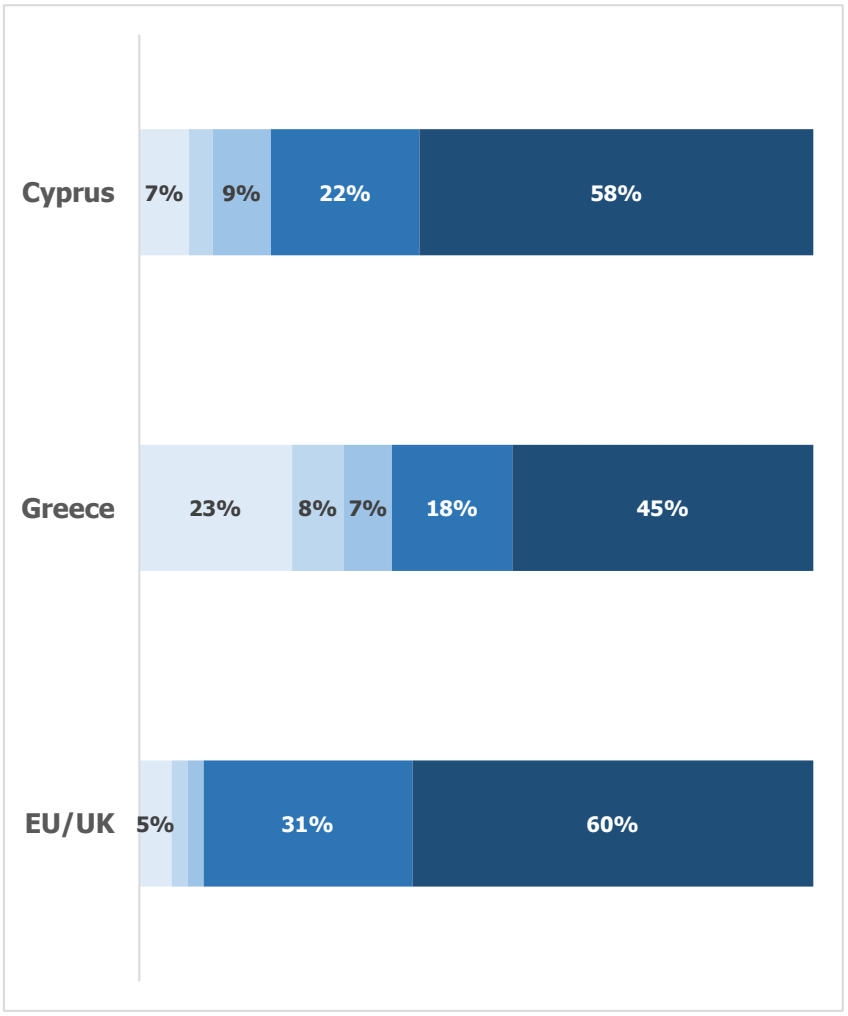

Figure 47: Differences in the Importance of surplus food consumption per participants' origin

Importance of composting

Four out of ten participants in the online poll, agree that composting is a very important tool in environmental protection (42%) and an additional 23% consider it quite important.

However, more than one third of the participants do not consider composting to be particularly important in protecting the environment (35%).

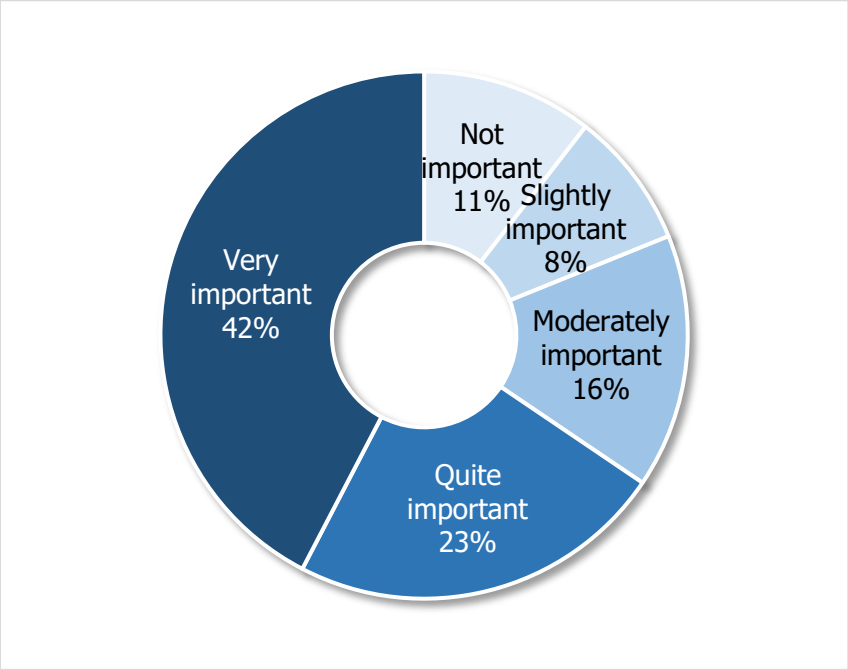

Figure 48: Importance of Composting for the protection of the Environment

In comparison, respondents from Cyprus place more importance on composting as an action for the protection of the environment (3.80) than participants from Greece (3.58), but less than participants from other EU countries and the UK (4.15).

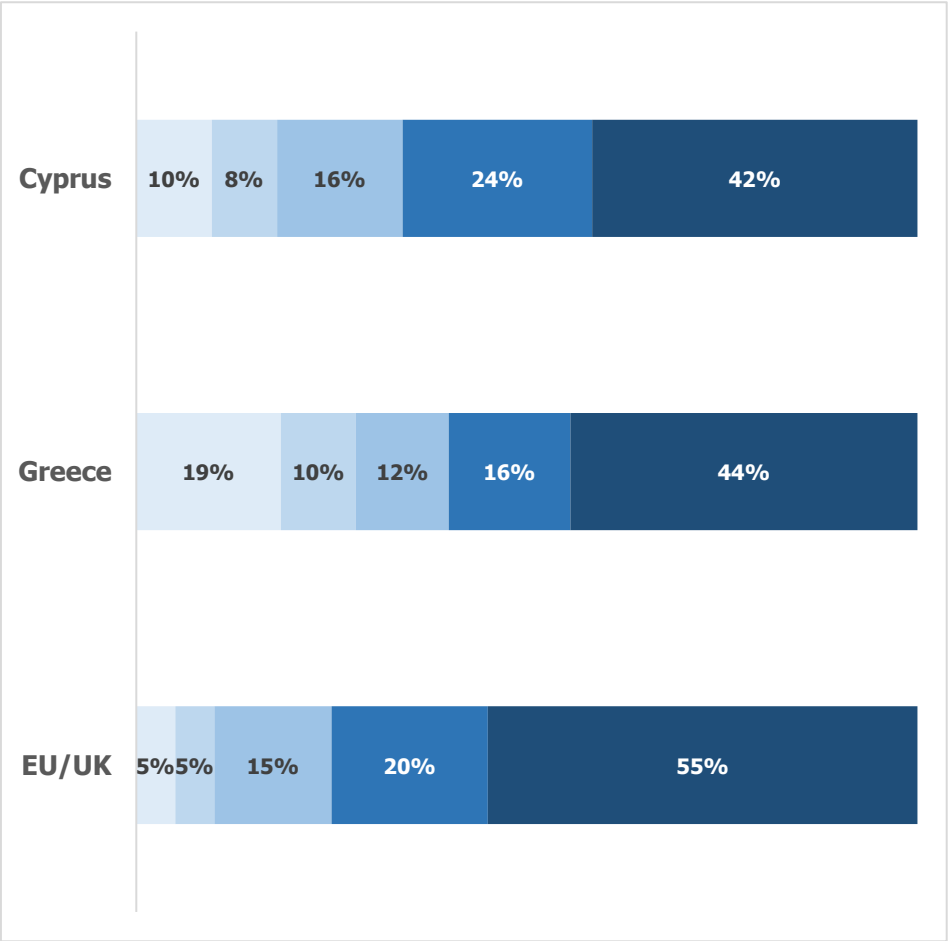

Figure 49: Importance of Composting for the protection of the Environment per participants' origin

:

Taking food leftover from outings

Almost four out of ten participants in the online poll agree that taking food leftover from outings is a very important action for the protection of the environment (38%), while 25% consider it a quite important action.

The percentage that does not consider it particularly important for the protection of the environment amounts to 38%.

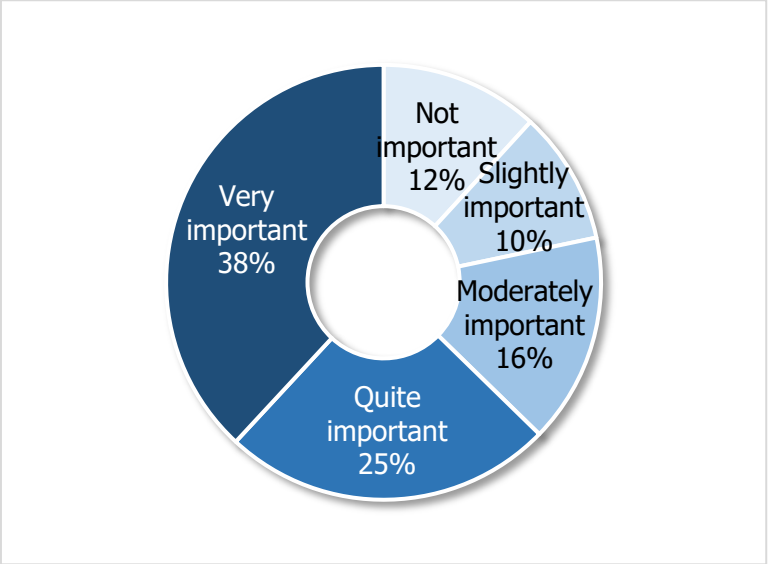

Figure 50: Importance of taking leftover from outings

In comparison, the people who participated in the survey from Cyprus attach more importance to getting a package of food leftover after eating out (3.70) than the participants from Greece (3.34), but less than participants from other EU countries and the UK (4.08).

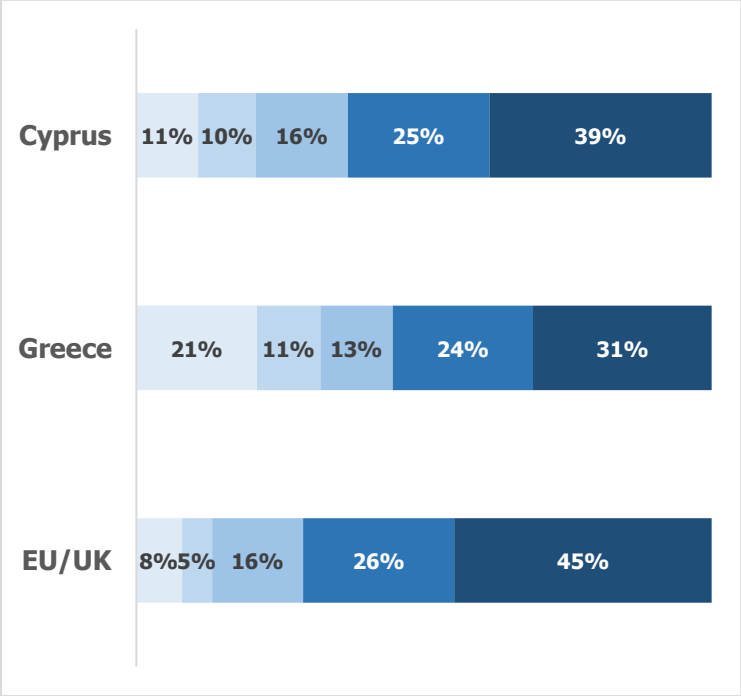

Figure 51: Differences in the Importance of taking leftover from outings per participants' origin

Taking food leftover from outings (opinions Vs actions)

The next question was aimed to measuring deviations between claims of importance of taking food leftover from outings and the real behaviors. In the whole sample, only 25% always take food leftovers from outings, 25% do it quite often, 20% do it sometimes and 30% do it rarely or never.

The habit of taking food leftover from outings, is more common among those living in other EU countries and the United Kingdom than among those participated from Cyprus or Greece.

Among the participants from Cyprus, 18% consider it very important to take food that is left over after eating out but does not always do so. Among participants from Greece it amounts to 16% and among participants from other EU countries and the UK it amounts to 14%.

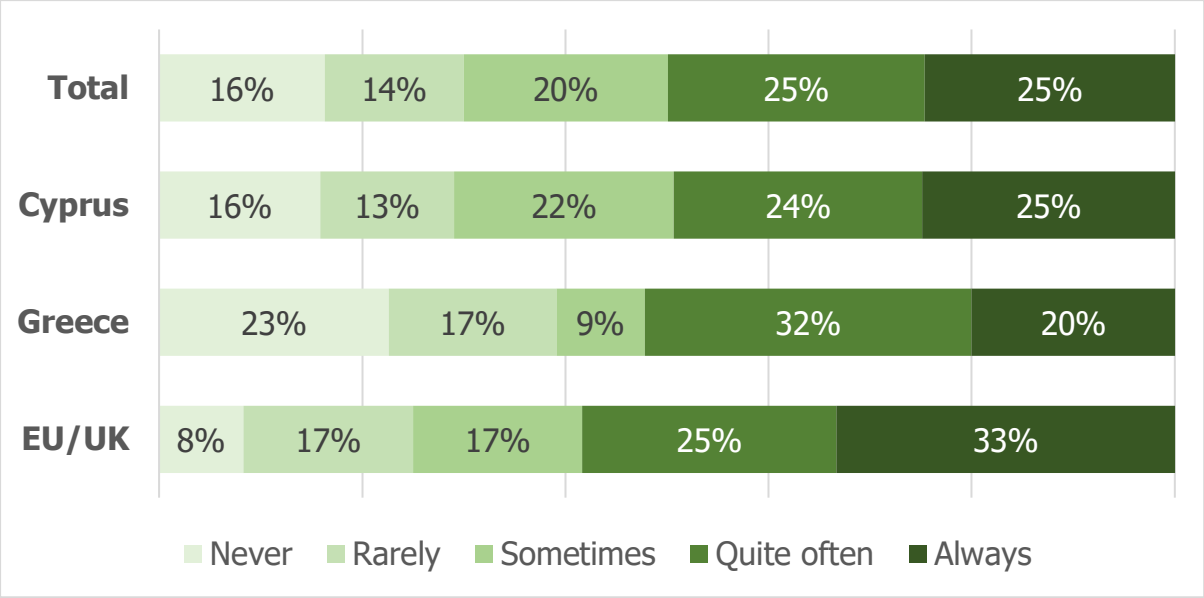

Figure 52: Taking Food Leftover from outings

Summarized Online Polls Results

Among the participants in the online poll we observe the following:

65% agree that buying food with a longer shelf life is a very / quite important action for the protection of the environment (35% find it of limited importance).

79% agree that the subsequent consumption of leftover food and its use for the preparation of other foods is very / quite important energy for the protection of the environment (21% find it of limited importance).

65% agree that composting is a very / quite important tool in the protection of the environment (35% find it of limited importance).

63% agree that taking food left over from outings is a very important action to protect the environment (37% find it of limited importance).

5.3 Overall Research Conclusions

As can be seen from the surveys, both from the questionnaires and from the online polls**, the vast majority of Cypriot consumers buy more than the necessary quantities of food on a regular basis**. This is done mainly for two reasons, to satisfy the different preferences of family members, and to maintain a sense of security and adequacy.

Even more **the percentage that indicates that during every meal, there are leftovers is high**. In most cases they are consumed in the next few days, or given for pet food, but there are **many cases in which the extra food is simply thrown away**. This is the second challenge beyond the excessive food purchases. **The poor management of food stocks results in about one in four cases, to surplus food simply ending up in the trash.**

The **food types that are wasted the most are fruits and vegetables**. However, while meat and other products are classified lower in terms of quantities wasted, they are more harmful for the environment.

The main reason for wasting food by consumers, is because they **do not consume it before the expiration date**, which means **poor planning of stocks**. This, couples with the excessive purchase of food, also shows **limited knowledge of food storage and preservation techniques and poor refrigeration and food management practices**.

Another point that deserves attention is that the **greatest contributors to food waste** are the **youngest people, the upper social classes, the people who shop more often and the people who more often order ready-made food**.

The results of the research highlight also some **contradictions between the answers**. While most consumers state that **they buy more and as a result throw more food away**, they also claim that they **carefully prepare a list before going for shopping, they pay special attention to the storage of food, they plan carefully what to cook and consume leftovers at a later stage**. So, they consider that they buy and cook only the necessary quantities and manage their food stocks in the best way. However, if good planning of food purchasing and good food waste management was in place (as claimed) they shouldn't buy more than needed and they shouldn't throw too much food away. Obviously, there are **positive intentions to better manage food, but this is not reflected in the actual behaviours of the consumers**.

It is also remarkable that **consumers do not consider the wasting of food as a serious environmental problem**. Instead, they feel **guilty when they waste food** (possibly because they throw food away while others do not have the necessary food) and also that they **waste their money**. So **financial concerns and charity feelings prevail** when food is wasted and **much less the environmental concerns**. Apparently, this is an outcome of the attention given so far to other types of waste (even in the EU), like plastic, packaging, weee, hazardous etc, creating an illusion that food waste is not a problem for the environment. The fact that this is organic waste that biodegrades in the environment to create compost, makes people believe that this being a natural process, is not harmful to the environment. This prevailing public opinion is **a result of misinformation on the greenhouse gas emissions associated with the composting of organic waste**.

5.4 Tackling Food Waste

There are several outcomes of the research performed that provide grounds for the design of an effective communication campaign for the public to tackle the food waste issue. At the same time, the total quantities of food wasted and the contribution of the business and commercial sector to this waste are significant, which makes the interventions of this project in the business and commercial sector promising in the effort to tackle the problem of food waste. Taking into account that we speak for an economy that in normal time accepts 4 million tourists every year which stay and consume for a few days each on the island, it is easy to appreciate the importance of changes in the food processing and management in this important sector.

From the research, some issues are more striking and will be used to design an effective campaign for the public, the main of which are:

- People are wasting almost a third of the food they buy
- They buy more than needed and they though much of that away (they do not manage it)
- The younger people waste more than older people
- More effluent consumers waste more
- Consumers buy more mostly for security reasons (to feel safe)
- They do not consume at the same rate they buy (over-consumerism)
- Consumers are having difficulties to manage their food (freezing, storing etc.) and consequently they throw more food away
- More than 70% of people throw their food waste in the trash and less than 10% compost it
- There is a fallacy that people plan their purchases and manage their food properly, but real behaviours do not support that
- There are good intentions to manage the food, but little action to do so
- Consumers do not consider food waste a serious environmental problem
- Consumers feel guilty when they waste food (possibly because they throw food away while others do not have the necessary food) and also that they waste their money (financial and charity feelings prevail)
- There is poor utilisation of food expiration labelling
- There is poor knowledge or limited attention to methods to prevent food waste
- Consumers are not used to share their food left-overs and instead they throw them in trash

Annex 1

Details of the sample for Survey 1 (Main Quantitative research, Oct. 2020)

		No.	%
Age	18-24	59	11%
	25-34	131	24%
	35-44	111	20%
	45-54	103	19%
	55-64	98	18%
	65+	52	9%
Gender	Male	269	49%
	Female	285	51%
Social Class	A-B	25	5%
	C1	169	31%
	C2	239	43%
	D-E	121	22%
Education	Up to secondary education	149	27%
	Tertiary (degree graduate)	269	49%
	Tertiary (postgraduate)	136	25%
Province	Nicosia	213	38%
	Limassol	170	31%
	Larnaca	88	16%
	Famagusta	32	6%
	Pafos	51	9%
Area	Urban	421	76%
	Rural	133	24%
	Total	554	100%

Questionnaire for Survey 1

Στοιχεία επαφής:

Ώρα έναρξης		Ώρα λήξης		Διάρκεια	
Ημερομηνία		Μέρα	Δευ.	Τρ.	Τετ.	Πεμ.	Παρ.	Σαβ.	Κυρ.
			1	2	3	4	5	6	7

ΕΙΣΑΓΩΓΗ:
Καλημέρα / καλησπέρα. Αυτή την περίοδο κάνουμε μια έρευνα κοινής γνώμης για διάφορα θέματα που αφορούν τις συνήθειες αγοράς και χρήσης φαγητού στο σπίτι. Θα θέλαμε να συζητήσουμε για λίγο μαζί σας για να ακούσουμε και τις δικές σας απόψεις. Η επιλογή σας στο δείγμα έγινε εντελώς τυχαία και οι απαντήσεις σας θα παραμείνουν απολύτως εμπιστευτικές. Δεν θα πάρουμε πάνω από 10 λεπτά από τον χρόνο σας.

Φ1. Ξεκινώντας, θα ήθελα να σας ρωτήσω κατά πόσο συμμετέχετε στην αγορά τροφίμων (ψώνια) για το νοικοκυριό σας;

Ναι, Αποκλειστικά	1
Μοιράζομαι την ευθύνη με άλλο μέλος του νοικοκυριού	2
Δεν ασχολούμαι καθόλου	3

Φ2. Συμμετέχετε στην ετοιμασία του φαγητού στο νοικοκυριό σας

Ναι, Αποκλειστικά	1	
Μοιράζομαι την ευθύνη με άλλο μέλος του νοικοκυριού	2	
Δεν ασχολούμαι καθόλου	3	**ΕΑΝ Φ1=3 ΚΑΙ Φ2=3 ΤΕΡΜΑΤΙΣΤΕ ΣΥΝΕΝΤΕΥΞΗ**

ΚΥΡΙΟ ΕΡΩΤΗΜΑΤΟΛΟΓΙΟ:

1. Πόσες φορές περίπου τη βδομάδα αγοράζετε τρόφιμα, φρούτα και λαχανικά στο νοικοκυριό σας;

Καθημερινά	1
4-5 φορές τη βδομάδα	2
2-3 φορές τη βδομάδα	3
1 φορά τη βδομάδα	4
Πιο αραιά	5

2. Πόσο συχνά εσείς ή κάποιο άλλο μέλος του νοικοκυριού σας μαγειρεύετε στο σπίτι για την οικογένεια σας;

Καθημερινά	1
4-5 φορές τη βδομάδα	2
2-3 φορές τη βδομάδα	3
1 φορά τη βδομάδα	4
Πιο αραιά	5

3. Πόσο συχνά αγοράζετε έτοιμο φαγητό για να το καταναλώσετε στο σπίτι;

Καθημερινά	1
4-5 φορές τη βδομάδα	2
2-3 φορές τη βδομάδα	3
1 φορά τη βδομάδα	4
2-3 φορές το μήνα	5
1 φορά το μήνα	6
Πιο αραιά	7

4. Όταν μαγειρεύετε στο σπίτι ή αγοράζετε έτοιμο φαγητό, μένουν υπολείμματα φαγητού;

Ναι τις περισσότερες φορές	1
Ναι, κάποιες φορές	2
Σχεδόν ποτέ	3

5. Πόσο συχνά κάνετε τα πιο κάτω σε σχέση με φαγητό που περισσεύει:
ΜΙΑ ΑΠΑΝΤΗΣΗ ΓΙΑ ΚΑΘΕ ΔΗΛΩΣΗ
RANDOMISE STATEMENTS.

	Σχεδόν πάντοτε	Αρκετά συχνά	Κάποιες φορές	Σχεδόν ποτέ
1. Το καταναλώνετε τις επόμενες μέρες	4	3	2	1
2. Το φυλάτε στην κατάψυξη για μελλοντική κατανάλωση	4	3	2	1
3. Το χρησιμοποιείτε για ετοιμασία άλλων φαγητών	4	3	2	1
4. Το δίδετε σε άλλα άτομα (φίλους, συγγενείς, ιδρύματα)	4	3	2	1
5. Το δίνετε για τροφή για κατοικίδια ζώα	4	3	2	1
6. Το πετάτε στα σκουπίδια	4	3	2	1
7. Το κομποστοποιείτε	4	3	2	1
8. Το δίδετε για τροφή σε ζώα εκτροφής (κότες, πάπιες, κουνέλια (κτλ)	4	3	2	1

ΌΣΟΙ ΑΠΑΝΤΗΣΑΝ ΣΤΗΝ ΕΡ.5.6 (3 ,4, 2)

6. Για ποιους λόγους πετάτε συνήθως το φαγητό που περισσεύει;
   ΣΗΜΕΙΩΣΤΕ ΟΣΑ ΙΣΧΥΟΥΝ.
   RANDOMISE STATEMENTS.

Δεν είναι εύγεστο	1
Μειώνεται η θρεπτική αξία του φαγητού	2
Δεν αρέσει στα μέλη της οικογένειας	3
Ανησυχίες ότι μπορεί να χαλάσει/δεν είναι ασφαλές για κατανάλωση	4
Η οικογένεια επιθυμεί πάντοτε φρέσκο φαγητό	5
Από συνήθεια	6
Επειδή έτσι κάνουν όλοι	7
Επειδή μπορώ (δεν μου κοστίζει κάτι)	8
Περιορισμένος αποθηκευτικός χώρος	

7. Για κάθε μια από τις ακόλουθες κατηγορίες τροφίμων, θα ήθελα να υποδείξετε πόσο συχνά τυχαίνει να έχετε είδη τα οποία πετάτε στα σκουπίδια;
   RANDOMISE STATEMENTS.

	Καθημερινά	4-5 φορές τη βδομάδα	2-3 φορές τη βδομάδα	1 φορά τη βδομάδα	Πιο αραιά
1. Φρούτα	5	4	3	2	1
2. Λαχανικά	5	4	3	2	1
3. Κρεατικά	5	4	3	2	1
4. Ψαρικά	5	4	3	2	1
5. Γαλακτοκομικά	5	4	3	2	1
6. Ζυμαρικά/αρτοσκευάσματα	5	4	3	2	1
7. Γλυκά	5	4	3	2	1

8. Ποιοι είναι οι πιο συχνοί λόγοι που αλλοιώνονται τα τρόφιμα, φρούτα και λαχανικά στο σπίτι σας;
   ΣΗΜΕΙΩΣΤΕ ΟΣΑ ΙΣΧΥΟΥΝ.
   RANDOMISE STATEMENTS.

Αγοράζουμε περισσότερα από ότι υπάρχει ανάγκη	1
Δεν τα καταναλώνουμε με την ταχύτητα που αναμένεται	2
Συνθήκες αποθήκευσης/φύλαξης τους	3
Ξεχνούμε να τα καταναλώσουμε	4
Είναι κατώτερης ποιότητας (π.χ. Β ή Γ), για οικονομικούς λόγους ή προσφοράς	5

9. Τι κάνετε με τα τρόφιμα, φρούτα και λαχανικά που κρίνετε ότι δεν είναι κατάλληλα για κατανάλωση;
   ΣΗΜΕΙΩΣΤΕ ΟΣΑ ΙΣΧΥΟΥΝ.

Τα πετάμε	1
Τα κομποστοποιούμε	2
Τα δίνουμε για κατανάλωση σε κατοικίδια ζώα	3

10. Σε μία τυπική/ συνηθισμένη εβδομάδα, εάν όλα τα τρόφιμα, φρούτα και λαχανικά που αγοράσατε αντιστοιχούν με 10 μονάδες, πόσα από αυτά πετάξατε στα σκουπίδια;
    USE SLIDING SCALE FROM 0 TO 10.

11. Από τους ακόλουθους, ποιοι είναι οι 3 κυριότεροι λόγοι που πετάτε στα σκουπίδια τρόφιμα, φρούτα και λαχανικά στο νοικοκυριό σας;
ΣΗΜΕΙΩΣΤΕ ΜΕΧΡΙ 3 ΛΟΓΟΥΣ.
RANDOMISE STATEMENTS. ITEM 1 ALWAYS 1st AND CANNOT BE CODED WITH OTHER ITEMS

Δεν πετάμε φαγητά και τρόφιμα **(EXCLUSIVE ITEM)**	1
Κάποια μέλη του νοικοκυριού δεν καταναλώνουν όλο το φαγητό τους	2
Το φαγητό που περισσεύει και φυλάγεται δεν είναι εύγεστο μετά	3
Το φαγητό που περισσεύει και φυλάγεται χάνει από τη θρεπτική του αξία	4
Το φαγητό που περισσεύει και φυλάγεται χαλά και δεν είναι ασφαλές για κατανάλωση	5
Η οικογένεια επιθυμεί πάντα φρέσκα τρόφιμα, φρούτα, λαχανικά	6
Ετοιμάζεται περισσότερο φαγητό από ότι υπάρχει ανάγκη για κατανάλωση	7
Αγοράζονται περισσότερα από τις πραγματικές ανάγκες του νοικοκυριού	8
Περνά η ημερομηνία λήξης/κατανάλωσης	9
Τρόφιμα, φρούτα και λαχανικά δεν αποθηκεύονται ορθά και αλλοιώνονται	10

12. Εδώ είναι κάποιες ενέργειες σχετικά με την αγορά και κατανάλωση τροφίμων. Ποιες από αυτές κάνετε εσείς στο νοικοκυριό σας;
ΜΙΑ ΑΠΑΝΤΗΣΗ ΓΙΑ ΚΑΘΕ ΔΗΛΩΣΗ
RANDOMISE STATEMENTS.

	Ναι	Όχι
Ελέγχουμε τι έχουμε στο ψυγείο πριν αγοράσουμε κάτι	1	2
Κάνουμε λίστα για το τι χρειαζόμαστε πριν πάμε για αγορές	1	2
Προγραμματίζουμε τι θα μαγειρέψουμε	1	2
Αγοράζουμε μόνο ότι χρειαζόμαστε	1	2
Ελέγχουμε την ημερομηνία λήξης/κατανάλωσης	1	2
Προσέχουμε για το πως διατηρούμε/αποθηκεύουμε το φαγητό/τρόφιμα στο ψυγείο	1	2
Μαγειρεύουμε την ποσότητα που χρειαζόμαστε	1	2
Χρησιμοποιούμε τα υπολείμματα φαγητού για ετοιμασία άλλων φαγητών	1	2
Καταναλώνουμε το φαγητό που περισσεύει τις αμέσως επόμενες ημέρες	1	2
Όταν έχουμε φρέσκα πετούμε τα παλιά	1	2
Μας αρέσει να διατηρούμε αρκετά αποθέματα στο σπίτι	1	2
Παίρνουμε μαζί μας το φαγητό που περισσεύει από εξόδους σε εστιατόρια	1	2

13. Για ποιους λόγους αγοράζετε περισσότερες από τις απαραίτητες ποσότητες τροφίμων και φαγητού;
ΣΗΜΕΙΩΣΤΕ ΟΣΑ ΙΣΧΥΟΥΝ.
RANDOMISE STATEMENTS. ITEM 1 ALWAYS 1st AND CANNOT BE CODED WITH OTHER ITEMS

Δεν αγοράζω περισσότερες από τις απαραίτητες ποσότητες **(EXCLUSIVE ITEM**	1
Νοιώθω ασφάλεια όταν υπάρχει πολύ φαγητό/τρόφιμα στο σπίτι	2
Θέλω να τηρώ αποθέματα σε περίπτωση που τύχει κάτι	3
Θέλω πάντα να είμαι προετοιμασμένος/η για επισκέπτες στο σπίτι	4
Δεν μπορώ να υπολογίσω τις ποσότητες που θα χρειαστώ	5
Δεν τρώνε όλα τα μέλη της οικογένειας το ίδιο φαγητό	6
Νοιώθω 'φτωχός' εάν δεν υπάρχει πολύ φαγητό σπίτι	7

14. Όταν απορρίπτετε στα σκουπίδια φαγητά και τρόφιμα αισθάνεστε:

Αδιαφορία/τίποτα	1
Ότι σπατάλησα άδικα τα χρήματα μου	2
Ότι κάνω ζημιά στο περιβάλλον	3

15. Εδώ είναι κάποιες κατηγορίες αποβλήτων. Θα θέλαμε την άποψη σας κατά πόσο η κάθε μια είναι απόβλητο φαγητού (food waste) ή άλλου είδους απόβλητο.
ΜΙΑ ΑΠΑΝΤΗΣΗ ΓΙΑ ΚΑΘΕ ΔΗΛΩΣΗ
RANDOMISE STATEMENTS.

	Απόβλητο φαγητού	Άλλου είδους απόβλητο
Μαγειρεμένο φαγητό που περισσεύει	1	2
Φλούδες από καθάρισμα λαχανικών και φρούτων	1	2
Χαλασμένα φρούτα και λαχανικά	1	2
Ληγμένα αλλαντικά και τυριά	1	2

ΔΗΜΟΓΡΑΦΙΚΑ:

S1. Φύλο

Άντρας	1
Γυναίκα	2

S2. Ποια χρονολογία γεννηθήκατε; ..... Χρονολογία

S3. Επαρχία

Λευκωσία	1
Λεμεσός	2
Λάρνακα	3
Αμμόχωστος	4
Πάφος	5

S4. Περιοχή

Αστική	1
Αγροτική	2

S5. Υψηλότερο επίπεδο μόρφωσης που ολοκληρώσατε

Πρωτοβάθμια	1
Δευτεροβάθμια / τεχνική σχολή	2
Τριτοβάθμια (πτυχίο)	3
Τριτοβάθμια (μεταπτυχιακό)	4

S6. Ποια από τις ακόλουθες δηλώσεις περιγράφει καλύτερα την οικονομική κατάσταση του νοικοκυριού σας;

Άνετη ζωή, υπάρχουν πάντα χρήματα για απρογραμμάτιστες αγορές / έξοδα και ψυχαγωγία	1
Διατηρούμε ένα καλό βιοτικό επίπεδο, δεν στερούμαστε τίποτα	2
Σταθερό εισόδημα, αλλά με κάποιους περιορισμούς στα έξοδα	3
Κάποιοι περιορισμοί στο εισόδημα / οικονομικά, οι οποίοι έχουν επιβάλει κάποιες περικοπές	4
Πολύ δύσκολη οικονομική κατάσταση, είναι δύσκολο να τα βγάλουμε πέρα	5

S7. Σύνθεση νοικοκυριού

Ένα άτομο	1
Ζευγάρι χωρίς παιδιά	2
Ζευγάρι με παιδιά	3
Συγκατοίκηση με ενήλικες, μη-συγγενείς	4

IF S7=3 OR 4

S8. Αριθμός μελών στο νοικοκυριό:

Αριθμός ανήλικων στο νοικοκυριό	
Αριθμός ενήλικων στο νοικοκυριό	

S9. Είδος οικίας

Σπίτι	1
Διαμέρισμα	2
Φοιτητική εστία	3

S10. Στην κατοικία σας διαθέτετε:

	Ναι	Όχι
Ψυγείο	1	2
Καταψύκτη	1	2
Κάδο κομποστοποίησης	1	2
Κάδους ανακύκλωσης	1	2

Annex 2

Questionnaire for Survey 1 (Quantitative Online Poll via the Dias Media Group websites)

1. Συγκριτικά με άλλες ενέργειες που μπορείτε να κάνετε για προστασία του περιβάλλοντος, πόσο σημαντική θεωρείτε την μείωση των απορριμμάτων φαγητού μέσω της αγοράς τροφίμων με μεγαλύτερη διάρκεια ζωής;

Πολύ σημαντική	1
Αρκετά σημαντική	2
Κάπως σημαντική	3
Όχι και τόσο σημαντική	4
Καθόλου σημαντική	5

2. Συγκριτικά με άλλες ενέργειες που μπορείτε να κάνετε για προστασία του περιβάλλοντος, πόσο σημαντική θεωρείτε την κατανάλωση μαγειρεμένου φαγητού που σας έχει μείνει είτε αργότερα ή την επόμενη μέρα, ή τη χρήση του για ετοιμασία άλλων φαγητών;

Πολύ σημαντική	1
Αρκετά σημαντική	2
Κάπως σημαντική	3
Όχι και τόσο σημαντική	4
Καθόλου σημαντική	5

3. Συγκριτικά με άλλες ενέργειες που μπορείτε να κάνετε για προστασία του περιβάλλοντος, πόσο σημαντική θεωρείτε την μείωση των απορριμμάτων φαγητού μέσω της κομποστοποίησης;

Πολύ σημαντική	1
Αρκετά σημαντική	2
Κάπως σημαντική	3
Όχι και τόσο σημαντική	4
Καθόλου σημαντική	5

4. Συγκριτικά με άλλες ενέργειες που μπορείτε να κάνετε για προστασία του περιβάλλοντος, πόσο σημαντική θεωρείτε την μείωση των απορριμμάτων φαγητού με το να παίρνετε μαζί σας στο σπίτι φαγητό που περισσεύει από εξόδους σας σε εστιατόρια και καφέ;

Πάντα	1
Αρκετά συχνά	2
Κάποτε	3
Σπάνια	4
Ποτέ	5

5. Κατά τις εξόδους σας σε εστιατόρια και καφέ, όταν περισσεύει φαγητό, πόσο συχνά το παίρνετε μαζί σας για κατανάλωση στο σπίτι;

Πάντα	1
Αρκετά συχνά	2
Κάποτε	3
Σπάνια	4
Ποτέ	5

6. References

1. Achinas, Spyridon & Achinas, Vasileios & Euverink, Gert-Jan. (2017). A Technological Overview of Biogas Production from Biowaste. 3. 299-307.10.1016/J.ENG.2017.03.002.
2. Araya, M. N., 2018, 'A review of effective waste management from an EU, national, and local perspective and its influence: the management of biowaste and anaerobic digestion of municipal solid waste', Journal of Environmental Protection 9(06), p. 652.
3. Azzurro, P., et al., 2016, Italy — country report on national food waste policy, Bologna (http://www. eu-fusions.org/phocadownload/country-report/ FUSIONS%20IT%20Country%20Report%2030.06.pdf) accessed 14 January 2020
4. Beretta, C. and Hellweg, S., 2019, 'Potential environmental benefits from food waste prevention in the food service sector', Resources, Conservation and Recycling 147, pp. 169-178 (DOI: 10.1016/j. resconrec.2019.03.023).
5. Bernstad, Anna & Andersson, T. (2014). Food waste minimization from a life-cycle perspective. Journal of environmental management. 147. 10.1016/j.jenvman.2014.07.048.
6. Bmlrt.gv.at. 2020. Zusätzlicher Pakt Mit Lebensmittelunternehmen, Bmlrt.Gv.At. [online] Available at: <https://www.bmlrt.gv.at/land/lebensmittel/kostbare_lebensmittel/Lebensmittel-sind-kostbar14.html> [Accessed 29 November 2020].
7. Buchholz, K., 2020. Infographic: 14 Percent Of Food Goes To Waste. [online] Statista Infographics. Available at: <https://www.statista.com/chart/19672/global-shares-of-different-agricultural-products-thrown-away/> [Accessed 28 November 2020].
8. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS – 11.12.19
9. EC, 2019a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — the European Green Deal (COM(2019) 640 final).
10. Ec.europa.eu. 2020. Directive 2008/98/EC on Waste (Waste Framework Directive) - Environment - European Commission. [online] Available at: <https://ec.europa.eu/environment/waste/framework/> [Accessed 28 November 2020].
11. Ec.europa.eu. 2020. File:Municipal Waste Landfilled, Incinerated, Recycled And Composted, EU-28, 1995-2017.Png - Statistics Explained. [online] Available at: <https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Municipal_waste_landfilled,_incinerated,_recycled_and_composted,_EU-28,_1995-2017.png> [Accessed 29 November 2020].
12. Ec.europa.eu. 2020. File:Municipal Waste Treatment, EU-27, 1995-2017 (Kg Per Capita).Png - Statistics Explained. [online] Available at: <https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Municipal_waste_treatment,_EU-27,_1995-2017_(kg_per_capita).png> [Accessed 29 November 2020].
13. Ec.europa.eu. 2020. Municipal Waste Statistics - Statistics Explained. [online] Available at: <https://ec.europa.eu/eurostat/statistics-explained/index.php/Municipal_waste_statistics> [Accessed 28 November 2020].
14. Ellenmacarthurfoundation.org. 2020. What Is The Circular Economy?. [online] Available at: <https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy> [Accessed 29 November 2020].

15. EU, 2008, Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312, 22.11.2008, pp. 3-30).
16. EU, 2009, Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009, pp. 16-62).
17. EU, 2018a, Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste (text with EEA relevance) (OJ L 150, 14.6.2018, pp. 100-108).
18. EU, 2018b, Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (OJ L 150, 14.6.2018, pp. 109-140).
19. Europarl.europa.eu. 2020. Food Waste: The Problem In The EU In Numbers [Infographic] | News | European Parliament. [online] Available at: <https://www.europarl.europa.eu/news/en/headlines/society/20170505STO73528/food-waste-the-problem-in-the-eu-in-numbers-infographic> [Accessed 29 November 2020].
20. European Commission - European Commission. 2020. Actions Being Taken By the EU. [online] Available at: <https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu_en> [Accessed 28 November 2020].
21. European Environment Agency, 2020. Bio-waste in Europe — turning challenges into opportunities. ISSN 1977-8449.
22. Farm to Fork Strategy – EU 29/7/20
23. Food and Agriculture Organization of the United Nations. 2020. Food and Agriculture Organization of the United Nations. [online] Available at: <http://www.fao.org/home/en/> [Accessed 28 November 2020].
24. Food Safety - European Commission. 2020. Farm To Fork Strategy – For A Fair, Healthy And Environmentally-Friendly Food System - Food Safety - European Commission. [online] Available at: <https://ec.europa.eu/food/farm2fork_en> [Accessed 29 November 2020].
25. https://www.biocycle.net/turning-biowaste-challenges-into-opportunities
26. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:640:FIN
27. https://ec.europa.eu/food/farm2fork
28. https://euromeatnews.com/Article-New-EU-Farm-to-Fork-Strategy/3881
29. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0381
30. Hebrok, Marie & Boks, Casper. (2017). Household food waste: Drivers and potential intervention points for design – An extensive review. Journal of Cleaner Production. 151. 10.1016/j.jclepro.2017.03.069
31. I.A.CO Ltd, 2016. ΠΑΡΟΧΗ ΥΠΗΡΕΣΙΩΝ ΓΙΑ ΤΗΝ ΕΚΠΟΝΗΣΗ ΜΕΛΕΤΗΣ ΓΙΑ ΤΟΝ ΠΟΣΟΤΙΚΟ ΚΑΙ ΤΟΝ ΠΟΙΟΤΙΚΟ ΠΡΟΣΔΙΟΡΙΣΜΟ ΤΩΝ ΑΠΟΡΡΙΜΜΑΤΩΝ ΠΕΡΙΟΧΩΝ ΔΙΑΦΟΡΕΤΙΚΟΥ ΤΥΠΟΥ ΣΕ ΔΗΜΟΥΣ/ΚΟΙΝΟΤΗΤΕΣ ΤΗΣ ΛΕΥΚΩΣΙΑΣ ΚΑΙ ΤΗΣ ΛΕΜΕΣΟΥ -ΤΠ 22/2015-.
32. Moa.gov.cy. 2020. ΤΜΗΜΑ ΠΕΡΙΒΑΛΛΟΝΤΟΣ - Στρατηγική Διαχείρισης Αποβλήτων. [online] Available at: <http://www.moa.gov.cy/moa/environment/environmentnew.nsf/page20_gr/page20_gr?OpenDocument> [Accessed 29 November 2020].
33. Philippidis, G., et al., 2019, 'Waste not, want not: a bio-economic impact assessment of household food waste reductions in the EU', Resources, Conservation and Recycling 146, pp. 514-522 (DOI: 10.1016/j. resconrec.2019.04.016).
34. Pubule, J., et al., 2015, 'Finding an optimal solution for biowaste management in the Baltic States', Journal of Cleaner Production 88, pp. 214-223.

35. Stenmarck, Å. and Jensen, C.,et.al, 2016. Estimates of European food waste levels. [online] Available at: <http://eufusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf> [Accessed 28 November 2020].
36. Thyberg, K. and Tonjes, D., 2016. Drivers of food waste and their implications for sustainable policy development. Resources, Conservation and Recycling, 106, pp.110-123.
37. Tostvin, C., et al., 2016, FUSIONS Food waste quantification manual to monitor food waste amounts and progression, Wageningen, Netherlands.
38. Wagner, P., 2020. Infographic: Households Waste More Food Than Estimated. [online] Statista Infographics. Available at: <https://www.statista.com/chart/15143/percieved-food-waste/> [Accessed 28 November 2020].
39. Wagner, P., 2020. Infographic: Households Waste More Food Than Estimated. [online] Statista Infographics. Available at: <https://www.statista.com/chart/15143/percieved-food-waste/> [Accessed 29 November 2020].
40. Xevgenos, Dimitris & Papadaskalopoulou, Christina & Panaretou, Vasiliki & Moustakas, Konstantinos & Malamis, Dimitris. (2015). Success Stories for Recycling of MSW at Municipal Level: A Review. Waste and Biomass Valorization. 6. 10.1007/s12649-015-9389-9.