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Assessment of food waste prevention actions

Development of an evaluation framework to assess the performance of food waste prevention actions

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Executive summary

The European Platform on Food Loss and Waste (FLW), established in 2016, aims to support all actors in defining measures needed to prevent food waste; sharing best practice; and evaluating progress made over time. This report presents a **framework for the evaluation of food waste prevention actions** and **its use in assessing the effectiveness and efficiency of such actions.** This exercise was developed jointly by the Directorate-General for Health and Food Safety and the Joint Research Centre of the European Commission in cooperation with the Platform's 'Action and Implementation' sub-group. Outcomes of the exercise will help inform the work of the Platform to develop recommendations for action for each stage of the food supply chain in order to prevent food waste.

A total of 91 actions were collected through a survey circulated to members of the EU Platform on FLW, submitted by different actors (NGOs, local authorities, companies, etc.). 8 additional actions collected through a review were included in the analysis. Overall, the prevention actions assessed covered a wide spectrum of action typologies, which were classified as follows:

- **Redistribution of food for human consumption**: actions aiming at redistributing surplus food fit for human consumption (32 actions),
- **Food valorisation**: actions in which surplus food is valorised in value added products such as animal feed (2 actions),
- **Consumer behaviour change**: actions promoting a behavioural shift amongst consumers to achieve a reduction in food waste generation (21 actions),
- **Improvement of the supply chain efficiency**: actions leading to an increase in the efficiency of the food supply chain, by acting either on the processes, the products, or the packaging to promote food waste reduction (21 actions), and
- **Food waste prevention governance:** crosscutting actions that encompass voluntary agreements, national food waste prevention programs, and regulatory frameworks (15 actions).

For the purpose of the evaluation framework the criteria presented in Table 1 were defined.

The objective of a prevention action should be defined by following the so-called 'SMART' (Specific, Measurable, Achievable, Relevant, Time-Bounded) approach and whenever possible, it should focus on the action's impact on food waste generation (i.e. that reflect a tangible change that has occurred following the intervention, such as achieving a 20% reduction in food waste generated in households).

A calculator was developed and tested as part of this exercise in order to enable practitioners to assess the net economic benefits and net environmental savings of food waste prevention actions. The environmental impacts and benefits deriving from the implementation of a food waste prevention action are calculated using the methodology of Life Cycle Assessment, which allows the evaluation of 16 different categories of impact[1] covering the entire food supply chain, from the agricultural stage up to the waste treatment. The economic benefits and environmental savings are assessed considering both the burden and benefits of the actions, namely (A) the cost or environmental impacts of the avoided food production, (B) the cost or environmental impacts of avoided food waste management, and (C) the cost or environmental impacts of the implementation of the action.

[1] climate change, ozone depletion, human toxicity – cancer, human toxicity – non-cancer, particulate matter, ionizing radiation – human health, photochemical ozone formation – human health, acidification, eutrophication – terrestrial, eutrophication – freshwater, eutrophication – marine, ecotoxicity – freshwater, land use, water use, resource use – minerals and metals, resource use - fossil.

Table 1. Criteria defined in the framework for the evaluation of food waste prevention actions.

Criterion	What is assessed?
Quality of the action design	To which extent the prevention action was well planned, including: i) the definition of the action aims and objectives, ii) the design of a strategy to achieve those objectives, iii) the definition of an implementation plan, and a monitoring system.
Effectiveness	To which degree the action was successful in producing the desired result, i.e. in reaching the objectives (which should ideally have a target associated) defined initially.
Efficiency	The capacity to reach a desired result with the least time/cost/effort. Indicators were defined to assess the efficiency of actions in terms of food waste prevented, economic benefits, environmental savings, social impacts, outreach and behaviour change.
Sustainability of the action over time	The potential of the action to be sustained over time, referring to the capability of maintaining the activity over time. Other sustainability aspects (such as environmental or social sustainability) are, instead, covered by the criterion efficiency
Transferability and scalability	To which extent transferability (possibility of being transferred or implemented in another context or place) and scalability (ability to be applied on a different scale, compared to the initial case, e.g. to be made larger) were considered during the design of the action and implemented.
Intersectorial cooperation	If the action was the result of a cooperation represented by a partnership between the private and the public sector and/or between different actors and stakeholders along the supply chain.

Key findings and conclusions

- The main gap observed among the actions collected, was the **absence of SMART objectives**, **baseline values**, **related Key Performance Indicators (KPIs)**, and a **monitoring system** to track progress made towards the stated goal(s). These elements are essential to assess the effectiveness and efficiency of the actions and to identify elements of success and obstacles, which can ultimately prove very useful in the development and implementation of future actions.

- The **evaluation of the actions** was **limited** due to information gaps. Where enough data were reported to allow evaluation of the action according to all/almost all the criteria, these initiatives were selected to be presented in **factsheets**. Figure 1 shows the stages of the food supply chain covered by the 42 selected actions presented in the factsheets. The selected actions cover all stages of the food supply chain. However, a lower number of actions were submitted relating to primary production and manufacturing stages.

- KPIs need to be tailored according to the type of action. In suggesting KPIs, the distinction between actions with a direct impact on food waste generation and those with a more indirect impact, for which measurement of food waste prevented was not possible, was taken into account. Table 2 presents a list of suggested KPIs that may be used to assess the effectiveness and efficiency of food waste prevention by action type.

Figure 1. Stages of the supply chain covered by the actions presented in the factsheets.

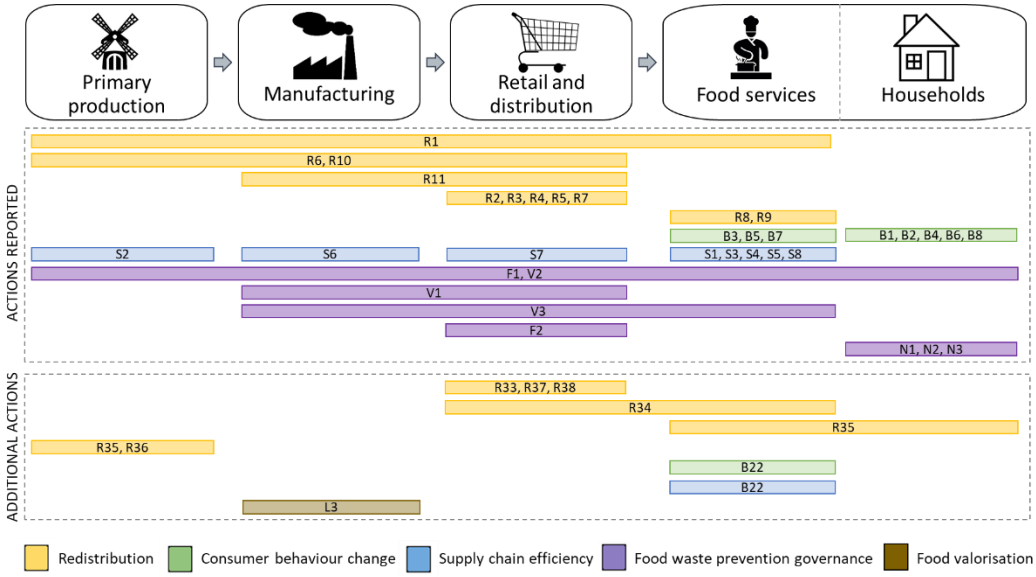


Table 2. Suggestion of KPIs for assessing the effectiveness and efficiency of food waste prevention action by type of action.

Type of action		KPI for effectiveness	KPI for efficiency*
Food redistribution		Total amount of food redistributed Number of food insecure individuals reached	Food waste: Total amount of food waste prevented Economic: Net economic benefits Environmental: Net environmental savings Social: Number of meals donated; Number of food insecure individuals reached; Number of people developing new skills Outreach: Number of people reached; Media coverage
Consumer behaviour	**A**	Households: per capita food waste generated in one year Food services: food waste generated per number of meals served	Food waste: Total amount of food waste prevented Economic: Net economic benefits Environmental: Net environmental savings
	B	% of people aware of the campaign % of people reporting a change in behaviour	Outreach: Total number of people aware of the campaign Behaviour change: Total number of people changing behaviour
Supply chain efficiency	**A**	Primary production/Manufacturing: food waste generated per kg produced Retail: food waste generated per kg sold Food services: food waste generated per meal served	Food waste: Total amount of food waste prevented Economic: Net economic benefits Environmental: Net environmental savings
	B	Number of businesses entering the program Number of businesses tracking FW Number of businesses reporting a FW reduction	Outreach: Total number of businesses entering the program; Total number of businesses tracking FW; Total number of businesses reporting a FW reduction
Food waste prevention governance		These actions are typically a combination of actions that fall under the types of action presented above so the KPIs should be selected accordingly	

*These indicators should be divided by the cost of the action implementation
A – Actions for which a measurement of food waste amount prevented is possible
B – Actions for which a measurement of food waste amount prevented is NOT possible

- To **evaluate the efficiency** of a food waste prevention action, it is **crucial to fully capture the total cost and benefits associated with the action's implementation**, which should reflect all resources used to implement the action and the multiple possible benefits.
- **Measurement** of the food waste amounts should be carried out prior to the intervention in order to establish a **baseline against which progress may be monitored. Comparison of food waste levels pre- and post- intervention is needed** to assess whether the action was effective in achieving its goal(s). Such measurement should be done following a **defined methodology** clearly stating what is the **definition of food waste used in the accounting exercise.**
- It is important to be aware of **socio-demographic** and other **contextual factors** that may **influence the results of the action.**

From the evaluation of the submitted actions, some **challenges** emerged in:

- **Comparing the performance of different types of action**. The diversity of action types requires the use of different KPIs and data, which in turn can make comparison very difficult.
- **Ensuring a comprehensive account of the burdens and benefits** associated with the action when **many different actors** are involved.
- Assessing the possible impact of a food waste reduction action in the absence of actual data on food waste levels and solely based on reported (rather than measured) **behavioural change**.
- Ensuring evidence-based **transfer of good practices**, given that similar actions reported very different outcomes.
- Performing an **objective assessment** of the actions reported, as the results provided were mostly self-reported by those implementing the action and not generated by an **independent assessment**.

Overall this report illustrates a number of different types of food waste prevention actions that may be successful in preventing food waste at different stages of the food supply chain. Nevertheless, the use of the evaluation framework developed to assess the effectiveness and efficiency of the actions submitted was limited due to the lack of data reported. This is directly linked to the lack of a monitoring system to systematically measure and monitor the actions' performance and impact. To ensure a robust evaluation of food waste prevention actions, actors responsible for their implementation should define a baseline and a target to achieve, and monitor the action's performance through time, using appropriate KPIs tailored to the intervention.

Abstract

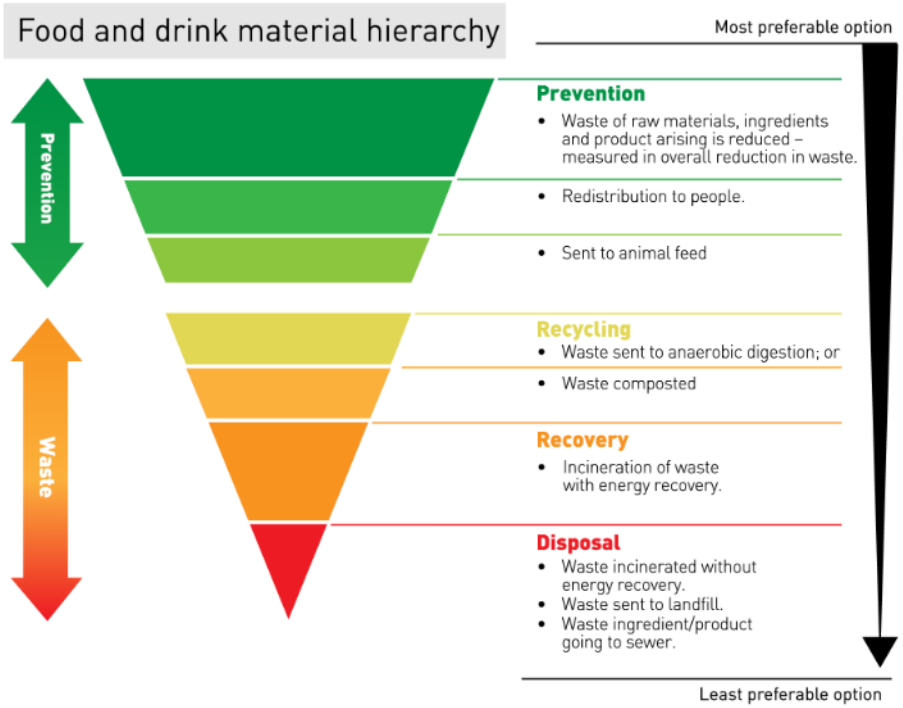
Food waste is considered a sustainability challenge, and its reduction is advocated by the Sustainable Development Goal 12.3. The development of food waste prevention actions is, hence, essential. To identify the most efficient and effective prevention actions, a systematic analysis is required. However, the evaluation of food waste prevention interventions is still at an early stage of development and appropriate methods to assess their effectiveness are missing. In this context, the European Commission carried out a pilot exercise of collection and evaluation of food waste prevention actions. This exercise was carried out jointly by the European Commission Joint Research Centre and the Directorate-General for Health and Food Safety (DG SANTE) as part of the activities of the European Platform on Food Loss and Waste (FLW) (sub-group on 'Action and Implementation'). This report presents the results of this exercise that involved (i) the collection of food waste prevention actions through a survey distributed to the members of the EU Platform on FLW; (ii) the development of a systematic framework to evaluate food waste prevention actions with selected criteria and indicators, including a calculator for assessing impacts on the basis of life cycle assessment; and (iii) the assessment of the actions reported according to the framework developed. A total of 91 actions have been submitted by different actors (NGOs, local authorities, companies, etc.) covering a wide spectrum of action typologies: 'Redistribution of food for human consumption', 'Food valorisation', 'Consumer behaviour change', 'Improvement of supply chain efficiency', and 'Food waste prevention governance'. Based on the assessment of the prevention actions reported, suggestions for data collection improvement and better action design are provided.

1 Introduction

Food waste (FW) has increasingly gained attention over the last years both at global and at European level. In 2015, more than 150 world leaders met in New York and adopted the 17 Sustainable Development Goals (SDGs) (UN, 2015). Specifically on food waste, under the SDG 12 – Responsible Consumption and Production, target 12.3 was set with the ambition to: 'by 2030 halve per capita global food waste at the retail and consumer levels, and reduce food losses along production and supply chains including post-harvest losses'. The European Commission (EC), besides committing to achieve the SDG 12.3 target, has identified FW as one of the priority areas of the European Circular Economy Action Plan (European Commission, 2015). To foster cooperation with stakeholders, in 2016 the EU Platform on Food Losses and Food Waste (FLW) was established with the overall mission of supporting the Commission, Member States (MSs), and all actors in the food supply chain (FSC) in achieving the SDG 12.3 target without compromising food safety, feed safety, and/or animal health. The Platform is coordinated by DG Sante and it is structured in four subgroups respectively dealing with 'Food Donation', 'Food Waste Measurement', 'Action and Implementation', and 'Date Marking'.

The amended Waste Framework Directive (2018/851/EC) (European Commission, 2018) obliges MSs to monitor the generation of food waste and to take measures to limit it, positioning food waste prevention at the top of the waste hierarchy, as illustrated in Figure 2. However, prevention 'actions' may be very different and research is necessary to identify their main features and the aspects that may bring benefits when the actions are implemented. To identify best practices in food waste prevention, one should first evaluate - in a systematic manner - existing 'actions' in order to assess their effectiveness and efficiency based on agreed key performance indicators (KPIs). Throughout this document the terms 'action' and 'intervention' are given the same meaning, and are defined as any activity designed to reduce the amounts of food waste generated at any point of the food supply chain.

Figure 2. Food waste hierarchy obtained from WRAP (2018).



The lack of a systematic evaluation of food waste prevention is pointed out by several authors that analysed existing food waste prevention initiatives (Reynolds et al., 2019;

Stöckli et al., 2018; Wunder et al., 2019). Reynolds et al. (2019) and Stöckli et al. (2018) reviewed food waste prevention actions targeting consumer food waste, assessing the amount of waste prevented by different types of action. The Champions 12.3 (an international coalition established to accelerate progress towards SDG target 12.3) calculated, based on historical data, the benefit-cost ratio of actions implemented at country, city, and company level, showing that there is a robust business case to reduce food waste (Hanson & Mitchell, 2017). They also analysed the business case for hotels (42 hotel sites located across 15 countries) (Clowes et al. 2018b), restaurants (114 restaurants sites located across 12 countries) (Clowes et al. 2019), and catering sites (86 catering sites located across 6 countries) (Clowes et al. 2018a), showing as well an economic benefit. ReFED (a collaboration of over 50 business, non-profit, foundation, and government leaders committed to reducing food waste in the United States) has identified 27 of the best opportunities to reduce food waste, including 12 prevention actions, 7 recovery solutions, and 8 recycling solutions (ReFED, 2016). The amount of economic benefit per ton of food waste avoided was calculated. Additional environmental (greenhouse gas (GHG) emissions reduction, water saved) and social (jobs created and meals recovered) indicators were determined. Although these studies can bring insight on the economic benefits of food waste prevention, there is currently lack of a framework to support the evaluation of prevention in a systematic manner.

To contribute to fill in this gap, the EC carried out a pilot exercise on the collection and evaluation of food waste prevention actions. To this end, an evaluation framework including criteria identified as relevant for a comprehensive assessment was defined. This exercise was developed under the activities of the sub-group on 'Action and Implementation' of the EU Platform on FLW that has been established to support members of the Platform in sharing best practices, information and learning related to food waste prevention initiatives and their results. In accordance with the Roadmap of the sub-group, key recommendations for action will be developed addressing all stages of the food supply chain: primary production; processing and manufacturing; retail and other distribution of food; hospitality and other food service sectors and households. Such recommendations will be determined by the sub-group based on the outcome of the pilot exercise and, more generally, the experience and learning garnered by its members in this field.

The pilot exercise was developed by the European Commission Joint Research Centre (EC-JRC) in four stages:

1) Development of a reporting template/survey for food waste prevention activities[2];

2) Collection of actions through the survey distributed to the members of the EU Platform on FLW;

3) Development of a framework to evaluate food waste prevention actions with selected criteria and indicators; and

4) Assessment of the actions reported according to the framework developed in 3.

This report presents the results of such exercise and it is divided in five sections, including this introduction (Section 1). Section 2 presents the evaluation framework developed and Section 3 presents the development of a calculator for assessing both the net economic benefits and net environmental impacts. Section 4 shows an overview of the actions collected and their evaluation, including identified data gaps and suggestions to improve the evaluation of food waste prevention actions; and Section 5, presents the conclusions of the exercise, highlighting relevant aspects to be taken into consideration in future assessment of food waste prevention initiatives.

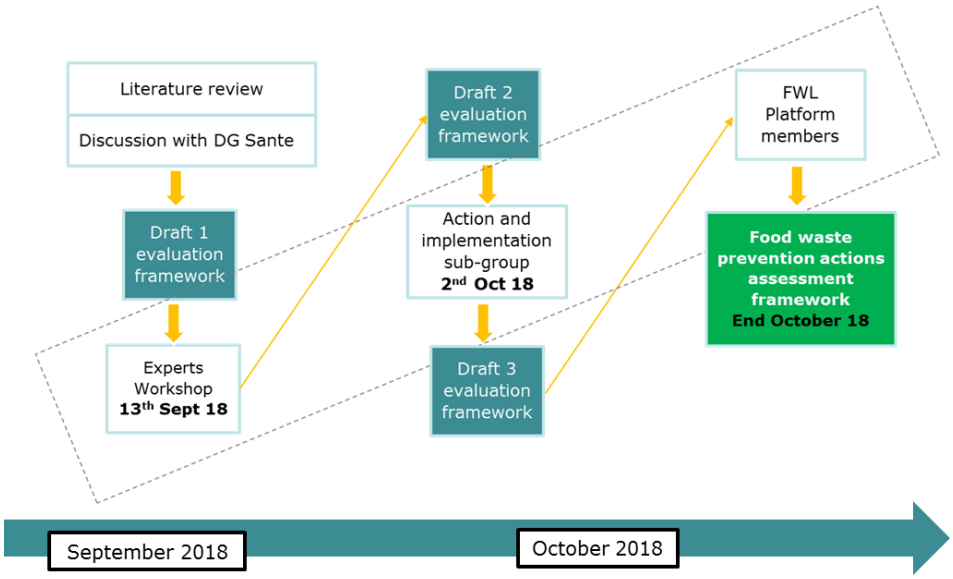
[2] Caldeira C., De Laurentiis, V., Sala S., 2018. Reporting template for food waste prevention activities. JRC technical report as interim deliverable of the Administrative Arrangement between European Commission DG Sante and Joint Research Centre 'Prevent Food Waste – Support to the European Platform on Food Losses and Food Waste' (contract n° 2018 SI2.776026) (the survey is presented in Annex 1).

2 Framework for the evaluation of food waste prevention actions

The evaluation of a prevention action involves the collection, analysis, and systematic interpretation of the action's implementation and its effects. It should reflect the extent to which the action was well planned, implemented, and had a real impact on the problem. Nevertheless, the research on food waste prevention evaluation is still in its infancy and there is great need for appropriate methods to evaluate food waste prevention interventions (Stöckli et al., 2018).

To contribute to this research gap, the EC-JRC in collaboration with the sub-group 'Action and Implementation' members of the EU platform on FLW developed a framework for the evaluation of food waste prevention actions, which is presented in Section 2.2. This framework was established building on a review of existing studies that evaluate food waste prevention actions (Section 2.1). After discussion with DG SANTE, a first draft of the framework was presented and discussed in a workshop with experts[3] that took place on the 13 September 2018 at the EC-JRC premises in Ispra (Italy). After this, a second draft was presented and discussed with the sub-group members on the 2 October 2018 and finally, it was presented to and approved by the members of the EU Platform on FLW. Figure 3 illustrates the development process of the evaluation framework.

Figure 3. Development of the evaluation framework.



A screening and an overview of current FW prevention actions was performed by means of a literature review and the assessment of the actions reported by the members of the EU platform on FLW. As a result, a classification system was put in place to categorize the actions and identify some common traits. This was based on two main levels: the goal of the action and the mean to achieve the goal. The actions were grouped in five classes according to their goal:

1. Redistribution of food for human consumption,
2. Food valorisation,
3. Consumers behaviour change,
4. Improvement of the supply chain efficiency, and
5. Food waste prevention governance

[3] The list of expert participating in the workshop can be found in the acknowledgements section.

For each goal, a number of action types, described as means to achieve the goal were identified. Table 3 presents the classification of food waste prevention actions adopted in this exercise.

Table 3 Classification of food waste prevention actions used in the exercise*.

Type	Sub-type
Redistribution	Surplus food redistribution
	Gleaning
	Digital tools for redistribution
Food valorisation	Value added processing
	Animal feed
Consumers behaviour change	Awareness/educational campaign
	Digital tool for behaviour change
	School programs
	Awards
Supply chain efficiency	Process innovation
	Innovation of products - packaging
	Innovation of products - date marking
	Training & guidelines
	Price discount
	Imperfect product sale
	Certification
	Public procurement
	Digital tools for supply chain efficiency
Food waste prevention governance	Voluntary agreement
	Regulatory framework/policy
	National food waste prevention program
	Fiscal incentives

*the sub-types of actions are just examples and are not considered a comprehensive list of possible prevention actions

1. Redistribution of food for human consumption

The goal of the **Redistribution** actions is to redistribute surplus food fit for human consumption by actions such as:

- redistributing surplus food fit for human consumption either for profit (through commercial organizations) or by donating it to people in need (through charitable organizations) - **'Surplus food redistribution'**;
- collecting leftover crops from farmers' fields after they have been commercially harvested or on fields where it is not economically profitable to harvest - **'Gleaning'**;
- using digital tools to manage the redistribution of food e.g. donation matching software or apps/websites to sell products close to sell by date - **'Digital tools'**.

2. Food valorisation

The goal of the **Food valorisation** actions is to valorise surplus food[4] by, for example:

- processing it into other food products such as juices or jams - **'Value added processing'**;
- using surplus food to produce animal feed - **'Animal Feed'**.

[4] Consists of finished food products (including fresh meat, fruit and vegetables), partly formulated products or food ingredients that may arise at any stage of the food production and distribution chain for a variety of reasons.

3. Consumer behaviour change

The goal of the **Consumer behaviour change** actions is to promote a behavioural shift amongst consumers to achieve a reduction in the food waste generated by, for example:

- implementing campaigns to raise awareness on the issue of food waste and providing tips to adopt a less wasteful behaviour - **'Awareness/educational campaigns'**;
- developing digital tools to guide consumers towards food waste reduction - **'Digital tools'**;
- running educational programs in schools to inform pupils on the topic of food waste - **'School programs'**;
- assigning awards to virtuous households/students based on food waste reduction achieved - **'Awards'.**

4. Improvement of the supply chain efficiency

Actions classified under the type **Supply chain efficiency** have the goal of increasing the efficiency at any stage of the food supply chain, by acting on either the processes, the products, or the packaging to promote FW reduction by, for example:

- implementing more efficient processes and technologies - **'Process innovation'**;
- providing training or developing guidelines to achieve FW reduction at production/processing/distribution stages and in commercial kitchens - **'Training and guidelines'**;
- developing digital tools to provide guidance and enable the implementation of the aforementioned FW reduction measures - **'Digital tools FSC';**
- applying discounts for products close to the end of shelf-life (i.e. close to the end of the 'use by' or 'best before' date)– **'Price discount';**
- selling at a lower price products that were rejected due to cosmetic reasons - **'Imperfect product sale'**;
- introducing new packaging options to reduce FW at distribution and/or at consumption (e.g. reducing the perishability of products, creating new packaging sizes) - **'Innovation of products - packaging'**;
- optimize and clarify the use of date labels to avoid that products are discarded prematurely - **'Innovation of products – date marking'**;
- improving public procurement procedures to increase their efficiency (e.g. better management of supply and demand) - **'Public procurement'**;
- issuing certificates to companies (manufacturers, distributors or food services) that put in place a set of measures to reduce FW - **'Certification schemes'**.

5. Food waste prevention governance

These actions can be also be described as crosscutting actions, as they encompass all voluntary and mandatory initiatives affecting actors towards FW reduction, by facilitating the implementation of one - or more likely a combination – of the action types belonging to the remaining groups. Actions classified under the type **'Food waste prevention governance'** include all those voluntary or mandatory initiatives that promote/facilitate the uptake of the prevention measures belonging to the other three groups. These include:

- voluntary agreements aiming at improving resource efficiency and reducing FW within the food sector – **'Voluntary agreement'**;
- regulatory frameworks/policies (including fiscal incentives) to simplify/promote the redistribution or reuse of surplus food and to promote the implementation of measures to increase the supply chain efficiency – **'Regulatory frameworks/policies'**;

- large scale programmes coordinated at national level encompassing various activities and initiatives to reduce FW through the supply chain – **'National food waste prevention programmes'**;
- fiscal incentives for businesses that put in place measures to prevent FW or redistribute/reuse surplus food – **'Fiscal incentives'.**

2.1 Evaluating food waste prevention actions: state of the art

Evaluating food waste prevention actions is essential to assess the benefits they bring as well as to unveil possible trade-offs. A literature review was conducted, showing that there is a notable dearth of studies dealing specifically with the evaluation of food waste prevention actions.

In the assessment of food waste prevention actions, criteria are defined and then, key performance indicators (KPIs) are used to evaluate the criteria. Criteria have a more general meaning (e.g. environmental performance) and the KPI is the actual measurable dimension associated to the criteria (e.g. GHG emissions). The development of the evaluation framework presented in this report was done following this approach, defining criteria and qualitative or quantitative KPIs to evaluate the criteria. Therefore, the literature review herein presented reflects this rationale, presenting the criteria considered in studies evaluating food waste prevention actions or policies, and KPIs used.

The EU's 'Better Regulation Toolkit' (European Commission, 2017) suggests the following evaluation criteria:

- **Effectiveness**: considers how successful interventions has been in achieving or progressing towards its objectives.
- **Efficiency**: considers the relationship between the resources used by an intervention and the changes generated by the intervention (which may be positive or negative).
- **Relevance**: focuses on the relationship between the needs and the problems in the society and the objectives of the intervention.
- **Coherence**: analyses how well the intervention is coherent with other interventions already in place or to be implemented.
- **EU-added value:** brings together the findings of the other criteria, presenting the arguments on causality and drawing conclusions, based on the evidence to hand, about the performance of the EU interventions.

In this spirit, the European project FUSIONS used three of these criteria: **effectiveness**, **efficiency** and **relevance**, for the evaluation of different policy measures related to food prevention and reduction (communication/marketing campaigns, market-based instruments, national food waste prevention and reduction plans, projects and other measures, regulatory instruments, and voluntary agreements) (Vittuari et al., 2016a).

These criteria are strongly linked to policy measures and they seem to be different if the focus is the evaluation of individual actions or good practices, as is the case of the STREFOWA project (Obersteiner et al., 2016). In this project, the selection of the best practices was mainly based on the **replicability** of the planned pilot activities in the project functional areas and on the degree of **innovation** of the actions. Other studies provide a list of good practices but without carrying out a systematized evaluation justifying their selection (Monier et al., 2010; European Union Committee of the House of Lords, 2014).

Criteria used under the FUSIONS project include (Vittuari et al., 2016b):

- **Targeted**: practices that have a strong waste prevention focus, clearly distinct from other waste management strategies or broad environmental goals.
- **Measurable**: practices that have an evaluation plan in place to measure program outcomes, even if they do not yet have evaluation data available to demonstrate the effectiveness of positive outcomes.

- **Effective:** practices based on guidelines, protocols, standards, reports, or preferred practice patterns that have been proven to lead to effective food waste prevention/reduction practices;
- **Innovative**: practices that use original techniques for waste prevention.
- **Replicable**: practices that can be easily reproduced and that are similarly relevant in regions across Europe.

The consortium ReFED highlights four fundamental criteria for the evaluation of food waste prevention actions: **data availability** (equivalent to the criterion measurable), **cost-effectiveness**, **scalability**, and **feasibility** (ReFED, 2016).

Evidently, different criteria are used to evaluate policy measures and food waste prevention actions, embracing different sustainability dimensions: environmental, economic, and social. This is valid as well when assessing the indicators used to measure the impact of good practices or policies. An overview of the most commonly used indicators for the environmental, economic, and social dimensions are reported hereafter.

Environmental impacts

The environmental impacts of the food prevention actions or policies is mostly measured using the indicators calculated using the methodology of Life Cycle Assessment (LCA)[5]. Despite the fact that this methodology provides the analysis of many different environmental impacts, the majority of the studies have employed, as the main environmental impact indicator the **GHG emissions** in terms of CO_2 equivalent. This is the case of the FUSIONS project, testing two different LCA approaches (bottom-up and top down). The same indicator was used in other studies carried out by European Union Committee of the House of Lords (2014), Monier et al. (2010), and Canovas Creus et al. (2018).

Other indicators used to measure the environmental impacts of food waste prevention actions or policy measures are **land use** and **water depletion** (Hanson and Mitchell, 2017; FAO, 2013). FAO (2013) also measured the food waste impact on the **biodiversity** using three indicators: percentage of species threatened by agriculture, forest conversion due to agricultural production, and trends in mean trophic levels of fisheries landings.

A very comprehensive study of prevention actions in terms of life cycle based environmental indicators adopted is the study of Cristóbal et al. (2018) in which 16 different environmental indicators have been assessed[6].

Economic impacts

The decision-making process also includes the need to evaluate the economic cost and benefits linked to the implementation of food waste prevention actions. This necessity is also highlighted by European Union Committee of the House of Lords (2014). On top of environmental considerations, Cristóbal et al. (2018) conducted an assessment of the cost and benefits associated with the actions. An indicator used to measure the economic impact is the **cost of implementing a food waste prevention initiative** (Cristóbal et al., 2018; European Commission, 2014; Hanson & Mitchell, 2017; Monier et al., 2010; ReFED, 2016).

The report by OECD (2017) presents a review on how the economic assessment of food waste prevention policies or interventions has been carried out in OECD countries such as Sweden, USA, and UK. The report concludes that a variety of methodological approaches have been used to assess the economics of food waste prevention actions. Most of the studies focus on the **financial savings** for firms and households, considering typically the **avoided costs with waste collection and treatment**. Another component contributing to the financial benefits is the **value of food waste avoided** estimated by converting

[5] An explanation of what LCA is and its usefulness to assess burdens and benefits of prevention actions is reported in section 3.

[6] The indicators covered the following impact categories: climate change, ozone depletion, human toxicity-cancer, human toxicity-non-cancer, particulate matter, ionizing radiation-human health, photochemical ozone formation-human health, acidification, eutrophication-terrestrial, eutrophication-freshwater, eutrophication-marine, ecotoxicity-freshwater, land use, water use, resource use-minerals and metals, resource use-fossil.

kilograms of food waste avoided into monetary terms (European Commission, 2014; FAO, 2013; Scherhaufer et al., 2015). Furthermore, WRI (Hanson & Mitchell, 2017) and ReFED (ReFED, 2016) included a description of all possible economic benefits that could be measured thanks to food waste prevention. This description covers **cost savings to food business and consumers,** and **additional revenues generated by food businesses**.

Hanson & Mitchell (2017) also highlighted the reduction of waste collection and management costs as a relevant benefit. In fact, European Commission (2014) used this parameter as the main indicator to measure benefits from the food waste prevention policies. Moreover, European Commission (2014) **merged economic and environmental** issues due to the inclusion of the environmental benefits of food waste prevention policies in the economic analysis thanks to the **conversion of tonnes of prevented food waste in monetary terms instead of using LCA parameters** (e.g. kg CO_2 equivalent) (Hogg et al., 2014).

Another indicator to analyse the economic impact of food waste prevention policies and actions is the **benefit-cost ratio.** The Champions 12.3 published a report describing how this indicator is calculated (Hanson & Mitchell, 2017) and real application to the case of hotels (Clowes et al., 2018b), catering (Clowes et al., 2018a), and restaurants (Clowes et al., 2019). Parameters for the calculation of this indicator include: i) benefits and costs, ii) the time period of the food loss, and iii) food waste reduction effort and the discount rate. Furthermore, the analysis shows the importance of clarifying 'who pays' and 'who benefits' the prevention action. This question was covered by ReFED (ReFED, 2016) using the indicator '**Business Profit Potential'**, which is defined as the expected annual profits that the private sector can earn by investing in solutions, after adjusting for initial investment required, differentiated costs of capital, and benefits that accrue to non-business stakeholders.

Finally, WRI (Hanson & Mitchell, 2017) and ReFED (ReFED, 2016) provide an additional concept called '**non-financial impact**' to be analysed within this economic dimension, namely externalities. WRI includes different issues that must be addressed such as environmental sustainability, stakeholder relationships, ethical responsibility or food security. ReFED included specific indicators in this concept of non-financial impact (GHG emissions reduced, water conserved, or meals recovered).

Social impacts

Within the reviewed documents, a few studies focused on the social aspect of food waste prevention actions and policies. The most relevant frameworks are: the **Social Life Cycle Assessment (S-LCA)** mentioned by Cristobal Garcia et al. (2016) and the **social impacts from food redistribution organizations** provided by Scherhaufer et al. (2015). The former encompasses several indicators to capture different impact categories (human rights, working conditions, health and safety, cultural heritage and governance), following the social LCA methodology (for an overview of S-LCA approaches see Sala et al. (2015)). In the latter, the framework was developed using the methodology of **social capital** developed by the World Bank which analyses five dimensions: groups and networks; trust and solidarity; collective action and cooperation; social cohesion and inclusion; information and communication (World Bank, 1998). The indicator created by FUSIONS called 'Impacts on health and nutrition of food waste', analysing nutrients, micronutrients and partly anti-nutritional factors, can also be considered an indicator to measure social impact of food waste.

Regarding the definition/selection of which KPIs to use, WRAP has published a report 'Improving the Performance of Waste Diversion Schemes: A Good Practice Guide to Monitoring and Evaluation' where several KPIs are suggested that capture critical success factors and are a framework for measuring achievements. These are designed for collection service/scheme or communication campaigns but can be adapted to other types of interventions. Examples of KPIs are 'kg of food waste generated per household per year' or 'participation rate' (WRAP, 2010).

Based on available literature, different criteria and indicators are used to evaluate food waste prevention policies and actions. This review also shows a lack of harmonized and systematic framework to be used in such evaluation with the goal to identify actions that will most likely bring benefits once implemented. Life cycle-based methodologies, such as LCA and social LCA are often adopted, mainly in light of their powerfulness in identifying hotspots of impacts and in unveiling possible trade-offs.

2.2 Food waste prevention actions evaluation criteria

Considering the criteria used in other studies and as result of the collaboration with the members of the sub-group on action and implementation of the EU Platform on FLW (illustrated in Figure 3), six criteria were considered relevant to be assessed when evaluating a food waste prevention action:

- **Quality of the action design**
- **Effectiveness**
- **Efficiency**
- **Sustainability of the action over time**
- **Transferability and scalability**
- **Intersectorial cooperation**

These criteria and associated indicators were defined in a way that they could be used to evaluate the different types of action presented in Table 3. However, due to specificities of the types of action, the KPIs used to evaluate some criteria need to be tailored. A goal of this exercise was to identify these specificities and to tailor the evaluation framework to the different types of actions. Therefore, the description of the criteria presented in the following sections is intentionally more general. Additional information for the evaluation criteria suggested for each type of action is provided in Section 4.2. It has to be noted that the criteria and the associated indicators reflect the ideal framework for the evaluation of prevention actions, providing that data from the actions are available and of sufficient quality.

2.2.1 Quality of the action design

This criterion evaluates the overall technical quality of the design of the action, reflecting to which extent it was well planned. The quality is assessed based on whether the following elements were considered when planning/implementing the action:

- identification of the problem;
- definition of the action aims and objectives;
- design of a strategy to achieve those objectives;
- definition of an implementation plan; and
- implementation of a monitoring system.

To evaluate an action it is crucial to (i) define aim(s), objectives (with an associated target) and key performance indicators (KPIs) prior to the action implementation and (2) to know what is the baseline situation against which the progress and success of the action will be measured. Once the aim[7] and objectives[8] are defined one should design and implement a monitoring system, i.e. a procedure in which the KPIs are measured through time and reported in a systematic way throughout the duration of the action. This will enable not only to monitor progress and success, but also to identify opportunities for improvement. The KPIs should be measured also after the action has been concluded to assess its long-term effect on food waste reduction and the sustainability of the action over time.

[7] Broad statement of what one is trying to achieve, e.g. food waste reduction in the school.

[8] Specific statement of what one is trying to achieve, e.g. 10% food waste reduction in the canteen.

Monitoring the effects of a food waste prevention action is crucial: this can enable to compare the performance of existing actions to identify best practice examples and to avoid investing resources in actions that have proven not to be effective in the past. A well-planned monitoring system can enable to fine-tune the action through time, to track the progress towards a target (e.g. SDG 12.3), and to justify the budget expense by quantifying the benefits (economic, social and environmental) associated with the prevention of food waste achieved. The last point can be particularly crucial in the case of SMEs, often operating on low profit margins.

The report by WRAP 'Improving the Performance of Waste Diversion Schemes: A Good Practice Guide to Monitoring and Evaluation', in particular chapter 2, can be useful to help in the definition of objectives and KPIs and implementing monitoring systems (WRAP, 2010). The chapter describes how to set aims and objectives (both for the activity to measure, as well as for the needed monitoring) and it gives examples of associated KPIs with which to measure activity performance. WRAP makes a distinction between three types of objectives:

- 'input objectives', that refer to something the practitioner has done and are largely a measure of the effort/activity of putting in place the prevention actions (e.g. to distribute 5000 leaflets in one month);
- 'outcomes objectives', that relate to an intermediate change that happens as a result of the actions one has taken (e.g. to ensure that 2500 households are aware of the campaign); and,
- 'impact objectives' that reflect a tangible change that has occurred because of the inputs and outcomes (e.g. to achieve a 20% reduction in the food waste generated in the households).

The evaluation of the efficiency and effectiveness of a food waste prevention action should be focused on impact objectives, allowing measuring the ultimate effect that has been achieved by the action i.e. by assessing if the action prevented or not food waste from arising and if so, what was the amount of food waste prevented. Nevertheless, for some types of action, e.g. awareness campaigns, it is not always possible to measure the food waste prevented. Instead, one can assess possible changes in awareness, attitudes and/or behaviour, that are typically self-reported and collected through surveys. The change in behaviour reported is an outcome (an intermediate change) that is expected to lead to an impact. Therefore, when it is not feasible to set a target on impact objectives, targets can be set instead on outcome objectives.

The REFRESH project recently published a reported providing guidance specifically for the evaluation of household food waste prevention (Quested, 2019). According to this document, the evaluation of the design of interventions focused on household food wasteis done by using a 'logic model', which describes how the activities of the intervention will lead to the 'final outcome'. For further details, the reader is referred to the document Quested (2019).

The objectives of the prevention actions should be defined following the so-called 'SMART' (Specific, Measurable, Achievable, Relevant, Time-Bounded) approach. The SMART term was first introduced by Doran (1981) stating that objectives should be:

- 'Specific – target a specific area for improvement.
- Measurable – quantify or at least suggest an indicator of progress.
- Assignable – specify who will do it.
- Realistic – state what results can realistically be achieved, given available resources.
- Time-related – specify when the result(s) can be achieved.' (Doran, 1981 p.36)

For each objective, at least one KPI should be set. These are quantifiable measures enabling to monitor the success of an activity. For instance a KPI related to the impact objective exemplified above could be: kg of food waste generated per household per week (WRAP, 2010).

2.2.2 Effectiveness

The effectiveness of a prevention action reflects to which degree the action was successful in producing the desired result, i.e. in reaching the objectives (which should have a target associated) defined initially. Ideally, an objective should be set on reducing the total amount of food waste generated, e.g. to obtain a 10% decrease in the amount of food waste generated in 2018 compared with 2017, for which the KPI is the 'amount of food waste generated'[9]. This indicator should be measured before and after the action's implementation, allowing determining the effectiveness of the action in terms of food waste prevented measured against a baseline (i.e. the amount of food waste generated before the action's implementation). As it might not always be possible to set a target upfront, in those cases, an action can be considered effective if it is proven that a food waste reduction was achieved.

Nevertheless, for some actions such as awareness and education campaigns, it may be very difficult to estimate/measure the amount of food waste prevented as a result of a behavioural change obtained through the campaign and, hence, other outcomes may be measured instead (e.g. outreach of the campaign). Also, it may be very difficult to distinguish between the effect of a campaign as a whole and the effects of single interventions (Stöckli et al.,2018) or to distinguish between the impact of a campaign and parallel influences in the society (e.g. increase of costs for food) (Wunder et al., 2019). Therefore, the effectiveness of an action can be assessed differently considering whether the amount of food waste prevented and the baseline can be quantified or not. In the latter case, other objectives and KPIs can be used to determine the effectiveness of the action. Examples of alternative KPIs for each type of actions are presented later in the report. Additionally, other KPIs may be justified by specificities linked to the type of sector/actor targeted.

2.2.3 Efficiency

Efficiency is measured as the capacity to reach a desired result with the least time/cost/effort. In the context of food waste prevention actions, the practitioner should account for all the resources used to implement that action and what were the results achieved.

The assessment of the operational cost of an action will vary significantly across different types of action. A list of potential costs (non-exhaustive) is provided below:

- design cost (e.g. research activities behind technological innovations to improve the efficiency of manufacturing processes);
- investment cost (e.g. costs related to fleet acquisition, costs of new machineries/equipment, etc.);
- launching of the action (e.g. communication, organisation and logistics costs behind the launch of an awareness campaign);
- daily operational costs (e.g. fuel to transport of food surplus to charities, equipment maintenance).

For each component it is necessary to consider direct costs (e.g. purchasing of equipment, training services, staff salaries) and, if relevant, an estimation of the economic value of the time and resources made available free of charge to implement the action (e.g. volunteer hours, donated equipment).

As for the evaluation of effectiveness, the amount of food waste prevented by the action would be a good KPI to determine the efficiency of the action. However, as mentioned

[9] Food waste quantification should be done according to what is established in the delegated act that establishes a common methodology and minimum quality requirements for the uniform measurement of levels of food waste generated in Member States (European Commission, 2019).

above, for some types of action, this may not be possible to determine and other KPIs may be considered.

The efficiency of an action is calculated as the ratio between its results (i.e. measures of the impact obtained) and the resources invested. It is important to highlight that this indicators do not meant to measure the evolution of the efficiency of an action through time. Therefore, both quantities (cost and amount of food waste) should be estimated for the same timeframe and since the start of the intervention, taking into account higher costs and/or potentially higher savings at the start. The indicator would reflect an average efficiency.

We suggest five dimensions to consider when evaluating the efficiency of a food waste prevention action:

(1) **amount of food waste prevented**;

(2) **net economic benefit**, measured as the economic savings to society, deriving from avoiding the food waste and avoiding the waste treatment, minus the costs of the action implementation; this should ideally cover direct and indirect costs, as well as externalities;

(3) **net environmental savings**, measured as the avoided environmental impacts (due to the avoided production of the food items and/or the avoided waste treatment) minus the environmental impacts related to the action implementation;

(4) **social benefits,** measured for example, by the number of meals donated, jobs created, people learning new skills, food insecure people supported); and

(5) **outreach** (e.g. number of people reached by a campaign)**/awareness** (e.g. number of people that became aware of the food waste problem)**/behavioural change** (e.g. number of people that changed behaviour towards food waste). All three, considered outcome measures.

Box 1. Net economic benefits and net environmental impacts

Within this study, EC-JRC has developed a calculator to be used by the practitioner to determine the net economic benefits and net environmental savings of food waste prevention actions. The latter are calculated using the methodology of Life Cycle Assessment (LCA).

The net economic benefit and net environmental savings are calculated taking into account the following components:

A. Cost or environmental impacts of the avoided food production

B. Cost or environmental impact of avoided food waste management

C. Cost or environmental impact of the implementation of the action

The net economic benefits and the net environmental savings are calculated by adding together components A and B and subtracting component C.

A detailed description on how the different components were calculated is presented in Section 3.

2.2.4 Sustainability of the action over time

This criterion assesses the potential of the action to be sustained[10] over time. To this end, the following elements were taken into account:

- existence of organisational support, operational framework defined including human resources, infrastructure and, where relevant, technology needed to carry out the action;
- economic sustainability of the action;

[10] In this case, sustainability refers to the capability of maintaining the activity over time. Other sustainability aspects (such as environmental or social sustainability) are, instead, covered by criterion efficiency.

- existence of training for staff in terms of knowledge, techniques and approaches in order to sustain it;
- existence of a long term strategic plan.

2.2.5 Transferability and scalability

This criterion assesses to which extent transferability (possibility of being transferred or implemented in another context or place) and scalability (ability to be applied on a different scale, compared to the initial case, e.g. to be made larger) were considered during the design of the action. In those cases where the action has been transferred and/or up-scaled, the assessment also considers the difficulties/lessons learned from the transferring/upscaling process.

2.2.6 Intersectorial cooperation

This criterion assesses if the action was the result of a cooperation represented by a partnership between the private and the public sector and/or between different actors and stakeholders along the supply chain. This can be assessed considering whether the action was carried out jointly by several actors belonging to different sectors (farmers, food manufacturing, retailers, food services, NGOs, local authorities, consumers), and, if this is the case, analysing the specific roles and responsibilities of each actor involved and the type of relationship between them. This criterion was included in the evaluation framework to provide insights that will allow to understand for which type of actions a higher level of intersectorial cooperation is crucial for success.

3 Development of the calculator for assessing the net economic benefits and net environmental savings of food waste prevention actions

A calculator was developed to calculate the net economic benefit of food waste prevention actions and to evaluate the net environmental savings (i.e. avoided impacts) obtained by implementing such actions. Social impacts are considered in the calculator captured by the impact categories related to human health. Additional social indicators as for example the nutritional value linked to food waste, would be of value to be included in the calculator. However, this was out of the scope of the work developed. Under the current section, the calculator is described together with the underlying principles adopted in its development.

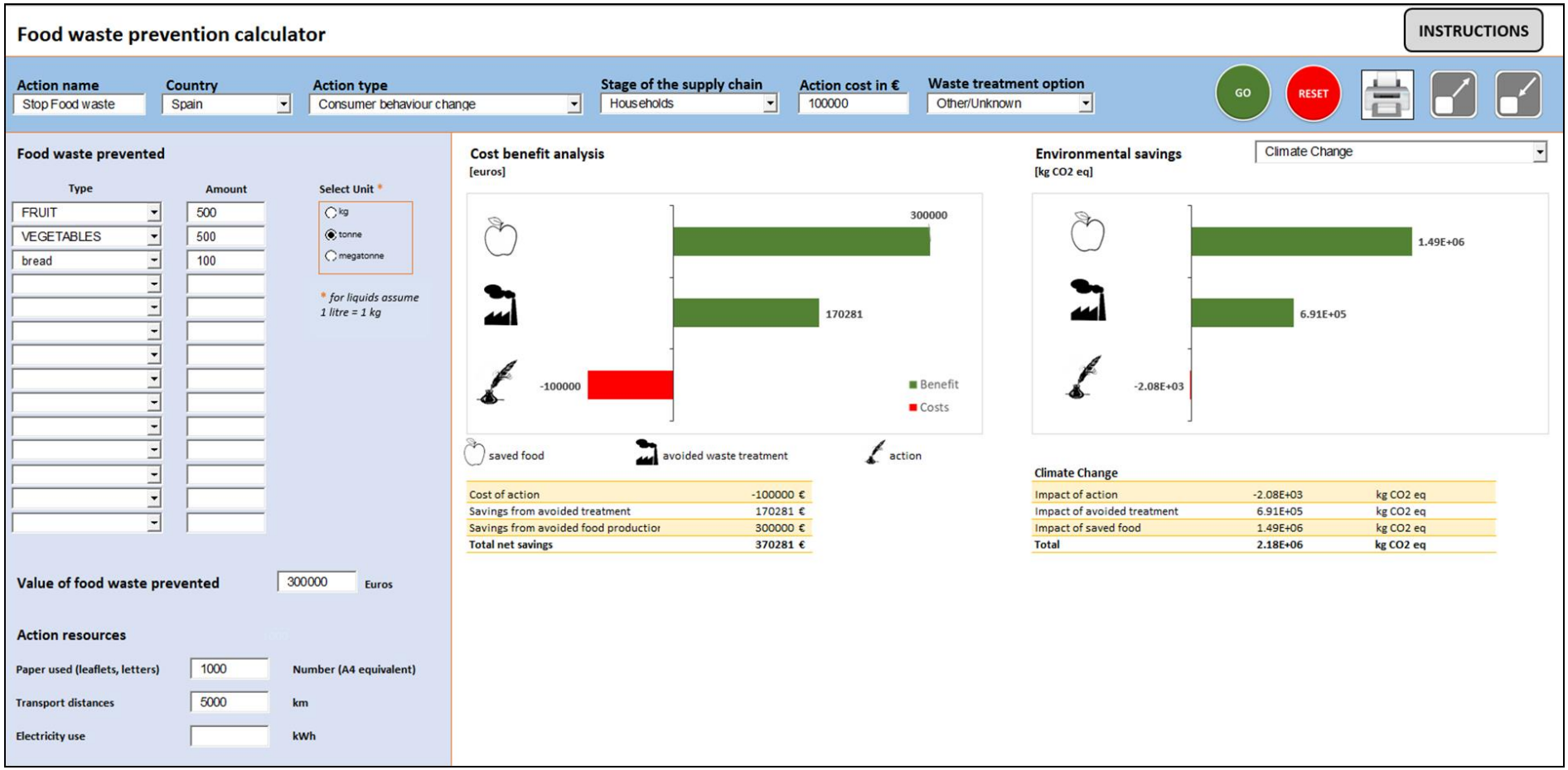
Figure 4 illustrates the user interface of the calculator. The following inputs are requested to perform the analysis:

- country where the action takes place;
- type of food waste prevention action;
- stage of the FSC where the food waste is prevented;
- cost of the action;
- waste treatment that would have been used had the food been wasted;
- types and quantities of food items saved;
- total economic value of the food items saved;
- resources needed to perform the action (e.g. number of leaflets, kilometres of transports, electricity used).

Not all of the above inputs need to be provided, as the calculator uses proxy data when the following information is not known: the waste treatment option, the types of food items saved, or their total economic value. However, the amount of prevented food waste is essential; otherwise, no calculation can be performed.

Based on the inputs provided, the calculator quantifies the net economic benefits and net environmental savings associated with the action implementation. The calculation of both elements is presented below. The calculation is only applicable for prevention at source and donations and it does not consider valorisation options (both in the environmental and in the economic assessment). To support the assessment regarding the effects of intervention with the additional effect of valorisation options, REFRESH has developed FORKLIFT, a spreadsheet-learning tool that indicates life cycle GHG emissions and costs for using selected food side flows (REFRESH, 2018).

Figure 4. User interface of the food waste prevention calculator developed.



3.1 Net economic benefits

The net economic benefits are calculated as the overall economic benefit to society brought by an action minus the overall cost of the action. This calculation is performed differently according to the type of action, as illustrated in Figure 5.

For supply chain efficiency, behavioural change, and redistribution actions where surplus food is donated, the net economic benefits are calculated considering three elements:

(A) the economic value of the avoided purchase of food;

(B) the avoided cost of food waste disposal;

(C) the cost of the action.

This is done by adding together the first two components and subtracting the third (A+B-C).

These elements were also considered by Hanson and Mitchell (2017) when performing a cost-benefit analysis of food waste prevention measures.

The actors that benefit from the action and those that pay for it vary according to the action type:

- for supply chain efficiency actions, it is usually the food manufacturers/retailers/ food services that pay for implementing the action and benefit from (1) having to purchase less food (thanks to an increase in efficiency), and (2) having to dispose of less food waste.
- in the case of consumer behaviour change actions, the households avoiding food waste benefit from having to purchase less food and the local/national government benefits from having to collect and dispose of less food waste. The cost of implementing the action is usually covered by the local/national government and/or by the food industry.
- for redistribution actions, where surplus food is donated, charities benefit from having to purchase less food to donate to people in need, the donors (food manufacturers/retailers/food services) benefit from having to dispose of less food waste. The cost of the action is covered by the food industry and/or the local/national government (this could also be in the form of fiscal incentives) and/or redistribution organizations/charities.

For redistribution actions where the surplus food is sold, the elements considered were:

(R) the revenue from selling surplus food;

(B) the avoided cost of food waste disposal;

(C) the cost of the action.

The overall net benefits are calculated as: R+B-C.

In this case, all benefits and costs are usually covered by economic actors in the food system (either food producer/manufacturers/distributor/retailers/food services). For instance, in the case of an action in which an entity purchases surplus food from a food producer and sells it to consumers, elements (R) and (C) are respectively, a benefit and a cost for the first actor (i.e. redistributing organization) while element (B) is a benefit for the second (i.e. food producer).

In all cases, when conducting the economic assessment, costs and benefits should be evaluated considering as far as possible all the entities affected by the intervention. This should also take into account potential trade-offs (e.g. a prevention activity achieving a reduction of food waste at retail and therefore bringing economic benefits at that stage, which may cause an increase in food waste downstream and therefore entails additional costs for households).

Figure 5. Economic benefits and costs associated with food waste prevention actions and illustrative examples of actors that pay/benefit from them.

	Supply chain efficiency	Consumer behaviour change	Redistribution (donating surplus food)	Redistribution (selling surplus food)
Cost savings from food waste prevention	A = avoided purchase of raw material B = avoided food waste disposal	A = avoided purchase of groceries B = avoided food waste disposal	A = avoided purchase of groceries B = avoided food waste disposal	B = avoided food waste disposal
Revenue				R = revenue from selling surplus food
Cost of the action	C = fixed and variable costs	C = fixed and variable costs	C = fixed and variable costs	C = fixed and variable costs

Who pays/benefits:

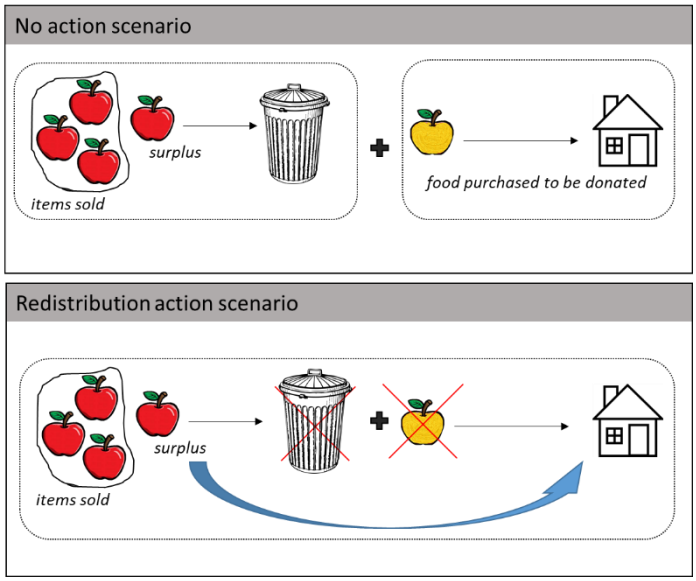
- Food manufacturers, retailers, food services
- National and local government
- Households
- Charities

Figure 6 provides a practical example of a redistribution action where surplus food is donated. A comparison is made between two scenarios. In the first scenario a retailer sends to waste treatment all of its surpluses. In parallel, a charity purchases food to donate it to people in need. In the second scenario, the retailer donates the surplus food to the people in need. In both cases the retailer will face an economic loss due to the purchase of the products that remain unsold. However, in the second scenario the retailer reduces some costs by avoiding the disposal of the surplus food. Additionally, the charity will reduce costs by not having to purchase the food to be donated. Finally, in the second scenario either the retailer or the charity (or an external actor, e.g. the government) will face some operational costs to implement the redistribution action.

It is important to stress that often redistribution organisations need to sort out poor quality donated products before they are either sold or sent to charities, therefore when assessing components A/R only the amount of food that reaches the consumer should be taken into account and not all the surplus food donated by producers/retailers.

In the calculator, when the economic value of the avoided food purchased (A) or the revenue from selling surplus food (R) are not known, these components are calculated by combining the information provided on the types and quantities of food items, the stage of the food supply chain at which the action takes place, and the country where the action is run, with proxy data. This consists of the average cost of 32 food commodities at three stages of the supply chain (selling prices of agricultural commodities, selling prices of processed food and supermarket food prices) for each European country. Such values are taken from several statistical sources (e.g. Eurostat); the full list of sources used, by food type and stage of the FSC, is provided in Annex 2**.** The calculation of component (B) is based on the average costs of waste treatment options at EU level, taken from Manfredi & Cristobal (2016). The cost of the action (C) needs to be provided by the user to perform the calculation. An overview of the proxy data used is provided in Table 4.

Figure 6. Practical example of a redistribution action in which surplus food is donated to people in need.



3.2 Net environmental savings

The net environmental savings associated with an action are assessed as illustrated in Figure 7 and Figure 8, by comparing two alternative scenarios. Figure 7 presents the case of actions that accomplish a reduction at source (i.e. supply chain efficiency and consumer behaviour change). Here, the first is a scenario in which the action does not take place and a certain amount of food is wasted, and the second is a scenario in which, thanks to the prevention action implemented, a part of the food previously wasted is instead saved. The elements of difference between the two scenarios are: the implementation of the action, the avoided production of the food diverted from waste, and the avoided waste treatment.

Figure 8 illustrates the case of redistribution actions where surplus food is donated (also presented in Figure 6). In this case, in the first scenario no action takes place and surplus food generated at e.g. retail level, becomes food waste. In parallel, charities are assumed to purchase food in order to donate it to people in need. In the second scenario, a redistribution action takes place, meaning that the surplus food generated is donated to people in need, replacing the food previously purchased by the charities. The elements of difference between the two scenarios are: the implementation of the action, the avoided production of the food replaced by the surplus food donated, and the avoided waste treatment of the surplus food. For redistribution actions where surplus food is sold, a similar rationale applies, but instead the surplus food redistributed replaces food purchased by consumers rather than by charities.

It is worth to mention that, in both cases, the assumption that the prevention of an amount of food waste leads to an equal reduction in the food being produced is not based on evidence. In fact, the extent to which preventing food waste affects food production is not known. Nevertheless, such phenomenon is expected to take place in the long term.

For both groups of actions, the net environmental savings associated with an action are calculated considering the following elements: (A) the environmental impacts linked to producing the food no longer purchased, (B) the environmental impacts linked to the waste treatment operations that would have taken place had the food been wasted, and (C) the environmental impacts caused by implementing the action.

The first two components represent a saving, while the last is a burden; therefore, the algebraic sum of the three components provides the overall net environmental savings.

Figure 7. Illustrative example of the rationale behind the calculation of the 'net environmental savings' of a food waste prevention action accomplishing a reduction at source of food, performed by the calculator, by comparing a scenario in which 'no action' takes place, with a 'prevention action scenario' in a illustrative case focusing on the retail stage. EI: environmental impact

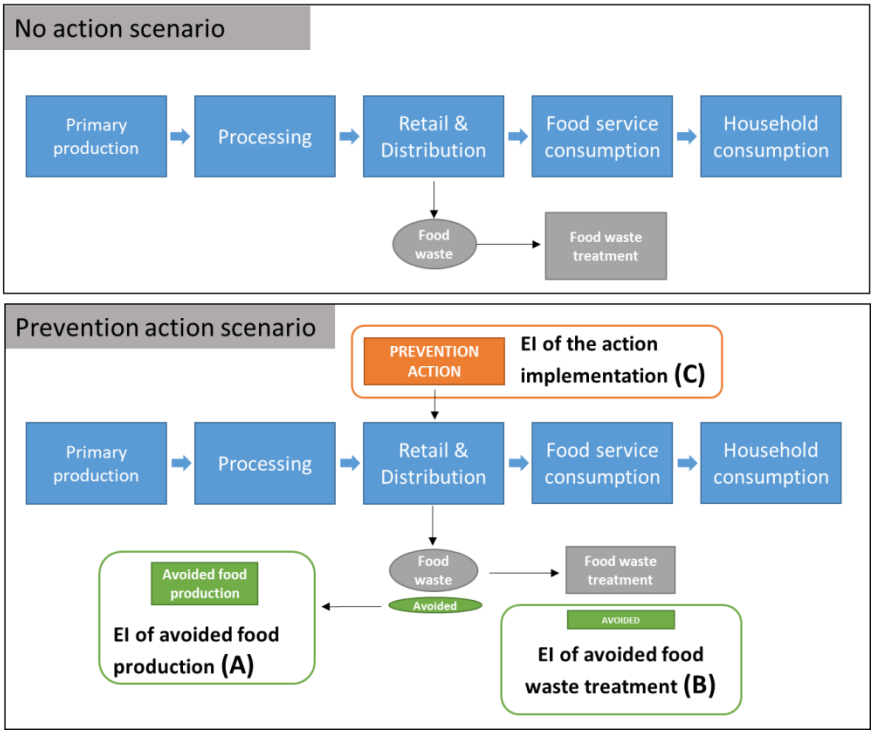
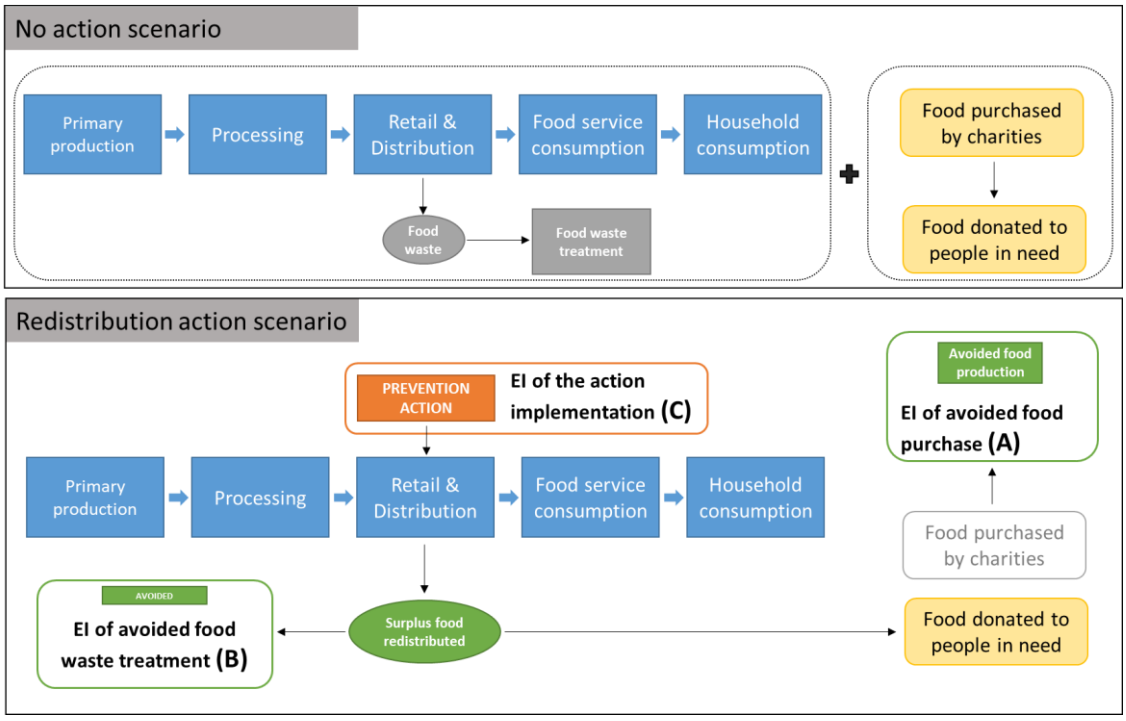


Figure 8. Illustrative example of the rationale behind the calculation of the 'net environmental savings' of a food waste prevention action based on redistribution of surplus food, performed by the calculator, by comparing a scenario in which 'no action' takes place, with a 'redistribution action scenario' in an illustrative case focusing on the retail stage. EI: environmental impact



The environmental impacts are calculated using the LCA methodology (Box 2). The impact assessment method used is the Environmental Footprint which recommends a set of sixteen midpoint impact categories (Fazio et al., 2018).

Box 2. Assessing the environmental impacts with Life Cycle Assessment (LCA)

LCA is a systematic methodology used to assess the potential environmental impacts, caused by the extraction of resources and the release of emissions, associated with products and product systems encompassing all stages of the supply chain, from the extraction of raw materials to the end of life. LCA is essential to identify hotspots along supply chains, unveiling trade-offs among life cycle stages or environmental impact category.

At EU level, the Environmental Footprint method is the reference method for conducting an LCA of a product or of an organisation. The method covers 16 impact categories, which are reported in Annex 3 with the respective indicators. The impact categories considered are climate change, ozone depletion, human toxicity–cancer, human toxicity–non-cancer, particulate matter, ionizing radiation–human health, photochemical ozone formation–human health, acidification, eutrophication–terrestrial, eutrophication–freshwater, eutrophication–marine, ecotoxicity–freshwater, land use, water use, resource use–minerals and metals, resource use-fossil.

The calculation of the embedded impacts in food products is based on the types and amounts of food products reported and the stage of the supply chain where the food waste is avoided. The background data used to perform this calculation are the environmental impacts of 32 food commodities, representing the impacts of food consumption of an average European citizen. The background data encompasses five stages of the food supply chain (agricultural production, processing, packaging, retail and use), as presented in Notarnicola et al. (2017) and Sinkko et al. (2019).

Environmental impacts of waste treatment operations are calculated for five different waste treatment options (landfill, composting, incineration, anaerobic digestion, and wastewater, including drinks wasted through the sink), as presented in Notarnicola et al. (2017). Additionally, average values of waste treatment impacts were calculated for each European country considering the relative share of each treatment option (both for agricultural, industrial and municipal waste), to be used as proxies when the waste treatment option is not known. It is important to stress that the environmental impact of waste treatment options are calculated as in Notarnicola et al. (2017), and therefore do not account for differences in the performance of waste treatment plants across EU countries.

Finally, the environmental impact related to the implementation of the action are estimated considering three proxies: the transport distances, the electricity used, and the amount of paper used (expressed as number of leaflets). This information should be provided by the user, and is then combined with the average impacts associated with: 1 km of transport in a passenger car, 1 kWh of electricity consumed, and the production of 1 A4 of printed paper. Background data were taken from the Ecoinvent 3 database (Frischknecht et al., 2007). The list of proxies might be expanded in a future version of the tool to enable a more comprehensive assessment of the action impacts. An overview of the proxy data used is provided in Table 4.

Table 4. Summary of proxy data used and respective data sources in the calculation of net economic savings and net environmental benefits.

	Component	Proxy data used	Source
Economic	A	Cost of food items by: - commodity - stage of the FSC - country	Statistical data sources (e.g. Eurostat). See Annex 2 for more information.
	B	- Average EU cost of waste treatment options - Weighted average considering country mix (unknown/other)	Manfredi and Cristobal (2016)
	C	*Information provided by users*	
Environmental	A	Environmental impacts of food items by: - commodity - stage of the FSC	Notarnicola et al. (2017) Sinkko et al. (2019)
	B	- Environmental impact of waste treatment options - Weighted average considering country mix (unknown/other)	Notarnicola et al. (2017)
	C	Environmental impact of: - Producing one A4 leaflet - 1 km of transport (passenger car) - Using 1 kWh of electricity	Ecoinvent 3 database (Frischknecht et al., 2007)

4 Food waste prevention actions evaluation

This section presents the results of the evaluation of the food waste prevention actions reported during the collection period (from the 20 June to 21 September 2018). Actions were collected by means of a survey distributed through the members of the EU Platform on FLW. An overview and classification of the actions reported is presented in section 4.1 and a summary of how the evaluation was done is presented in section 4.2. In the following sections the results obtained per type of action are presented: redistribution (section 4.3), consumer behaviour change (section 4.4), supply chain efficiency (section 4.5), and, food waste prevention governance (section 4.6).

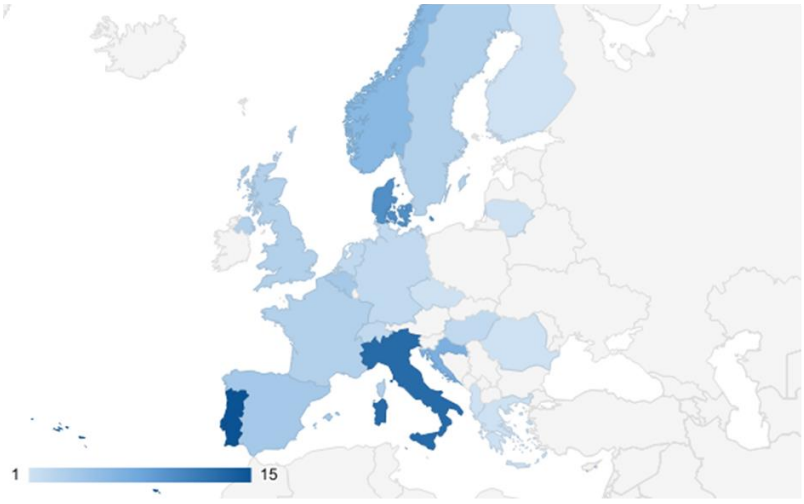
To complement the actions submitted by the platform members, selected actions found through a review of literature, grey literature and an internet search were analysed. After an initial screening, 25 actions were selected and a reference person was contacted to obtain more information for each action. Of these, 8 answered back providing all the necessary information and were analysed more in detail. Section 4.7 presents the result of such analysis.

4.1 Overview and classification of the actions reported

In total 91 actions were collected. Each action was attributed a code and the full list of actions reported is presented in Annex 4. The actions reported were classified according to their type, i.e. the goal of the action, and their sub-type, i.e. the mean used to achieve the goal (Table 3).

Figure 9 shows the countries where the actions took/are taking place. The majority of the reported actions were from Denmark (10), Italy (13) and Portugal (15). It is important to stress that the distribution of actions across countries and typologies it is not considered representative of the actual EU situation due to a potential bias in the group of entities receiving the survey.

Figure 9 Countries where the reported actions took/are taking place. International refers to those actions taking place in more than one country.



Country	Reported actions
Albania	1
Belgium	4
Croatia	7
Czech Republic	1
Denmark	10
Finland	1
France	3
Germany	2
Greece	1
Hungary	2
Italy	13
Lithuania	1
Netherlands	2
Norway	7
Portugal	15
Romania	1
Spain	4
Sweden	3
Switzerland	2
United Kingdom	3
International	7
Total	**91**

Figure 10 shows the breakdown per sub-type of action and

Table **5** presents, for each action sub-type, the total number of actions reported for each stage of the supply chain. The majority of actions reported are redistribution actions (31)

implemented mainly at the distribution and retail stage. Then, 14 actions were reported as awareness/educational campaigns and 7 school programs (aiming to reduce food waste either at food service establishments – focusing on customers – or in households). The majority of the actions on training and guidelines were implemented in the food service sector. As for the crosscutting actions, 6 national food waste prevention programmes were reported, 5 actions classified as regulatory framework/policy and 4 were voluntary agreement. Most of these actions aim at preventing food waste across the full supply chain.

Table 5. Number of actions reported for each stage of the food supply chain and action sub-type. (actions can be associated with more than one stage for the FSC, therefore the sum of the values in this table is higher than 91).

Type	Sub-type	Supply chain stage				
		Primary production	Manufacturing	Distribution and retail	Food service	Households
Redistribution (R)	Surplus food redistribution	6	11	26	8	
	Gleaning	1				
	Digital tools R					
Food valorisation	Value added processing			1		
	Animal feed			1		
Behaviour change (BC)	Awareness/educational campaign				5	11
	Digital tool BC					1
	School programs					4
	Awards					
	Innovation of products - date marking					1
Supply chain efficiency (SCE)	Process innovation	1	1		6	
	Innovation of products - packaging			1		1
	Training & guidelines		3	1	5	
	Price discount			1		
	Imperfect produce sale	1				
	Certification					
	Public procurement				1	
	Digital tools SCE					
Food waste prevention governance	Voluntary agreement	2	3	2	2	2
	Regulatory framework/policy	2	2	5	2	
	National FW prevention programme	2	2	2	4	5
	Fiscal incentives					

Figure 10. Breakdown of the actions collected by sub-type of action (BC – behavioural change, FW – food waste).

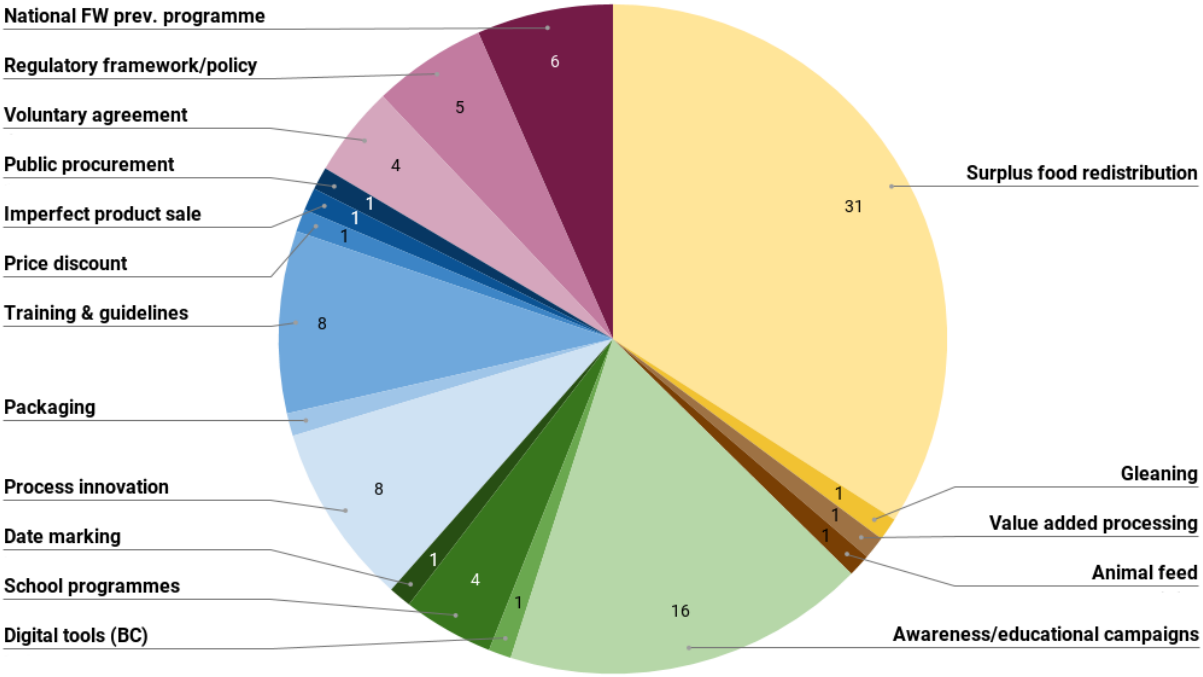


Figure 11 shows, for each type of action, how many of them reported on food waste amounts prevented. Overall, less than half of the actions (42) reported an amount, while the remaining 49 did not provide a quantity of food waste prevented. For the redistribution actions, almost all of them reported an amount of food waste prevented whilst for the consumer behaviour change ones, only two awareness/educational campaigns reported the food waste prevented. For the other types, there is a balance between those reporting the amount of food waste prevented and those that have not.

Figure 12 shows the breakdown of the actions collected by type of funding. 23 actions reported to receive public funding, 18 are funded by the private sector, and 22 reported not to receive any type of funding. Furthermore, 16 are the result of private-public funding and 11 reported receiving funding from several sources, classified as 'mixed' (a combination of two or more of the options except private + public, e.g. crowdfunding + public).

Figure 11. Breakdown between actions reporting/not reporting the amount of food waste prevented by action sub-type.

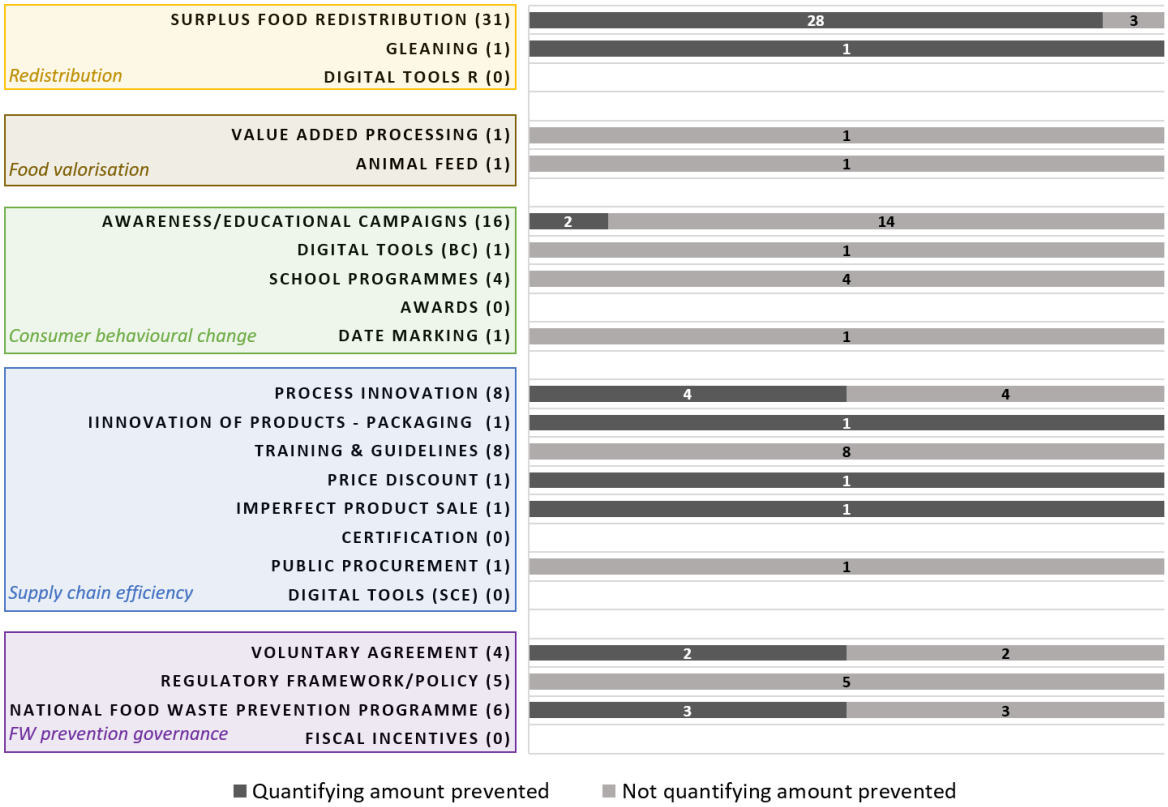
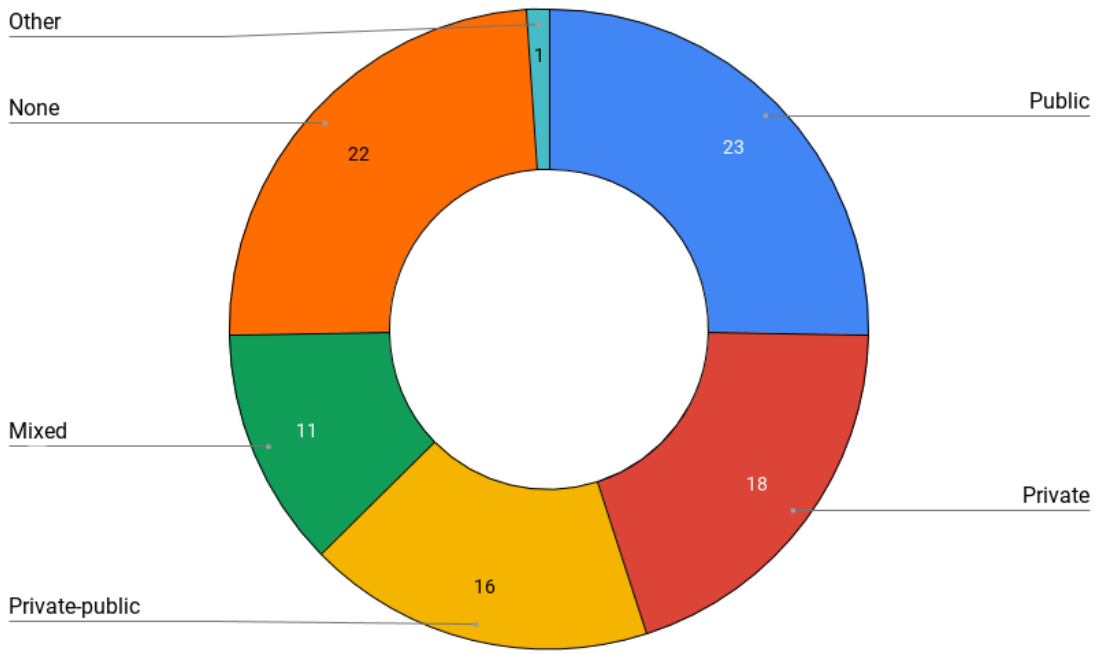


Figure 12. Breakdown of the actions collected by type of funding as declared by respondents (mixed funding means a combination of two or more options other than private and public).



4.2 Evaluation process

The actions reported were assessed in groups according to the type as presented in Table 3 (redistribution, food valorisation, consumer behaviour change, supply chain efficiency, and food waste prevention governance) following the evaluation framework presented in section 2.2.

The aspects of sustainability of the action over time and intersectorial cooperation were not included in the survey, but were taken up later in the context of the finalisation of the evaluation framework. For this reason, survey respondents were contacted whenever this information could not be retrieved from additional sources of information such as the additional documents provided when submitting the action or from their website. Also, when the information provided was unclear, the respondents were contacted to provide clarifications.

The results of the evaluation are presented according to the rationale used in the evaluation procedure, which is reflected in the following structure:

(i) An overview of the actions reported for each type, including those excluded and the reasons for their exclusion. Some actions, which did not agree to be published, are not presented in this report though their assessment was carried out. Each action was attributed a code. This is composed of a letter and a number (e.g. R4), in which the letter is related to the type of action: 'R' for redistribution, 'B' for consumer behaviour change, 'S' for supply chain efficiency, 'V' for voluntary agreements, 'N' for national food waste prevention programme, 'F' for regulatory frameworks, and 'L' for valorisation.

(ii) A general evaluation of the actions reported for each criterion, including an assessment of the quality of the data provided. This was done by assigning to each action a score for each of the six criteria (*i*) according to the following classification:

- the data provided were enough to assess the action according to criterion *i*;
- the data provided were enough but partially unclear, and it was not possible to obtain a clarification (this was the case when we contacted the practitioners but received no answer);
- the data provided were incomplete;
- the data were not provided.

(iii) Selected actions presented in factsheets. While all the actions submitted for evaluation were analysed, only those actions considered most complete, i.e. that provided data to evaluate all or almost all the criteria, were selected to be included as factsheets in the report. It is worth to highlight that although we have estimated the environmental savings for 16 impact categories, for the sake of simplicity only two categories are presented in the factsheets – Climate Change (reported in kg of CO_2 equivalent) and Water Use (reported in m^3 equivalent). Each factsheet presents the action code in the right upper corner.

(iv) Suggestions for actions' implementation. We identified the elements to be considered when implementing, monitoring, and reporting a food waste prevention action, in order to enable its assessment according to the evaluation framework developed.

None of the actions classified as 'food valorisation' (actions L1 and L2 in Annex 4) could be included in the assessment. Action L1 could not be assessed due to a lack of information, as the project reported is still ongoing and more data will be available at the end of 2019. Action L2 was not included in the assessment as the information reported described a research project, which showed the potential to include old bread in the production of animal feed, although this has not yet been put in practice by the industry. For this reason, there is no analysis related to this type of actions in the following sections.

It is worth noting that we identified some limitations in using the data reported to calculate the efficiency as described in section 2.2.3. This was mainly related to the following facts:

data on food waste prevented were not provided, and data on the cost of the action did not capture the resources used in implementing the action. Therefore, for this criterion, we opted to simply present the resources used and the results of the action.

4.3 Redistribution: results of the evaluation of the prevention actions

For the redistribution type, 32 actions were submitted, of which 29 were 'Food surplus redistribution' actions. The other sub-type reported was 'Gleaning' (1 action). Action R29 was excluded from the assessment because it had just started and most of the survey questions could not be answered yet, while action R32 did not agree to be published. Table 6 presents the actions assessed, excluding those that did not agree to be published. The complete list of actions can be found in Annex 4.

4.3.1 Data quality and general evaluation of the actions

An evaluation of the data quality reported for each action for each assessment criterion is presented in Table 6. In general, most actions provided enough data for the assessment of the quality of the action design, and transferability and scalability. In contrast, most of the actions did not provide enough data (or provided no data) to assess their effectiveness. Only three actions provided enough information to determine their effectiveness. All the actions provided information for the evaluation of their efficiency but this was not always clear and/or complete. We then contacted the respondents asking for clarifications. When those were provided, the additional information was used to complete the assessment of the efficiency. In the remaining cases only a partial assessment was performed. This was also the case for the evaluation of the sustainability of the action over time and intersectorial cooperation.

The actions selected to be presented in factsheets are highlighted in dark yellow in Table 6. All the actions selected, belong to the sub-type 'surplus food redistribution', and almost all of them are implemented at the retail and distribution stage. Action R1 covers all the stages of the FSC except households, actions R6 and R10 cover primary production, manufacturing, retail and distribution.

In general, the **quality of the action design** is satisfactory as most actions presented a clear identification of the problem, an aim, and a strategy to reach that aim. Most of the actions have in place a monitoring system to register the amount of surplus food that is donated. Hence, the KPI 'amount of food waste prevented' can be monitored in this type of action. It is important to stress that in the context of food waste prevention actions, only the surplus food recovered from the supply chain should be accounted as food waste prevented. What seems to be missing is the definition of SMART objectives to track the progress of an action. In the case of continuous actions, the progress of the action can be monitored by comparing the amount of surplus food redistributed each year against the previous year.

Although most of the actions reported the KPI 'amount of food waste prevented', we could not assess the **effectiveness** of the actions using this KPI as there was no baseline or target defined (this is related to the lack of SMART objectives). Exceptions are: action R3 which set a target of reducing food waste by 50% but for confidentiality reasons could not provide the baseline figures; and action R6, which reported the baseline values for 2015 described as surplus food suitable for redistribution and the amount redistributed in the same year (11% of the surplus food available). In this case, a target of doubling the amounts of food redistributed in 2020 compared to 2015 was set, and therefore it is too early to say whether this action was effective in achieving such target. Nevertheless, progress is being made as an increase of 50% in the amount redistributed was reached in 2017 (compared with 2015). Alternative KPIs to measure effectiveness were used. For instance, in action R2, a target on the 'number of food insecure individuals' to be reached was set and achieved. Action R7, run by the corporate foundation of a retail chain, registered the 'share of their supermarkets donating surplus food'. Although no target was

defined, this increased from 35% to 60% in one year. Finally, action R11 reported setting a target to increase the 'amount of food to be redistributed' each year based on the amount redistributed the previous year. For example in 2017, 565 tonnes of food were redistributed; therefore a target of 600 tonnes was set for the year 2018.

For all those actions that reported the amount of food waste prevented and the cost (which was a mandatory field in the survey) the **efficiency** of the action could be measured in terms of food waste prevented, economic, environmental, and social benefits (number of meals donated) divided by the cost (as presented in section 2.2.3). However, a number of actions reported a cost of zero. This could entail that the operational costs of these actions are hard to estimate (e.g. when an action is part of the normal operations of a business), that the respondents preferred not to disclose such information, or that the action relied solely on volunteers and donated infrastructure (e.g. trucks, computers). In general, when a combination of capital goods and other resources are used to implement an action, a measure of efficiency should take into account all different inputs, by capturing the resources and efforts put into place to implement the action such as the working hours of the volunteers. This was done in the case of action R10 where an estimation of the financial value of the volunteers working time was made considering the total hours worked by the volunteers and the gross minimum hourly wage in France.

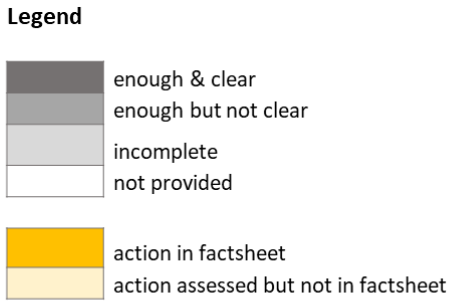
As mentioned in section 4.2, for some actions data on food waste prevented were not provided, and data on the cost of the action were not capturing the resources used in implementing the action. Therefore, it was decided not to calculate the efficiency by dividing the results by the costs (as described in section 2.2.3) but instead, list the resources used and the results obtained. There is a wide range of results obtained by the different actions having different resources. In some cases, the results and the resources used were reported for different periods, making it impossible to assess the efficiency. This was the case for actions that have been growing through time (hence the number of staff increased gradually from the start), but reported the total amount of food waste prevented since the start of the action. A measure of the impact of the action was the 'net economic benefit' calculated as presented in Section 3. For the actions assessed this always resulted in a positive value (i.e. the sum of the value of the food diverted from waste and the cost of the avoided waste treatment was higher than the operational cost of the action). Nevertheless, it is important to stress that redistribution actions are often relying heavily on the support of volunteers (whose contribution was not considered when calculating the operational costs); in the hypothetical case in which volunteers have to be replaced by paid staff, the results of this calculation might not always lead to positive values.

A large number of actions reported information on the outreach using different KPIs as for example 'number of events held', 'number of pupils reached', or 'coverages in newspapers, radio or TV'. Since most of these actions mainly focus on redistribution activities, an evaluation of the behavioural change was out of their scope. For those that also included awareness raising activities (R1, R3, R10, and R11) no study to evaluate the behavioural change was conducted.

The actions reported different strategies to ensure their **sustainability over time**. For example, action R1 was designed with low operational costs to ensure its financial sustainability. Furthermore, as it mainly relies on donations, the organizers have ensured that the sources of the incoming donations would be diverse. Many actions reported that they heavily rely on volunteers, which were identified as being the most important factor to ensure the continuity of these actions. A more certain scenario can be foreseen for those actions that are self-sustaining or that are implemented by companies and are therefore included in the company lines of action as is the case for action R3, R5, and R7.

Table 6. 'Redistribution' actions and quality of the data provided for the evaluation of each criteria.

Action code	Action name	Sub-type	Quality of the action design	Effectiveness	Efficiency	Sustainability over time	Transferability And scalability	Intersectorial cooperation
R1	Boroume	SF Redistribution						
R2	Christmas Surplus	SF Redistribution						
R3	Transformar.te	SF Redistribution						
R4	Fondation Partage (foodbank)	SF Redistribution						
R5	Buon Fine Coop 2017	SF Redistribution						
R6	Integrated approach to increasing redistribution in the UK	SF Redistribution						
R7	Food without Waste	SF Redistribution						
R8	Zero Desperdício (Zero Waste)	SF Redistribution						
R9	Project "Food Support Network"	SF Redistribution						
R10	Fight against foodwaste and precariousness	SF Redistribution						
R11	Stockholms Stadsmission/Matcentralen	SF Redistribution						
R12	FEBA - European Food Banks Federation	SF Redistribution						
R13	Direct food surplus redistribution	SF Redistribution						
R14	Rete Banco Alimentare Onlus	SF Redistribution						
R15	Maisto bankas	SF Redistribution						
R16	The fresh food program initiative	SF Redistribution						
R17	Solidarity bread	SF Redistribution						
R18	The bread of everyday, Brother Galdino, Emporiums	SF Redistribution						
R19	Cibus	SF Redistribution						
R20	Operazione Quattro Province	SF Redistribution						
R21	Una sola famiglia umana, cibo per tutti	SF Redistribution						
R22	Life food waste stand up	SF Redistribution						
R23	Emporio della Solidarietà	SF Redistribution						
R24	Restolho	Gleaning						
R25	Food Bank	SF Redistribution						
R26	Donation of food to different social organisations	SF Redistribution						
R27	Distribuição de refeições que sobram em refeitórios de uma escola e da CerciEspinho (ONG)	SF Redistribution						
R28	Food Banks of the Netherlands, Voedselbanken Nederland	SF Redistribution						
R30	Nestlé food donation activities in Europe	SF Redistribution						
R31	Food donations	SF Redistribution						



Note: The colour code refers to the completeness of the data provided and not to the quality of the action. SF = surplus food.

For what concerns **transferability and scalability**, most of the actions started as a pilot project or were implemented locally. After proving to be successful, they were up-scaled either by increasing their geographic coverage or by increasing the amounts of partner organisations (for instance in terms of donors or charities). Only a few actions have been transferred to a different location (R1, R8, and R10).

For nearly all the redistribution actions assessed, the **intersectorial cooperation** is at the core of their operations. This is logic, as to redistribute surplus food different sectors of society need to cooperate. This usually includes:

- the donors (e.g. farmers, food manufacturers, retailers, food services) that generate the surplus food in the first place;
- the redistribution organizations (e.g. food banks or similar entities), that have the network and the infrastructure in place to collect the surplus food from the donors, store it and transfer it to charitable organizations;
- the charitable organizations (e.g. NGOs, parishes) that receive the donations and take care of distributing the food to the families and people in need either as raw ingredients or by using it to prepare meals offered in soup kitchens;
- the local and national competent authorities, that often take care of facilitating the relationship between the other actors.

Not all the actors mentioned above played a role in the actions reported: for instance in some cases there were no coordinators. In those cases, either the donor was actively seeking for charitable organizations and taking care of the logistical arrangements or vice versa. Often the actions had a clear identification of the roles and the responsibilities of the different actors. For instance, the coordinator is sometimes in charge of training the volunteers of the charitable organizations, on matters of food safety and hygiene. However, this varied depending on the action.

To conclude, from the assessment of the redistribution actions, it became clear that there is a large potential for diverting surplus food that would be treated as waste, to support the poorest members of society, and it is thanks to the cooperation of different sectors that what is a burden for some can become a resource for others.

In addition to the information necessary to assess the actions according to the evaluation criteria defined, the survey respondents were asked to report the key learning points and success factors and the barriers encountered when implementing the actions. Some examples are reported below.

A key **learning point** from implementing this type of action is the need to facilitate the 'donate and receive' process, by accommodating the required logistic arrangements and simplifying the process. Additionally, it is also necessary to have strong sponsorship and provide adequate training to volunteers so that they can carry out the operations independently and in compliance with existing regulation.

A key **success factor** identified was the cooperation amongst different actors towards a common goal, giving priority to the interests of people in need.

Barriers and possible ways to address them identified by the respondents are:

- The administrative burden of implementing this type of action as well as the fiscal and regulatory context.
- A mismatch between the surplus food available and the needs of the beneficiaries, both in terms of its geographical location and its nature, which can result in the refusal of donations. The investment in training programs is essential to overcome this problem to ensure that the receiving entities are aware of this challenge.
- A resistance towards the implementation of monitoring systems, seen often as 'added work with no value' or even as information that needs to be hidden as food waste generation could be seen as a barrier for marketing and sales activities.

- A lack of funding for redistribution organisations as it was reported that most of the funding is directed to the charitable organisations instead.
- The fact that several types of food cannot be redistributed due to food safety rules and legislation (e.g. fresh fish).
- Constraints related to the receiver organizations (e.g. NGOs) in terms of location and technology/infrastructure (e.g. cold chain), or simply the quantity of surplus food available not being enough (e.g. donated by small restaurants) to make it worth for the receiver organisation to collect.
- A lack of awareness amongst some businesses on the amounts of surplus food generated. To address this barrier guidance and tools aimed at implementing widespread and effective measurement need to be produced.
- Gaps in understanding what types of food might be suitable/safe/legally permitted for redistribution.
- Logistical difficulties/sensitivities around branded products. In this case, partnership agreements and case studies help address these issues.
- Competing destinations for food surplus and waste. This can be addressed through reinforcing the food hierarchy via multiple channels and awareness raising by the sector.

4.3.2 Factsheets on selected actions

Actions considered more complete, i.e. that provided data to evaluate all or almost all the criteria, were selected to be presented in factsheets. In total 11 actions are reported in Annex 6.

4.3.3 Suggestions to improve evaluation

In light of the actions' analysis, we could identify missing elements essential to evaluate the actions according to the criteria presented in section 2.2. The gaps were identified mainly based on key elements necessary to assess the quality of the action design, their effectiveness and efficiency. The information provided by the survey respondents was enough to perform the evaluation of the remaining criteria.

A gap identified in the assessment of the quality of the action design was the **lack of a clear definition** of the **objectives** and the **related KPIs**. The definition of SMART objectives together with the implementation of a monitoring system are essential to measure the effectiveness of the action. KPIs that can be used for the assessment of redistribution actions can be: 'amount of surplus food redistributed' or 'number of food insecure individuals reached'. Objectives can also be defined regarding the type of food recovered, targeting for example the recovering of fresh fruit and vegetables or protein sources (e.g. meat, fish). In this case, KPIs to use can be 'amount of surplus fresh fruits/vegetables/meat/fish redistributed'. An additional KPI that can provide insights on the outreach of the action can be for example the 'number of donors'. Nevertheless, this KPI should be not be used to reflect the success of an action as a small number of well-selected donors may be more efficient than a huge number of small donors or donors who donate on an irregular basis. Instead, it can be used to evaluate the outreach of the action. The KPIs should be measured before the implementation of the action, so that a **baseline can be established**. The value measured after the action will allow concluding about the **effectiveness** of the action.

For the assessment of efficiency, a **complete accounting of resources** and results should be reported. The resources should be monetised, for example the number of hours of volunteers can be monetised considering the gross minimum hourly wage in the country, so that the cost of the action is comprehensively captured. The KPI 'amount of surplus food redistributed' should be monitored as it will allow assessing the efficiency of the action in terms of food waste prevented and economic and environmental benefits. For the social

component, an example of KPI is 'number of meals donated'. It is important that both **resources and results** (measured with the KPIs) **refer to the same timeframe** i.e. an action presented a cost of X and Y results over two years. In the actions 'surplus food redistribution' the outreach can be measured using the KPI 'number of donors' or 'number of times the action was mentioned in national media'. If the action does not include a component on awareness/behaviour change, the assessment of these aspects is not necessary.

Table 7 presents **examples of KPIs** that can be used to measure the **effectiveness and efficiency** of this type of action as well as the monitoring approach suggested. The main goal of a redistribution action is to increase the amount of food redistributed and/or increase the number of food insecure individuals receiving food donations. Therefore, it is suggested to use KPIs referring to these two quantities. Nevertheless, it can be useful to monitor also other KPIs to assess in a more comprehensive manner the outreach and/or social impact of the action. Examples of such indicators are 'the number of donors participating in the action' related to the outreach of the action, and 'number of jobs created' and/or 'number of people developing new skills' related to the social impacts of the action. These indicators can also be used to assess the effectiveness of the action when reflected in the objectives of the action. Other additional KPIs can be defined to assess health impacts. According to Bourome (R1), the quality and nutritional values of the food redistributed is higher than what the charities would be able to provide otherwise to households in need. Therefore it would be important to capture this aspect as well.

Table 7. Suggestions of KPIs to measure effectiveness and efficiency of actions of the type 'Redistribution'. The KPIs in grey can be monitored to capture additional information on the action impact.

<table>
<tr><th>Criteria</th><th>Dimension</th><th>Examples of KPIs</th><th>Monitoring approach</th></tr>
<tr><td rowspan="1">Effectiveness</td><td></td><td>Amount of food redistributed/reused
Number of food insecure individuals reached</td><td>1. Set an objective (examples)
Increase by 20% amount of surplus food redistributed by 2019 against the baseline of 2017
Increase by 20% the number of food insecure individuals reached by 2019 against the baseline of 2017
Increase by 20% the number of donors by 2019 against the baseline of 2017
Increase by 20% the amount of surplus vegetables redistributed by 2019 against the baseline of 2017
2. Monitor the KPIs through time to track progress towards the objective</td></tr>
<tr><td rowspan="6">Efficiency</td><td>Food waste</td><td>Total amount of food waste prevented/ Cost of the action*</td><td rowspan="6">1. Calculate total food waste prevented by the action
2. Estimate related economic benefits and environmental savings
3. Measure the KPIs related to the social and outreach
4. Divide the different KPIs defined for each dimension by the cost of the action

Make sure results and cost of the action refer to the same timeframe.</td></tr>
<tr><td>Economic</td><td>Net economic benefits**/ Cost of the action*</td></tr>
<tr><td>Environmental</td><td>Net environmental savings**/ Cost of the action*</td></tr>
<tr><td>Social</td><td>Number of food insecure individuals reached / Cost of the action*
Number of meals donated/ Cost of the action*
Number of jobs created / Cost of the action*
Number of people developing new skills/ Cost of the action*
Nutritional value of the food donated/ Cost of the action*</td></tr>
<tr><td rowspan="2">Outreach</td><td>Number of donors/ Cost of the action*</td></tr>
<tr><td>Coverage in national media***/ Cost of the action*</td></tr>
</table>

* Cost of action - overall cost of implementing the action (e.g. new equipment, additional salaries, the number of hours of volunteers can be monetarized considering the gross minimum hourly wage in the country); ** As described in section 2, box; ***Only relevant if the action includes public outreach as one of its objectives (for instance recruiting new donors through a communications programme).

4.4 Consumer behaviour change: results of the evaluation of the prevention actions

In total, 22 actions were submitted under the type 'Consumer behaviour change'. Of these, 5 actions were excluded from the analysis as had yet to begin/just begun at the time of reporting (B15, B16, B17, and B19) or were out of scope (B18)[11] and 2 actions did not agree to be published. Of the remaining actions, 2 were school programmes, 1 was a digital tool (web platform) hosting educational content to raise awareness on food waste, 1 was a product innovation – date marking, and the remaining 11 actions were awareness campaigns. Most actions reported were focused on reducing the food waste generated by households, while 5 actions (B3, B5, B7, B10, and B11) targeted food waste generated by customers of restaurants and catering services. Table 8 presents all the actions assessed, excluding those that did not agree to be published. The complete list of actions can be found in Annex 4.

4.4.1 Data quality and general evaluation of the actions

An individual assessment of each action was undertaken to evaluate the data quality reported according to the different assessment criteria required, as shown in Table 8. Almost all actions provided enough information to assess the quality of the action design and their transferability and scalability. None of the actions provided enough information to assess their effectiveness according to what is presented section 2.2.2. Eight actions provided information to assess their efficiency, but in some cases this was not clear and/or complete. The sustainability of the actions over time and their degree of intersectorial cooperation could be assessed for eight and nine actions, respectively.

Actions belonging to the 'consumer behaviour change' type presented a satisfactory **quality of the action design**. If on one hand, they often reported a clear identification of the problem and final aim, clearly described the implementation of the action and (when present) the monitoring system to assess the food waste reduction achieved, on the other hand, very few actions defined SMART objectives and reported a baseline and targets to track their progress towards reaching their goal(s). When defined, most objectives were related to the decrease of the current food waste levels or the increase of awareness of this issue.

Half of the actions analysed did not report any KPI that was monitored to assess their **effectiveness**. Of those that did, KPIs used were either based on measures of food waste reduction (B3, B5, and B7), and/or on measures of the outreach of the action, collected via surveys or interviews (B2, B3, B6, B8, and B13). Only 3 actions had in place a monitoring system to measure the impact of the action in terms of food waste avoided (B3, B5, and B7). Of these, apart from action B3[12], none reported a target, and therefore the assessment of effectiveness as described in Section 2.2.2 could not be performed for these actions. Nevertheless, actions B5 and B7 reported achieving a decrease of food waste generated, and actions B2, B6, and B8 reported achieving an increase in awareness measured through surveys, which might lead to a decrease in food waste (Quested, 2019). If on one hand the relatively small number of actions where food waste amounts where monitored shows that for this typology of actions empirical measurement of the reduction of food waste achieved can be challenging, on the other hand it shows that it can be conducted.

[11] Action B18 was considered out of scope as it is not a food waste prevention initiative per se but an initiative to disseminate knowledge on several topics related to sustainable food systems, including food waste reduction.

[12] Action B3, in combination with action S3 (Section 4.5), reported the target of cutting by 20% the food waste per guest generated by 2020 against a baseline of 2017. However, at the time of reporting (spring 2018), no data were yet available to track the progress towards achieving this target.

Table 8. 'Consumer behaviour change' actions and quality of the data provided for the evaluation of each criteria.

Action code	Action name	Sub-type	Quality of the action design	Effectiveness	Efficiency	Sustainability over time	Transferability And scalability	Intersectorial cooperation
B1	Chef save the food	Awareness/educational campaign						
B2	Zu gut für die Tonne! "Too good for the bin!"	Awareness/educational campaign						
B3	"CutFoodWaste2020". Communication campaign towards guests	Awareness/educational campaign						
B4	"Brukopp-leksikon" - A guide for consumers on how to store and reuse food	Awareness/educational campaign						
B5	Do not waste it, take what is yours!	Awareness/educational campaign						
B6	Date marking campaign	Awareness/educational campaign						
B7	Menos Olhos que Barriga - "Less Eyes than Belly"	Awareness/educational campaign						
B8	Additional date labelling	Innovation of products - Date marking						
B9	No tires la comida "Do not waste food"	Awareness/educational campaign						
B10	Doggy bag for restaurants	Awareness/educational campaign						
B11	Solidarity Tray	Awareness/educational campaign						
B12	Green chef - school contest	School programme						
B13	Coleção Zero Desperdício - "Zero Waste Collection"	School programme						
B14	EFFECT	Digital tools - BC						
B20	Every crumb counts food waste challenge	Awareness/educational campaign						

Legend

- enough & clear
- enough but not clear
- incomplete
- not provided

- action in factsheet
- action assessed but not in factsheet

Note: The colour code refers to the completeness of the data provided and not to the quality of the action.

The actions implementing a monitoring system to measure the amount of food waste avoided are:

- action B2: a national consumer awareness campaign on food waste;
- action B3: a communication campaign towards restaurants guests (involving approximately 1700 sites from hotel chains, canteen chains, and restaurants);
- action B5: a three-week intervention, in which guests of four restaurants were encouraged to take their leftovers home in reusable lunch boxes;
- action B7: an awareness campaign run on a university campus, encouraging students and staff to take only what they need at self-service canteens.

It could be argued that for actions B5 and B7 the monitoring exercise is made easier by the fact that the system under control is relatively small. Actions B2 and B3 reported having a monitoring system in place but did not report the results as they were not yet available. For action B3, the key aspects to put in place a monitoring system capturing the impact of the intervention across all sites were:

i) to ensure that each site took care of monitoring food waste amounts (which was mandatory in order to take part to the intervention), and
ii) that the values reported were comparable (by providing clear guidelines and training the staff at the start of the intervention).

Finally, it is worth stressing that of the 4 actions mentioned above (the only ones reporting quantities of food waste avoided), 3 were targeting food waste generated by food services, whilst just 1 was focusing on food waste generated at household level. Although measuring the reduction in food waste generated by households as a result of an awareness campaign is certainly more challenging and more costly compared to food services, this is a crucial aspect, as several quantification studies have shown how in the EU consumers are responsible for the largest share of food waste generated. Several measurement methods can be adopted to quantify the impact of a food waste prevention action targeting households; for a comprehensive guidance the reader is referred to Quested (2019).

In order to calculate the **efficiency** of an action, its results should be compared with the resources invested in implementing it. As previously mentioned, those actions that quantified their impact using KPIs did it either by measuring the amount of food waste avoided or by measuring their outreach. In terms of resources used, most actions reported the overall cost of implementation (generally including the cost of human labour). Only one action (B7) mentioned having relied volunteers. In this case, the overall cost of the action should be calculated including a monetisation of the volunteer hours (as suggested for food redistribution actions). In the case of actions B5 and B7, which reported the amount of food waste avoided, it was possible to calculate the net economic benefits and the environmental savings resulting from the action implementation. These values can be compared with the cost of the actions to evaluate their efficiency. For actions providing a measure of the outreach, this can be compared with the resources invested to measure their efficiency. For instance, action B6 reported causing 1% increase in the share of Danish population that knows the difference between two different date marks (use-by and best before); this is roughly equal to 60 000 people. As the action reported a cost of 30 000 euros, it translates into two persons that learned the difference between the two date marks for each euro spent.

As actions belonging to this group generally do not result in an economic return for those implementing them, their **sustainability over time** is often relying on the ability to find funding sources. For this reason, to ensure the continuity of the funding in the future, it is key to be able to prove that the action was effective in achieving its goal and efficient in terms of resources used. In some of the cases reported, conducting awareness campaigns on food waste was part of a broader strategy, which can ensure the long-term sustainability of these actions – or at least until the strategy remains in place. Some examples are: government strategies to reduce food waste (actions B2 and B6), voluntary agreements between food industry actors (actions B3 and B4), and sustainability plans of businesses or institutions (action B7). Action B5 was instead only conducted for three weeks in 2014. According to their coordinator, the reasons for not continuing this action were a lack of

human resources in restaurants to conduct the monitoring of food waste and the high cost of the reusable food containers (as opposed to disposable ones) that did not make it economically sustainable. In the light of these findings, such action could be adapted to ensure it can be conducted without representing a burden on the restaurants and it can therefore become part of the daily operations of the restaurants involved.

In terms of **transferability and scalability**, actions B12 and B13 (the first consisting on a school contest and the second on a set of books on the topic of food waste) reported that they had been upscaled from an initial phase. For the first action, this was mainly due to more schools joining the program, while for the latter, it was by transferring the books from a physical platform to a digital one (by developing multimedia books freely available online) thus potentially reaching a much larger audience. None of the remaining actions had been upscaled or transferred to a different context since their start. Nevertheless, many of them were already conducted at national level, and are considered to be potentially transferable to other countries. An example is action B1, a cooking competition show teaching people how to cook new meals out of leftovers, as proven by the fact that often TV shows are successfully replicated in new countries, there is no reason to believe this could not be the case also for *Chef Save the Food*. Another example of an action potentially transferable is action B7: after proving to be successful in reducing the food waste generated by the catering operations of the University of Minho, a similar initiative could be implemented in other universities (both in Portugal and abroad).

Actions belonging to this group presented a moderate degree of **intersectorial cooperation**. Those aiming at reducing household food waste were generally coordinated by public authorities (either national government or local authorities), consumer associations, or private companies (e.g. action B4), and often counted on the support of NGOs and other organisations (e.g. religious associations, anti-consumerist organisations) to reach a wider audience. Actions focused instead on food waste generated by food services are based on the cooperation between the coordinator (e.g. food waste consultancies, trade associations, food banks, waste management companies) and the food services where the action is implemented. In other cases there are actions that run internally to institutions, as in the case of action B5, presenting no real intersectorial cooperation.

A **challenge** reported for several actions was the difficulty to increase the level of awareness amongst the population on the issue of food waste. In some cases this was because the public already had a good level of knowledge on the topics covered (e.g. this was the case for action B6). In others (e.g. action B2 and B4), it was deemed due to a lack of a clear choice of the target audience or to the use of ineffective communication channels. On the other hand, action B5 reported as the main barrier the local mentality and prejudice against the act of taking leftovers home from restaurants. Others commonly reported barriers were the lack of funding to ensure the sustainability of the action, the possibility of using effective communication channels, and communicating the messages of the campaign in a clear and understandable way (as reported in the case of action B1, B4, and B6).

4.4.2 Factsheets on selected actions

Actions considered more complete, i.e. that provided data to evaluate all or almost all the criteria, were selected to be presented in factsheets. In total 8 actions are presented in the factsheets in Annex 6.

4.4.3 Suggestions to improve evaluation

The assessment of the food waste prevention actions belonging to this group enabled to identify a number of shortfalls in their reporting due to which the assessment according to the evaluation framework presented in Section 2 could only be conducted partially. Most actions did not set **SMART objectives** or provide **baseline values** against which one

could measure the actions' performance. In the following, specific suggestions to improve the evaluation of the effectiveness and efficiency of this group of actions are provided.

Actions belonging to this group are primarily focused on educating and raising awareness amongst the public on the issue of food waste. Although this should ideally lead to a reduction in the amount of food waste generated, the majority of the actions reported were focused on monitoring outcome objectives (e.g. an increase in the population understanding the difference between two date marks) rather than impact objectives (e.g. the reduction of the waste per meal generated by a restaurant). Whenever possible, **priority** should be given to the measurement of **impact objectives**, to enable a proper evaluation of the effectiveness of a food waste prevention action. Nevertheless, **when this is not feasible** and it is not possible to robustly monitor the impact of a prevention action in terms of food waste reduction due to e.g. budget reasons, **outcome objectives** should be set and monitored. This can be done by conducting surveys before and after the action implementation to measure the increase in the awareness of the targeted population.

The definition of KPIs to monitor either impact objectives or outcome objectives is crucial to measure both the **effectiveness** and the **efficiency** of such interventions. **Examples of KPIs** that could be used to this end are provided in Table 9 for two groups of actions:

(A) actions in which it is possible to measure the amount of food waste prevented, and

(B) actions where the measurement is not feasible and where instead, the increase in awareness and/or the behavioural change are assessed.

For the first group of actions (A), effectiveness can be measured by tracking through time KPIs such as the 'food waste generated per capita in one year' or the 'plate waste generated per meal in a restaurant'[13]. It is important to note that when comparing the food waste generated in the current year against a baseline year**, KPIs** need to be **independent** from the **variation in the level of productivity** (e.g. the total amount of meals served) or the sample size (population in the area under study). The first step to measure efficiency is to estimate the overall food waste avoided since the beginning of the action. This can be done by comparing the waste that would have been generated if the waste intensity (waste per capita/per meal) had remained unchanged (from baseline levels) compared to the amount generated with the new (lower) waste intensity. An example of how to conduct such calculation is provided in Annex 7. Based on the overall waste avoided, the related economic and environmental benefits can be calculated. These three quantities should then be divided by the **total resources invested** in implementing the action (since the start) to evaluate its **efficiency**. Resources should include all operational costs, including staff salaries. It is crucial to ensure that results and resources are referring to the **same timeframe**.

For the second group of actions (B), effectiveness can be measured by tracking through time KPIs such as 'the share of the targeted population aware of the campaign' or reporting a **change in behaviour** as a result of the campaign (this could be measured by conducting surveys amongst a representative sample of people) and setting objectives to reach through time. To measure efficiency, the total number of people that e.g. reported a change in behaviour since the start of the action due to the action could be compared with the overall resources spent to implement the action, providing a measure of the outreach efficiency.

Regarding the assessment of changes in the consumer behaviour related to food waste, the REFRESH project has developed a methodological framework and survey designed to understand these changes, by identifying the types of food waste, and what motivations, opportunities and abilities support or hinder food waste prevention (Geffen et al., 2016;

[13] This KPI is to be used in the evaluation of the performance of one action in for example one restaurant. Since the weight of the meals is not standardized and may vary from restaurant to restaurant, for comparison between restaurants or between restaurants and other types of food services, a suitable KPI is 'plate waste generated per kg served food'.

Wunder et al., 2019; Geffen et al., 2017). These **surveys** can be carried out **before and after** the implementation of the action to capture changes in consumer behaviour.

Besides, another interesting aspect to explore further is the occurrence of possible the rebound effects caused by a food waste prevention action. These are defined as situations in which the avoidance of food waste in households causes an increase in the disposable income that could be potentially spent on other products or services. In case this additional income is spent on products/services with lower environmental impacts, the overall effect is positive. If not, this additional expenditure may reduce significantly or even offset the environmental benefits of food waste prevention actions (Salemdeeb et al., 2017; Reynolds et al., 2019). Although little research has been conducted on this topic so far, to avoid any potential rebound effect it would be key to ensure that food waste reduction is promoted in parallel with changes towards more sustainable lifestyles.

Table 9. Suggestions of KPIs to measure effectiveness and efficiency of actions of the type 'Consumer behaviour change'.

Group of actions	Criteria	Dimension	Suggested KPIs	Monitoring approach
A Actions measuring FW reduction obtained	**Effectiveness**		Households: per capita food waste generated in one year (a) Food services: food waste generated per number of meals served (b)	1. Set an objective e.g. 20% food waste reduction per meal/per capita in one year, by 2020 compared with the reference year (e.g. 2017). For this type of action, **impact objectives** can be defined. 2. Monitor the KPIs through time to track progress towards the objective
	Efficiency	Food waste	Total amount of food waste prevented** / Cost of the action*	1. Calculate total food waste prevented compared to a baseline year (as presented in Annex 7). 2. Estimate related economic benefits and environmental savings. 3. Divide these by the cost of the action *Make sure results and cost of the action refer to the same timeframe.*
		Economic	Net economic benefits***/ Cost of the action*	
		Environmental	Net environmental savings***/ Cost of the action*	
B Actions measuring increase in awareness/behavioural change obtained	**Effectiveness**		% of people aware of the campaign % of people reporting a change in behaviour due to the action	1. Set an objective e.g. 50% of people interviewed should be aware of the campaign by 2020. For this type of action, only **outcome objectives** can be defined. 2. By means of surveys, monitor the KPIs through time to track progress towards the objective
	Efficiency	Outreach Awareness Behaviour change	Total number of people reached by the campaign / Cost of the action* Total number of people aware of the campaign / Cost of the action* Total number of people changing behaviour / Cost of the action*	1. Calculate the total number of people aware of the campaign/changing behaviour since the start (based on the results of the survey and the total population exposed to the campaign). 2. Divide these by the cost of the action *Make sure results and cost of the action refer to the same timeframe.*

* Cost of action - overall cost of implementing the action (e.g. research and development, new equipment, additional salaries, monetization of volunteer hours).
** See Annex 7 for an example of how this should be calculated.
*** Calculated using the food waste prevention actions calculator (presented in Section 3).

4.5 Supply chain efficiency: results of the evaluation of the prevention actions

In total, 20 actions were submitted under the type 'Supply Chain Efficiency'. These actions are aimed at increasing the efficiency of the supply chain by introducing leaner processes at primary production, manufacturing, distribution and in food service establishments. These include: (i) 'training and guidelines' (7 actions) developed to enable/encourage such change; (ii) actions that combine training programs, the implementation of food waste reduction measures and food waste monitoring (often using digital tools), defined as 'process innovation' (7 actions); (iii) 'imperfect product sale' (1 action); (iv) actions regarding the systematic discount of products close to their expiry date, defined as 'price discount' (1 action); and actions acting on the shelf life of products by changing the packaging technology (1 action). 12 out of 22 actions targeted the food service sector, while the remaining focused on the primary production, manufacturing, and distribution sectors. 2 actions were out of scope (not focusing on food waste reduction per se), and therefore were excluded from the assessment (S16 and S17) and one action did not agree to be published (S18). Table 10 presents the actions assessed, excluding those that did not agree to be published. The complete list of actions can be found in Annex 4.

4.5.1 Data quality and general evaluation of the actions

Table 10 provides an overview of the quality of the data reported for each action to enable the assessment according to each of the six criteria. Overall, enough data were provided to assess the quality of the action design, and the transferability and scalability of the actions. 8 out of 21 actions presented enough information to assess the sustainability of the action over time and their degree of intersectorial cooperation. Finally, just one action (S5) provided enough information to comprehensively assess its effectiveness and efficiency, while for the remaining actions this information was often incomplete (e.g. setting KPIs and monitoring them through time but not setting a target) or sometimes missing.

Actions considered for the analysis presented generally good **quality of the action design**, by presenting a clear identification of the problem and a final aim, clearly describing the implementation of the action and (when present) the monitoring system to assess the food waste reduction achieved. A number of actions defined a baseline situation, SMART objectives, and targets to track their progress towards reaching their aim.

To assess the **effectiveness** of actions targeting the food service sector, the most common KPI used was 'grams of food waste per guest' and a target was set to reduce this amount by a certain percentage (varying between 20% and 50%). Some actions (S4, S8, S12, and S13) reported the percentage reduction of the amount of waste generated per guest, without having set an initial target. Although a target is necessary to measure their effectiveness according to the framework presented in Section 2, it could be argued that these actions were effective, as they have achieved a food waste reduction. Action S7, aiming at reducing the food waste at retail of a product by applying changes to its packaging to increase its shelf life, used as a KPI the food waste percentage out of the amount sold (measured before and after the action implementation). In this case, the food waste was reduced from 8% to around 3%.

In other cases, the effectiveness of the action could be measured by using different KPIs. For instance, in the case of action S6 a target was set at the beginning of the action regarding the 'number of audits and questionnaires' to be conducted with the food industry (as this action aimed at accounting for food waste in the food industry and provide tips based on the outcome), and was met.

Table 10. 'Supply chain efficiency' actions and quality of the data provided for the evaluation of each criteria.

Action code	Action name	Sub-type	Quality of the action design	Effectiveness	Efficiency	Sustainability over time	Transferability And scalability	Intersectorial cooperation
S1	Guidelines on FW reduction in hospitality	Training & guidelines	enough & clear	not provided	not provided	enough & clear	enough & clear	enough & clear
S2	Fruta Feia	Imperfect product sale	enough & clear	incomplete	enough but not clear	enough & clear	enough & clear	enough & clear
S3	CutFoodWaste2020 – employee training program	Process innovation	enough & clear	incomplete	incomplete	enough & clear	enough & clear	enough & clear
S4	WasteWatch powered by LeanPath	Process innovation	enough & clear	incomplete	incomplete	enough & clear	enough & clear	enough & clear
S5	The Gothenburg model for reduced food waste	Process innovation	enough & clear	enough & clear	enough & clear	enough & clear	enough & clear	enough & clear
S6	Food Losses in the Flemish Food Industry	Training & guidelines	enough & clear	incomplete	not provided	enough & clear	enough & clear	enough & clear
S7	Improved shelf life	Innovation of products - Packaging	enough & clear	not provided	enough & clear	enough & clear	enough & clear	enough & clear
S8	Eating in Hesse	Process innovation	enough & clear	incomplete	incomplete	enough & clear	enough & clear	enough & clear
S9	Systematic price discount for food close to the expiry date	Price discount	enough & clear	enough & clear	enough but not clear	not provided	enough & clear	not provided
S10	Reducing food waste in restaurants	Training & guidelines	enough & clear	not provided	not provided	not provided	enough & clear	not provided
S11	Every Meal Matters	Training & guidelines	enough & clear	not provided	not provided	not provided	enough & clear	enough & clear
S12	Less food waste in restaurants	Process innovation	enough & clear	incomplete	incomplete	not provided	enough & clear	not provided
S13	The food waste hunters	Process innovation	enough & clear	incomplete	enough but not clear	not provided	enough & clear	not provided
S14	No food waste campaign	Training & guidelines	enough & clear	not provided	not provided	not provided	enough & clear	not provided
S15	From food waste to food resources	Training & guidelines	enough & clear	incomplete	incomplete	not provided	enough & clear	not provided
S19	Measuring and reporting food waste and byproducts	Process innovation	enough & clear	not provided	not provided	not provided	enough & clear	not provided
S20	The whole tree	Process innovation	enough & clear	not provided	not provided	not provided	enough & clear	not provided

Legend

- enough & clear
- enough but not clear
- incomplete
- not provided

- action in factsheet
- action assessed but not in factsheet

Note: The colour code refers to the completeness of the data provided and not to the quality of the action.

In order to calculate the **efficiency** of an action, its results should be compared with the resources invested in implementing it. In terms of resources, most actions reported an overall cost for their implementation, while some reported separately the human resources involved (as full time equivalents). In terms of results, five actions (S4, S5, S7, S9, and S13) reported the total amount of food waste prevented, which enabled to calculate the related economic benefits and environmental savings. For those actions that reported only a percentage reduction of the 'food waste generated per guest' (action S3 and S12), it should be relatively simple, using the data collected to measure the existing KPIs, to calculate the overall amounts of food waste avoided to measure their efficiency.

Some of the actions reported (e.g. S1, S11, and S14) were based on developing and distributing a brochure, to provide tips to food manufacturers, retailers and food services, on how to reduce food waste and/or to donate surplus food. Such actions did not implement any monitoring system to assess the resulting food waste avoided and therefore their efficiency cannot be evaluated as suggested in Section 2.2.3. Nevertheless, in such cases, a measure of outreach efficiency could be performed, by considering the number of entities that have implemented some of the measures suggested as a result of receiving these guidelines. This could be assessed by conducting a questionnaire.

It is worth highlighting that action S2 (sub-type 'Imperfect product sale') performed a comprehensive study assessing the action and its business model regarding the three pillars of sustainability - economic, environmental, and social (Ribeiro et al., 2018). Although this task may be demanding, it is a good example on how a collaboration between those implementing the action and researchers can provide a science-based evaluation of the action.

Actions belonging to this type are generally implemented within the private sector or in the public food service sector. Their **sustainability over time** relies on their ability to achieve food waste reductions, as this implies that less resources are spent on purchasing the food, balancing the costs of implementing the action. Additionally, for those actions introducing new and more efficient processes, their ability to last in time also depends on their level of acceptability amongst management and staff, which in turn relies on a number of factors, including the quality and effectiveness of the training programs (this point was stressed by many respondents when listing success factors). For food waste prevention actions based on the innovation of products (such as date labelling or applying changes to the packaging), their sustainability over time is difficult to assess in the short term, depending mainly on market conditions. Some of the interventions reported were single activities, such as the preparation of guidelines and brochures providing tips on food waste reduction, for these the sustainability over time is linked to durability of their impact, and can be monitored by tracking the change of KPIs in time.

Most of the food waste prevention interventions belonging to this type present a good degree of **transferability and scalability**. Some reported having started as a pilot project and then being upscaled subsequently (e.g. S4 and S7), others stated that they had been (at least partially), replicated in different contexts (e.g. S1, S5, and S6). Other actions started at regional level and after proving successful were upscaled at national level (e.g. S12). Regarding actions targeting the food service sector, one survey respondent stated that, due to the heterogeneity of this sector, specific measures that proved to be effective in one site might not be effective in a different one. Therefore, when transferring this type of action, it is important to keep in mind that it needs to be tailored to the specific context.

Actions aiming at improving the efficiency of the supply chain resulted to be less reliant on **intersectorial cooperation** than the other groups of actions assessed. This is because most of the reported interventions were conducted within an organization (either private or public) with the aim of increasing the efficiency and reducing losses. In other cases, professional organizations were responsible for implementing the action for the benefit of their members. Finally, there were cases in which the action was based on the relationship between a consultancy (in charge of implementing the program), food services (taking part to the program), and in some cases academia/research bodies (in charge of collecting and analysing the data). This was the case for action S3, and in part for action S4, where a

partner company performed the data collection and analysis. An exception is action S8, which presented a high degree of intersectorial cooperation (with the industry, trade associations, NGOs and the public authorities), and identified this as one of the elements guaranteeing its sustainability over time.

Key **learning points** reported for actions aiming at improving the efficiency of the food services sector (by either introducing new processes, conducting training programs, publishing brochures and guidelines, or using digital tools to measure and record food waste) are presented.

Firstly, most survey respondents stressed that to make sure an intervention will be successful it is key to bring staff and management on board since the start, by:

- making a clear link between preventing food waste, saving costs and using the program as a marketing strategy to increase customer satisfaction (particularly relevant for micro enterprises);
- engaging management in the new program by demonstrating its value through business cases and pilot exercises;
- involving both staff and management in the development of the training program;
- focusing part of the training program on awareness raising activities to ensure that staff will positively react to the implementation of food waste reduction measures.

The first two points are particularly relevant for small businesses, which operate on low profit margins and have therefore limited capacity for investing in new programs, for which reason they need to be reassured on the net economic benefit brought by reducing food waste.

Secondly, a learning point reported was that in busy environments such as commercial kitchens, written communication rarely works. Instead, to ensure the success of their program, many used graphic material, videos, user friendly and interactive tools, all of which are more effective in communicating the desired message. Furthermore, they stressed the importance of providing simple tips and recommendations that are easy to introduce in daily operations, especially when the new measures are introduced without the support of a food waste expert.

To conclude, one respondent stated the importance of adopting a systematic approach: *'A systematic approach and involvement from outside can significantly contribute to reducing the food waste. In order for the work to be successful, it requires daily efforts and focus. Most of the kitchen work is characterized by changing focus areas and bustle, and it requires persistence and patience to stick to new routines and workflows'.*

The respondents reported two main challenges. The first regarded the difficulty to recruit restaurants in their program.

'It was hard to recruit restaurants. The consulting firm had to meet business owners face-to-face to explain the project. As an example, 1100 restaurants were contacted, 100 meetings were organised, and amongst which 30 restaurants were very interested and only 20 restaurants participated in the end.'

To overcome this issue, the following elements needed to be in place: *'a cost non-existent for the business owner, a simplified version of the online tool, a way to highlight the project to the general public, an profit coming from the saving generated by food waste prevention actions and a transfer of skills through the training program to the staff.'*

The second challenge reported was that due to the heterogeneity of the restaurant and catering sector, good practices followed and innovations made in one company are not always transferable to another. To overcome this issue, they suggested that food businesses should to be encouraged to plan and implement their own methods to prevent and reduce food waste.

4.5.2 Factsheets on selected actions

Actions considered more complete, i.e. that provided data to evaluate all or almost all the criteria, were selected to be presented in factsheets. In total 8 actions are presented in the factsheets in Annex 6.

4.5.3 Suggestions to improve evaluation

In light of the assessment of the actions conducted, we could identify missing elements essential to comprehensively evaluate most actions, according to the evaluation criteria presented in Section 2.2. Several actions belonging to this group reported having set KPIs, enabling them to track progress against a baseline situation, although only in four cases these included setting SMART objectives including a target. Specific suggestions regarding KPIs that can be used to track progress of this group of actions and to improve the evaluation of their effectiveness and efficiency are provided in Table 11. These are mainly based on the examples provided by those actions that reported good quality data to assess their effectiveness and efficiency. To provide specific suggestions to evaluate the effectiveness and efficiency of this type of action a distinction needs to be made between:

(A) actions that are based on the implementation of practical measures to reduce food waste (e.g. process innovation, product innovation) and that can, therefore, directly monitor and report the amounts of food waste avoided, and

(B) actions that provide information, training or tools to implement or to track success of practical measures to reduce food waste (e.g. digital tools, training and guidelines), for which it is less straightforward to provide a measurement of the food waste avoided.

In order to measure the effectiveness of actions belonging to group (A), **objectives** can be set on **achieving a reduction of food waste** by a certain year against a **baseline year**. It is however important to note that when comparing the food waste generated in the current year against a baseline year, **different levels of productivity** (e.g. the total amounts produced/sold/served) need to be taken into account. For this reason KPIs should be set as the ratio between the food waste generated and the total output of the process considered (examples are provided for different FSC stages), in other words as **waste intensities**. When setting KPIs, the feasibility of collecting such information should be taken into account. Targets should be set on decreasing such KPIs by a certain percentage in a defined time against a baseline year. An action is considered effective if the targets are met.

The first step to measure efficiency is to estimate the overall food waste avoided since the beginning of the action. This can be done by comparing the food waste that would have been generated if the food waste intensity (e.g. in the case of restaurants the waste per capita/per meal) had remained unchanged (from baseline levels) compared to the amount generated with the new (lower) waste intensity. Annex 7 provides some practical examples of how to conduct such calculation.

Based on the overall waste avoided, the related economic benefits and environmental benefits can be calculated (as presented in Section 3). These three quantities should then be divided by the cost of implementing the action to evaluate its efficiency. The cost of the action should include **all resources** used to implement the action, including staff salaries. It is crucial to ensure that results and resources are referring to the same timeframe.

As regards the second group of actions (B), it is likely that there will be no direct measurement on the resulting changes in food waste generated. Therefore, KPIs can be set to track the **outcome of the action** (e.g. the number of restaurants taking part in a training program). As for the previous group, a target should be set for each KPIs to evaluate the action effectiveness. To evaluate efficiency, KPIs measuring the outcome of the action since its start (e.g. total number of businesses tracking food waste) should be divided by the action cost. Also in this case, it is key to ensure that results and resources are referring to the same timeframe.

Table 11. Suggestions of KPIs to measure effectiveness and efficiency of actions of the type 'Supply chain efficiency'.

Group of actions	Criteria	Dimension	Suggested KPIs	Monitoring approach
A Actions based on the implementation of process/product innovations to reduce food waste	**Effectiveness**		Primary production/Manufacturing: food waste generated per kg produced (a) Retail: food waste generated per kg sold (b) Food services: food waste generated per meal served (c)	1. Set an objective e.g. 20% food waste reduction per meal by 2020 compared with 2017. For this type of action, **impact objectives** can be defined. 2. Monitor the KPIs through time to track progress towards the objective
	Efficiency	Food waste	Total amount of food waste prevented** / Cost of the action*	1. Calculate total food waste prevented compared to a baseline year (as presented in Annex 7). 2. Estimate related economic benefits and environmental savings. 3. Divide these by the cost of the action *Make sure results and cost of the action refer to the same timeframe.*
		Economic	Net economic benefits**/ Cost of the action*	
		Environmental	Net environmental savings**/ Cost of the action*	
B Actions that provide information, training or tools to implement or to track success of practical measures to reduce food waste	**Effectiveness**		Number of businesses entering the program Number of businesses tracking FW Number of businesses reporting a FW reduction	1. Set an objective e.g. engage 800 restaurants by 2020. For this type of action, only **outcome objectives** can be defined. 2. Monitor the KPIs through time to track progress towards the objective
	Efficiency	Outreach	Total number of businesses entering the program/ Cost of the action* Total number of businesses tracking FW/ Cost of the action* Total number of businesses reporting a FW reduction/ Cost of the action*	1. Calculate the total number of businesses entering the program/ tracking FW/reporting FW since the start. 2. Divide these by the cost of the action *Make sure results and cost of the action refer to the same timeframe.*

* Cost of action - overall cost of implementing the action (e.g. new equipment, additional salaries, monetization of volunteer hours).
** See Annex 7 for an example of how this should be calculated.
*** Calculated using the food waste prevention actions calculator (presented in Section 3).

4.6 Food waste prevention governance: results of the evaluation of the prevention actions

In total, 15 actions were reported under this type. 4 actions were classified under the sub-type 'Voluntary agreement', 5 actions under the sub-type 'Regulatory framework', and 6 under 'National food waste prevention program'. Actions F5 and N5 were excluded from the assessment because they were yet to start. Action N6 was excluded because it is not a food waste prevention action[14]. Table 12 presents the actions assessed, excluding those that did not agree to be published. The complete list of actions can be found in Annex 4.

4.6.1 Data quality and general evaluation of the actions

The evaluation of the data quality reported for each action for the assessment of each assessment criterion is presented in Table 12.

For the actions 'Voluntary agreement', action V3 provided enough data to assess all the criteria. Actions V1 and V2 were lacking data for the assessment of effectiveness and efficiency. This is because these are ongoing actions and the measurements to monitor the action are planned to be done later. Action V4, although classified under this sub-type, is not exactly a voluntary agreement. It is a collaboration between businesses, organizations, and local authorities sharing information and experiences, identifying barriers e.g. in legislation and developing new ideas to reduce food waste. The action was reported as concluded and no monitoring or evaluation of the action was developed by the respondent.

The lack of data to assess effectiveness is also observed for actions reported under the sub-type 'Regulatory framework'. Two of the actions provided enough data to assess their efficiency. All the other criteria could be assessed with the data provided.

For the 'National food waste prevention program', action N1 provided enough data to assess all the criteria and N3 to assess all except effectiveness.

Actions that provided data to evaluate all or almost all the criteria were selected to be presented in factsheets. The actions selected are highlighted in yellow in Table 12.

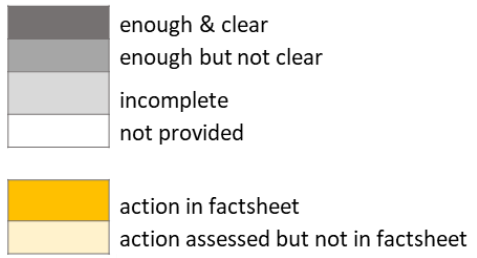
The **'Voluntary agreements'** actions reported have a good **quality of the action design** as they presented a clear identification of the problem, an aim and a strategy to reach that aim. Moreover, these agreements defined specific objectives which included food waste reduction targets against a baseline situation. This allows the assessment of the **effectiveness** of the actions.

However, at this point this could only be done for action V3 because for the other actions monitoring measurements were still to be done at the time of writing this report. Action V3 refers to three voluntary agreements established to tackle food waste at different stages of the food supply chain: manufacture, retail, and hospitality and food service sector. As presented in the factsheet of this action, one of the agreements (CC2) almost achieved its target (92% of the target was achieved) and the other (HaFS) surpassed the target by the double. One of the voluntary agreements (CC3) could not achieve the target set. In fact, there was an increase in the amount of food waste generated. In the period of the action the population grew, food prices fell and more people lived alone. All these factors contributed to an increase in the total amount of food thrown away by households (WRAP, 2017).

[14] The focus of the action reported is to increase the recycling of organic waste.

Table 12. 'Food waste prevention governance' actions and quality of the data provided for the evaluation of each criteria.

Action code	Action name	Sub-type	Quality of the action design	Effectiveness	Efficiency	Sustainability over time	Transferability And scalability	Intersectorial cooperation
V1	Voluntary Food Waste Agreement	Voluntary agreement						
V2	Food Supply Chain Roadmap on Food Loss 2015-2020							
V3	Voluntary Agreements to reduce supply chain food waste							
V4	Partnership for Less Food Waste							
F1	Legislation regarding food donation system in Croatia and Ordinance on VAT	Regulatory framework						
F2	The amendment of the Czech Food Law (2018)							
F3	Legislative change regarding possibility of donating and consuming food after the expiration of "best before date"							
F4	The abolition of a national prohibition to sell best before products past their durability.							
N1	LIFE-FOODWASTEPREV / Wasteless	National food waste prevention programme						
N2	Estrategia Nacional "Más alimento, menos desperdicio"							
N3	Integrated action to reduce household food waste							
N4	Denmark without Waste II - A Waste prevention strategy							



Note: The colour code refers to the completeness of the data provided and not to the quality of the action.

Only action V3 reported an amount of food waste prevented and the cost of implementing the action. This allows the assessment of the **efficiency** of the action in terms of food waste prevented, economic and environmental benefits divided by the cost (as presented in section 2.2.3). The action managed to bring benefits to the different stages covered by the agreements, with the highest (in terms of food waste prevented and environmental savings) observed for the manufacturing sector, followed by the retail sector, and lastly the hospitality and food service sector. An interesting aspect is that although more food waste was prevented at manufacturing than in the retail sector (almost 2 times more) the net economic benefits calculated are quite similar. This is because the cost of the action was more than double at manufacturing than at retail and the value of the food prevented was slightly higher at retail. The higher cost of the action implementation at manufacturing compared to the cost at retail level offsets the economic savings from the amount of food waste prevented.

The **sustainability over time** of these actions is defined by the duration defined in the voluntary agreements. In the case of actions already concluded (action V3), the experience and lessons learned were used to design new and up-scaled voluntary agreements.

In respect to **transferability and scalability,** action V1**,** initially implemented in Norway was transferred to Finland and the Netherlands. Action V3 was transferred within the UK (where it was initially implemented) and outside of the UK through the REFRESH project. The action was up scaled to the new voluntary agreement Courtauld Commitment 2025 (C2025), which has a broader scope by including a national target instead of just applying to signatories, therefore influencing non-signatories.

For what concerns **intersectorial cooperation,** the voluntary agreements involve the collaboration of different entities such as government, business, and NGOs. There is one entity responsible for the management of the voluntary agreement receiving the data from the industries and the food businesses, which are responsible for implementing changes to reduce food waste, collecting data, and reporting.

Each of the voluntary agreements entails different measures (that can per se be considered a food waste prevention action) to be implemented, for example the voluntary agreement described in V2 is composed of 57 actions. In such cases, it is not possible to assess the contribution of each measure to the overall impact of the voluntary agreement. Additionally, there are a series of external factors to the action implementation, e.g. increase in food prices or increase of number of people living alone, than can influence the measured food waste amounts.

In the case of action V3, it was reported that *'critical elements of success include having a strong evidence base upon which to set ambitious but realistic targets and to identify where businesses should target action, practical guidance, tools and case studies to help direct action, clear 'ground rules' to allow open (pre-competitive) discussion between businesses to share learnings and systems to ensure the secure management of confidential signatory data. Having a collective target which WRAP owned, and reported against was important. There has been scepticism amongst some NGOs and others about the ability of voluntary approaches to deliver meaningful impact (vs regulation), and therefore having a sufficiently large signatory base covering a significant percentage of each sector was critical for credibility, and being transparent in reporting on collective progress. The support of national governments was also key to success, for funding, credibility and to ensure a close link between policies and the agreement deliverables. Retailers and trade associations played a central role in helping to recruit and reach the widest possible number of suppliers and smaller businesses.'*

Challenges reported were related with the *'availability and quality of food waste data, particularly in the early years, which affected the engagement of some businesses (low levels of awareness around the extent of food waste in their operations, and the benefits of taking action) and the ability to track change over time. Considerable effort has been made to provide practical guidance to build industry capability in this area.'*

The **'Regulatory framework'** actions received were mainly changes in the legislation to facilitate the donation of food. No objectives/targets were defined for the actions and therefore, it is not possible to assess their **effectiveness**. The KPIs 'amount of surplus food redistributed' and the 'financial value of surplus food redistributed' were reported by the respondents having as baseline the values registered in the year previous to the action implementation. In both cases, there was an increase of the KPIs figures.

Similarly to what was observed for many actions on food redistribution, the cost of action implementation reported in these actions was zero. This is unrealistic as the changes in the law have costs associated (for example, the number of hours worked by the staff involved in law drafting, consultations, studies to support impact assessment) and costs related to market implementation of legislative proposals that are considered in the assessment of policy options as part of the impact assessment process, etc. Therefore, we would conclude that the information provided is incomplete to calculate the **efficiency** as described in 2.2.3.

Being a law, the **sustainability over time** of the actions reported is guaranteed unless changes in the regulation are made. Nevertheless, the actions are still dependent on the existence of food donors and entities that organize the redistribution of the food. The later depend as well on funding from the government.

The **intersectorial cooperation** in this type of action exists between the government that defines the law and the different entities involved in a food redistribution scheme (private companies, charities, NGOs).

In what concerns **transferability and scalability**, none of the actions reported was transferred or up-scaled.

All the actions classified as **'National food waste prevention program'** were focused on reducing food waste generated by households. The 'amount of food waste prevented' was reported by the respondents (N1, N2, and N3) but only action N1 had defined a food waste reduction target. Nevertheless, the amount of food waste prevented reported in this action is an estimation of what the action is 'expected' to achieve and therefore, **effectiveness** could not be assessed at this moment. Measurement of food waste levels will be carried out in 2020. Action N1 was designed considering several KPIs that will allow assessing the effectiveness and efficiency of the action in different dimensions, including behavioural change. To this end, surveys were carried out before the action and after one year of implementation. The complete list of indicators considered in this action is reported in the action's factsheet.

Actions N2 and N3 reported high values of food waste prevented and the cost of action implementation allowing assessing their **efficiency,** which resulted in economic and environmental savings.

Regarding the **sustainability of the action over time**, at the date information was collected for this exercise (September 2018), the programs are currently ongoing (actions N2 and N3) or planned to be continued in a second phase (N1). The second phase was designed considering the learnings of the first phase and adjustments were made on the areas of intervention and timeframe.

Action N3 has been transferred and implemented in several countries.

Similarly to the voluntary agreements, also the national food waste prevention actions show a high degree of **intersectorial cooperation** involving the cooperation of different stakeholders, including the entity responsible for developing and coordinating the plan and food and other businesses, consumer and community groups, food regulators, local and national governments.

Action N3 highlights as key success factors:

- 'A comprehensive evidence base that helped secure high profile media coverage, the interest of a wide range of partners and consumers themselves. This evidence

base helped direct the development of effective resources and recommendations for partners.
- Working with a wide range of partners, who had the trust of consumers and who could reach different groups of the population. This included retailers and large brands, local authorities, community and other groups etc.
- Adopting a positive and helpful tone, and ensuring that messages and benefits were motivating to consumers (e.g. monthly/annual cost savings were much more appealing to most than 'hard' environmental messages) and advice was easy to implement (e.g. 'fruit in the fridge', simple rather than complex recipes).
- Taking a multi-channel and multi-pronged approach. For example helping to dispel myths and concerns around freezing food was made much easier when done in parallel to changing 'official' advice and on-pack labelling.
- Supporting behaviour change work with technical innovations that increased shelf-life, improved labelling, offered more appropriate pack sizes and new functionality that kept food fresh for longer.
- Addressing barriers 'head on' with new evidence and through engagement with influential stakeholders (e.g. the perception that packaging was 'bad' for fresh produce).'

Action N3 reports as major challenges the difficulty *'to ensure 'joined up' communication with consumers and businesses on related issues such as food waste recycling, food safety and diet. Working closely with governments and regulators helped mitigate against this risk. Securing sufficient funding/resources from the public and private sector is also not easy, when large scale and difficult behaviour change is needed. Research showing how concerned consumers are about food waste, and what they expect business and others to do to help them, has been helpful.'*

4.6.2 Factsheets on selected actions

Actions considered more complete, i.e. that provided data to evaluate all or almost all the criteria, were selected to be presented in factsheets. In total 8 actions are presented in the factsheets in Annex 6.

4.6.3 Suggestions to improve evaluation

'Voluntary agreements' and **'National food waste prevention programmes'** entail a combination of specific measures/actions that can be of different types/sub-types. Although additional KPIs can be used to monitor the action development, an overarching KPI relevant to consider in these types of action is the 'total amount of food waste prevented'. All the voluntary agreements reported, presented an objective/target defined using this KPI, which enables to measure their effectiveness (when a monitoring system is implemented). These actions reported costs of implementation enabling to assess the efficiency of the action. Other objectives (and related KPIs) can be defined depending on the measures included in the agreement/programme. For example, if one of the actions is an awareness campaign, objectives and KPIs presented in Table 9 can be used. The different types of action and possible KPIs were already discussed and presented in the previous sections (Table 7 for 'food redistribution' actions, Table 9 for 'consumer behaviour change' actions, and Table 11 for 'supply chain efficiency' actions). The action planner can select among them depending on the combination of actions considered under the agreement/programme. Action N1 is a good showcase of the different types of KPIs that can be used to monitor the effectiveness and efficiency of these types of action.

The assessment of '**Regulatory frameworks'** and **'Fiscal Incentives'** actions is quite particular. These actions do not present a specific objective (i.e. no target is defined) and in fact this may be difficult to establish for these types of action. Another critical aspect is to determine the cost associated with the implementation of regulatory policy instruments. It is very challenging to have cost estimation as currently data are only available for market-based instruments such as fees or taxes (OECD, 2017). Additionally, when regulators assess costs of implementing regulatory frameworks they are not only looking

at government's own administrative costs but, in most cases, the much larger cost impacts on the actors involved (European Commission, 2014). Therefore, the assessment of the effectiveness and efficiency of these actions is not straightforward. However, according to what was reported in the actions collected on regulatory framework KPIs used could be 'amount of surplus food redistributed' or 'financial value of surplus food redistributed' to monitor the progress of these actions, when the aim of the regulatory framework or of the fiscal incentive is to promote the redistribution of surplus food. Nevertheless, as it may be the case that other factors may influence the food redistributed, other KPIs can be 'the number of applications towards the fiscal incentive (e.g. tax credits)' or 'the monetary value related to the fiscal incentive'.

4.7 Additional actions collected

Eight additional actions were analysed after collecting them through a separate review of the literature and grey literature and contacting them directly to obtain the missing information. The list of actions is reported in Annex 5.

According to the classification presented in Section 2, the actions analysed belong to the following types:

- Redistribution (6)
- Consumer behaviour change & Supply chain efficiency (1)
- Food valorisation (1)

Each action was analysed following the framework presented in section 2.2 and the results are presented in factsheets in Annex 6.

Overall, all eight actions reported a clear identification of the problem, aim and objectives to reach, and a monitoring system to track progress through time (both in terms of amount of food waste avoided or surplus food redistributed, and in terms of social impact). Six actions also reported having in place target(s) to meet. A particularly good example is the initiative Too Good To Go, that not only has targets in place, but is reporting through its website the state of the progress towards such targets. However, often the targets reported were referred to the future; therefore, the effectiveness as defined in section 2.2.2 could not be assessed at the time of writing.

All eight actions provided amounts of food waste avoided, although in one case, the Local Food Waste Hub, this was a projection, as the pilot year was not completed at the time of reporting. This enabled the calculation of net economic benefits (when not already provided directly by the actions) and environmental savings. Seven actions reported the cost and six actions reported separately the volunteer hours (the remaining two did not have volunteers). Five actions provided a measure (quantitative or qualitative) of the social impact, e.g. in terms of meals donated, volunteers involved, feedback on the benefits of the action on the beneficiaries collected through surveys, job creation, professional skills development. Three actions provided a measure of their outreach, such as number of users of an App, number of people reporting an increase in awareness or a change in behaviour.

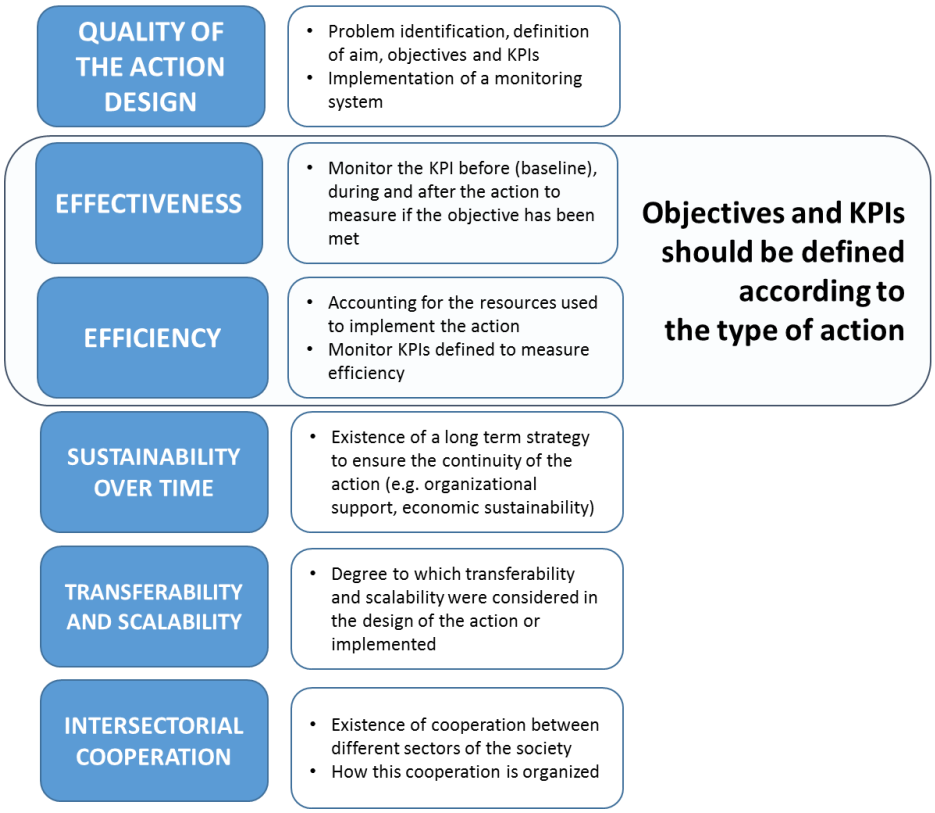
One of the interventions analysed (Local Food Waste Hub) is a pilot project, while the remaining 7 interventions have been growing since the start, with two now at international level. Various strategies were reported to ensure the long-term sustainability of these actions (e.g. training of staff, relying on volunteers to keep the costs low, marketing operations, relying on a robust business model), but a strategy mentioned in almost all cases was the crucial role of having a strong network of partners. As can be seen in the assessment of the intersectorial cooperation presented in the factsheets, the support of several different sectors of society was mentioned in almost all cases as key to the success of the intervention. For more information on each action analysed the reader is referred to the factsheets in Annex 6.

5 Discussion and conclusions

5.1 General considerations on the actions assessed

This report presents the results of the pilot exercise conducted by the EC on the collection and evaluation of food waste prevention actions. To this end, an evaluation framework of food waste prevention actions was developed based on a set of criteria (presented in Figure 13). The actions collected were divided in 4 categories: 'Redistribution', 'Consumer behaviour change', 'Supply chain efficiency', and 'Food waste prevention governance'. Several sub-types of action were defined under each category (Table 3). The high diversity of actions increased the challenge of establishing an evaluation framework that could be used for all types of action. Although the suggested evaluation framework can be used to assess all the actions, the indicators used to conduct the assessment should be tailored to the type of action, especially in the case of the evaluation of effectiveness and efficiency. Effectiveness is defined as the degree to which an action was successful in producing the desired result and achieving its goal(s). It is to be expected that actions as diverse as an awareness campaign, a measure to increase the efficiency of a commercial kitchen, and a food redistribution program, will have different goals and therefore the indicators used to measure their effectiveness will differ significantly. In the same way, the results of prevention actions that are used to measure their efficiency, vary substantially across action types and should therefore be assessed differently. Therefore, such evaluation framework is mostly useful to guide practitioners in the design phase of a food waste prevention action, and to compare the performance of actions belonging to the same typology; however, it should not be used to compare actions evaluated using different KPIs.

Figure 13. Criteria for the evaluation of food waste prevention actions**.**

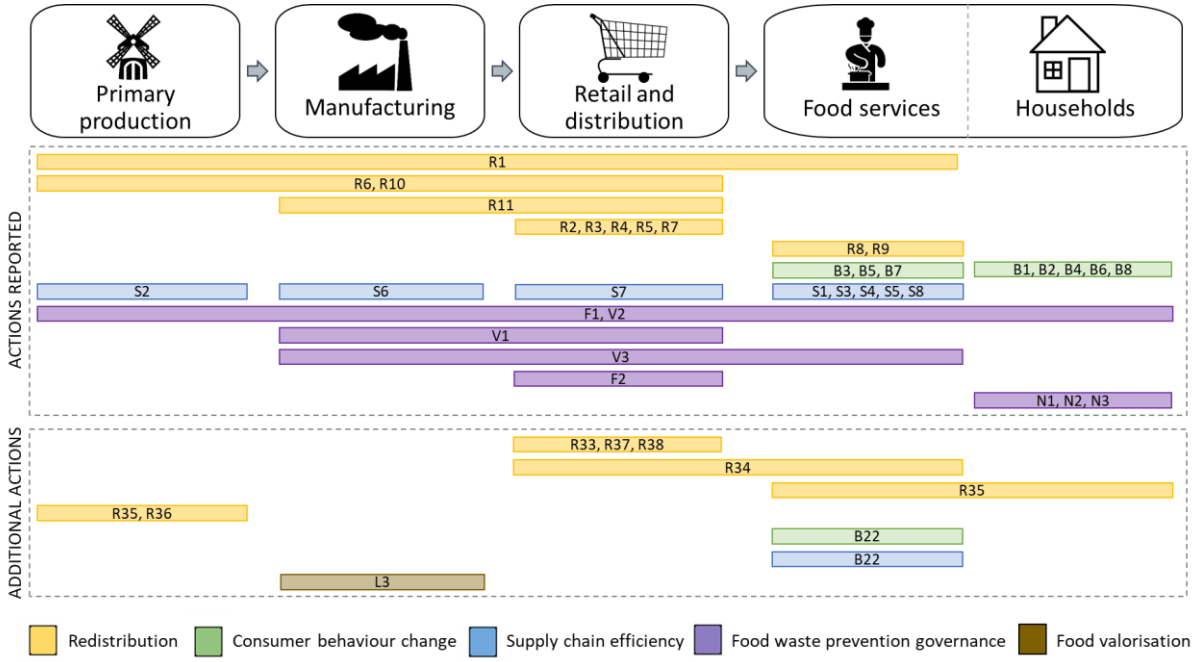


In this exercise, 91 actions were collected through a survey and individually assessed to test the evaluation framework developed. There are a number of food waste prevention actions that were successful in preventing food waste in different stages of the FSC that

are illustrated in this report. Nevertheless, there was a significant lack of data to enable the assessment of the performance of many of the actions reported, specifically to determine their effectiveness and efficiency as defined within the evaluation framework. Of the 91 actions submitted, 34 were selected to be presented in factsheets, as they provided enough information to assess all or almost all the criteria. A review of the literature was conducted to complement the actions provided collected the survey, and 25 actions were selected and contacted to obtain the missing information. Of these, 8 answered back and were therefore analysed and are reported in factsheets.

Figure 14 shows the stages of the FSC covered by the actions presented in the factsheets, differentiating by type of action. This selection covers all the stages of the FSC; however, a lower number of actions was implemented at primary production and manufacturing stages. Most of the actions selected reported the amount of food waste prevented, which enabled to determine the economic benefits and environmental savings as defined in the evaluation framework. In all the cases where this could be assessed, the calculation of the net economic benefit gave a positive result, i.e. the sum of the value of food waste avoided and of the cost of the waste treatment avoided was higher than the operational cost of the action under the assumptions made (e.g. the value given to the recovered food, the cost of waste treatments). The range of benefits is quite wide depending on the scale of the action and other elements (e.g. the involvement of volunteers enabling to reduce significantly the costs).

Figure 14. Stages of the supply chain covered by the actions presented in factsheet.



Most of the redistribution actions reported an amount food waste prevented. These actions are mainly implemented at the retail and distribution stage. Intersectorial cooperation is at the core of their operations and in fact, the cooperation among different actors is identified as a key aspect of success. Other key factors for success are to have a diversity of donors and low operational costs to ensure the sustainability of the action over time, and to facilitate the donation process, by accommodating the required logistic arrangements and simplifying the process.

Very few of the consumer behaviour change actions reported an amount of food waste prevented. Studies in the literature that have assessed consumer food waste prevention actions reported a lack of evidence on how effective these interventions are at preventing consumer food waste (Stöckli et al., 2018; Wunder et al., 2019). This lack of evidence jeopardizes the development, funding and implementation of actions that effectively reduce food waste. In the few cases where an evaluation was performed, this was done following

different methodologies which makes their comparison impossible (Wunder et al., 2019). Despite the difficulty in identifying effective actions, some seem to be more impactful than others. This is the case of interventions that increase consumers' skills in food management (e.g. planning of food purchases, storing food correctly, maintaining an overview of the food in stock, reusing leftovers) or campaigns that aim to influence social norms. On the other hand, campaigns only focused on providing information and increase awareness of the negative impacts of food waste do not seem to have an impact (Stöckli et al., 2018; Wunder et al., 2019). As suggested by one of the survey respondents, one social norm that needs to be tackled to reduce consumer food waste generated in restaurants is the idea that portions should always be abundant (often containing more food than what can be consumed by an average customer). As long as restaurant guests expect this, it will be very challenging for restaurants to effectively put in place actions to reduce plate waste. Furthermore, in several countries there is no culture of taking home leftovers; although this practice only partly leads to a reduction of food waste (doggy bags might not be consumed in the end), overcoming such cultural barrier could prove beneficial in reducing food waste and changing consumers' attitude towards food leftovers.

Reynolds et al. (2019) conducted a review of academic literature focusing on applied interventions targeting food waste at consumption stage. They identified and analysed 17 interventions that claimed to have achieved a food waste reduction. According to the authors, interventions that proved to be effective in reducing food waste included changing the size of plates in hospitality, reporting up to 57% of food waste reduction, and changing the nutritional guidelines in schools, reporting to reduce vegetable waste by up to 28%. Other actions analysed such as cooking classes, fridge cameras, food sharing apps, advertising and information sharing showed no robust evidence of being effective.

Several of the supply chain efficiency actions reported an amount of food waste prevented. An action successful in preventing food waste at the retail stage was based on the implementation of a new packaging technology ensuring a longer shelf life of products. An action that proved successful in preventing food waste at primary production was the creation of an alternative market for 'ugly' fruits and vegetables. This action is self-sufficient and has been up scaled and transferred to other countries. Three actions focusing on the introduction of new procedures to reduce food waste generated by food services, reported achieving a food waste reduction. A key aspect to ensure their success was the engagement of the on-site staff. Of these, only one action enabled a comprehensive assessment of its economic performance, reporting a positive net economic benefit before the end of the second year.

Although being limited in scope, this is in line with the findings of three studies performed by the Champions 12.3 analysing actions implemented in hotels, restaurants and in catering sites. The studies focusing on hotels and restaurants have shown an average benefit-cost ratio of 7:1 (i.e. a benefit of 7 euros per each euro spent) over a 3-year timeframe (Clowes et al. 2018b, Clowes et al. 2019). A similar study, focusing on the catering sector, presented an average benefit-cost ratio of more than 6:1 over a 3-year timeframe (Clowes et al. 2018a). Common key strategies identified in the three sectors for achieving food waste reduction were to measure food waste, engage staff, reduce food overproduction, and repurpose excess food. Specific strategies for hotels were to rethink the buffet by reorganizing the placement of certain foods, to display messaging about food waste near the buffet and to offer high-value items 'a la carte'. Simple changes such as providing smaller plates or selling leftovers from the buffet later in the day also enabled to reduce significantly the amount of food waste (Clowes et al. 2018b). Specific strategies for restaurants were to rethink inventory and purchasing practices, by analysing historical waste data and qualitative information gleaned from staff engagement; to negotiate with its suppliers a different delivery schedule that better fits the restaurant's specific need; or to restructure its inventory management system and tailor it to the restaurant's specific circumstances (Clowes et al 2019). For the case of catering services, a specific key strategy was to start by using pilot projects to test a food waste reduction program, allowing caterers to work through potential issues with a small number of staff and then to define a clear action plan (Clowes et al. 2018a). Nevertheless, it is important to keep in mind that

most restaurants are not able to do so and need to be helped if they need to engage in actions which imply some monitoring. External (third party) cooperation is needed to perform such monitoring in the majority of cases (HOTREC, 2019).

The voluntary agreements already concluded reported a reduction in food waste at manufacturing, retail, hospitality and food service sector. This is in agreement with the results of the REFRESH analysis on existing voluntary alliances, concluding that voluntary agreements show high potential for food waste reduction by bringing supply chain stakeholders together and can be adapted to any national context (REFRESH, 2016). In the REFRESH policy brief recently published, key aspects for the successful implementation of a voluntary agreement were identified (Burgos et al., 2019). REFRESH has also developed a Blueprint tool (REFRESH, 2019) outlining 5 pillars to help defining the country baseline scenario and readiness for the establishment of a Voluntary Agreement.

Actions classified as National Food waste prevention programmes were focused on targeting food waste at household level. Two actions were successful in preventing food waste. One of the actions evaluated in this report (N3) was also analysed by the Champions 12.3 that also concluded on its success (Hanson & Mitchell, 2017).

5.2 Improving the evaluation of food waste prevention actions

As presented in Figure 15, the development of a food waste prevention action can be divided in three stages: 1. Action planning, 2. Action implementation, and 3. Action conclusion and follow-up. The first stage corresponds to the planning of the action and includes:

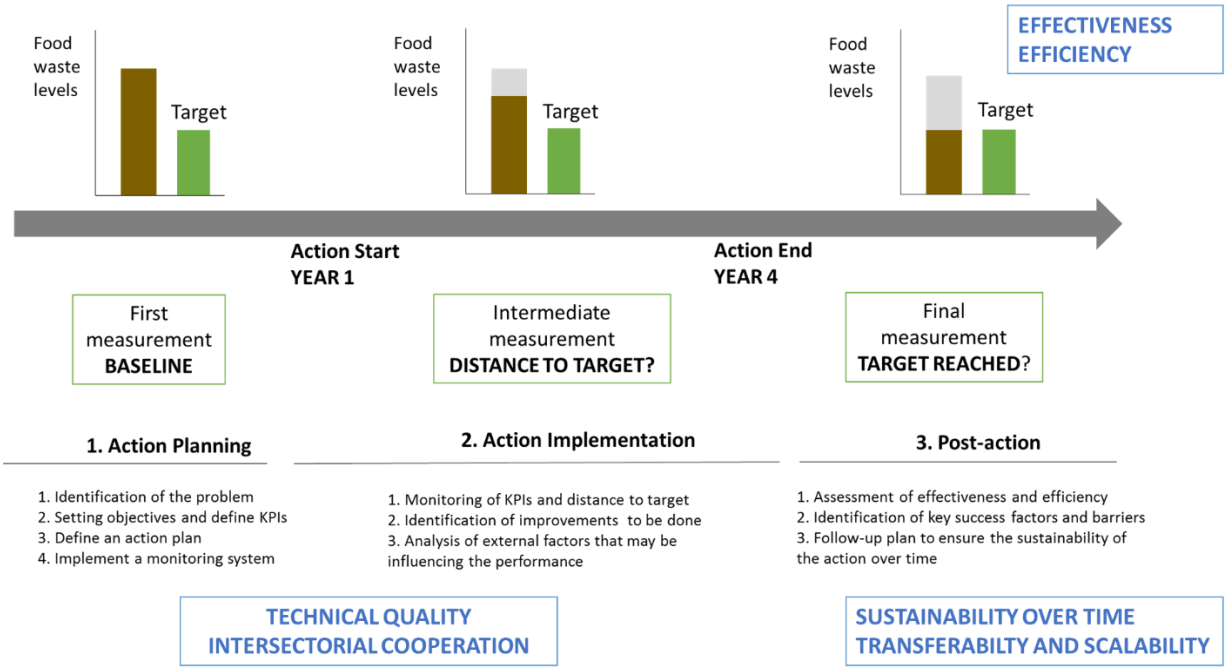
i) identifying the problem,
ii) setting the aim, objectives and related KPIs,
iii) defining a plan to reach the objectives, and
iv) implementing a monitoring system to measure the baseline situation and to monitor the progress and success of the action.

The second stage is the 'action implementation' during which the KPIs need to be monitored and reported systematically to analyse how the action is progressing, and, if necessary, identify opportunities for improvement. In the last stage, when the action is concluded, the effectiveness and efficiency of the action can be evaluated.

Key success factors and barriers should be identified to support the development of future actions and if appropriate to design a follow-up plan to ensure the long-term sustainability of the action. Furthermore, in order to assess the long-term effects of an action, the same KPIs should be monitored after the conclusion of the action in order to verify whether the results achieved are maintained over time. In the case of continuous actions, which have been implemented for years such as many food donation schemes, this can be translated in e.g. one-year periods and progress should be measured continually from year to year.

As pointed out previously, the use of the evaluation framework developed to assess the effectiveness and efficiency of the actions was limited due to the lack of data reported. The main gap observed among the actions collected, was the absence of SMART objectives, related KPIs, and a monitoring system to track their progress towards achieving their goal(s). These elements are essential to assess the effectiveness and efficiency of the actions and to identify elements of success and obstacles, which can ultimately prove very useful in the development and implementation of future actions. This is in line with the three-step approach advocated by the Champions 12.3 to reduce food waste: Target, Measure, and Act. To be successful in reducing food waste it is important to set targets for food waste reduction, measure food waste generated to establish a baseline, and implement actions to reduce food waste (Flanagan et al., 2018). As for some type of actions it is very difficult to quantify amounts of food waste prevented (e.g. awareness campaigns) alternative KPIs should be selected to evaluate the performance of the action.

Figure 15. Stages of development of food waste prevention actions and related criteria.



To support the development of future actions, examples of objectives and KPIs useful to evaluate prevention actions are provided for each type. Suggestions of KPIs for measuring the effectiveness and efficiency of prevention actions are presented in Table 7 for redistribution actions, Table 9 for consumer behaviour change actions and Table 11 for supply chain efficiency actions. For the last two groups of actions a distinction was made between prevention actions where it is possible to measure the food waste reduction (by setting impact objectives) and those where the food waste reduction cannot be measured, in which case examples of outcome objectives were provided instead. For actions classified as 'voluntary agreements' and 'national food waste prevention programmes' an overarching KPI that can be used is the 'amount of food waste prevented'. However, since these actions are often the result of combining different types of food waste prevention actions, specific KPIs already identified under the other types of action can also be included.

Some actions on 'surplus food redistribution' and all the ones classified as 'regulatory frameworks' stated that the action had no operational costs. For the first group of actions, this can be explained considering that these actions might rely solely on volunteers and donated infrastructure (e.g. trucks, computers). For the regulatory policy instruments it is very challenging to have cost estimation as currently data are only available for market-based instruments such as fees or taxes (OECD, 2017). Nevertheless, to evaluate the efficiency of a food waste prevention action it is crucial to fully capture the total cost of the action implementation, which should reflect all the resources used to implement the action, including human resources as volunteers. These resources can then be monetised (e.g. considering the total hours worked by the volunteers and the gross minimum hourly wage in the country). It is also important that the costs and the results obtained from an action refer to the same timeframe.

The list of resources used in implementing the action can also be used to determine the environmental impacts of the action implementation. So far, this aspect was not considered in the calculation of the net environmental benefits of the actions assessed due to a lack of data. However, it is considered fundamental to identify potential trade-offs between the environmental impacts associated with a prevention action and the environmental benefits related to the achievement of a more efficient use of resources.

Regarding the measurements of the food waste amounts to establish baselines and monitoring the action, it is very important that this is done following a common methodology, clearly stating what is the definition of food waste used in the accounting exercise (e.g. stating if the food waste amounts are referring to edible parts of food or are including both edible and inedible parts). In the specific case of food redistribution actions, the amount to be captured in the context of food waste prevention is the surplus food recovered from the supply chain and subsequently redistributed. Food that is purchased by the organizations/charities to redistribute i.e. that is not surplus food, should not be accounted as food waste prevented. A clear account would contribute to decrease the uncertainties associated with empirical analyses, thus contributing to a more precise evaluation of food waste prevention actions (OECD, 2017). To contribute to the systematization of food waste accounting, the EC is about to publish a delegated act establishing a common methodology and minimum quality requirements for the uniform measurement of level of food waste generated in MS (European Commission, 2019).

Additional relevant aspects to consider when assessing the impact of a food waste prevention action include:

- Analyse the influence that socio-demographic and other context-related factors that may have in the results of the action, such as increase in number of inhabitants, changes in food prices, rising number of single households, economic recession causing a reduction in disposable income and therefore food waste, either because they buy less food or waste less (Priefer et al., 2016). A holistic view is essential to understand the variability introduced by external factors and help establishing a causal linkage between a certain prevention action and the amounts of food waste prevented, and can contribute to the design of future actions. Furthermore, understanding if the impact of an action is sustained in time is very important in assessing cost-effectiveness.
- Consider possible shifts of food waste which is avoided in one level of the FSC due to a food waste prevention measure to another level of FSC (e.g. doggy bags for consumers to take surplus food home for later consumption, a lower amount of food waste is generated by the restaurant but nobody knows how much of the doggy bag food is really eaten later). Such an unintended negative impact should be already considered within the design phase of the action (e.g. in the course of a risk analysis).

The systematic evaluation of food waste prevention actions allowed the testing of the questionnaire developed to collect data on food waste prevention actions as well as the proposed evaluation framework. This analysis revealed important information gaps that hinder the systematic impact assessment of food waste prevention interventions. This is in agreement with what is reported by other studies in the literature (Reynolds et al., 2019; Stöckli et al., 2018; Wunder et al., 2019). Future activities should be designed and implemented ensuring the provision of the data required for their evaluation. Additionally, the database of actions collected could be expanded by means of tailored surveys developed for each type of action, to optimize the data collection and lighten the burden of the respondents in completing the survey.

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List of abbreviations

C2025	Courtauld Commitment 2025
CC2	Courtauld Commitment 2
CC3	Courtauld Commitment 3
DG	Directorate General
EC	European Commission
ES	Spain
EU	European Union
FW	Food Waste
FLW	Food Losses and Waste
FSC	Food supply chain
GHG	Greenhouse Gas
HaFS	Hospitality and food service sector
HOTREC	Confederation of National Associations of Hotels, Restaurants, Cafés and Similar Establishments in the European Union and European Economic Area
IT	Italy
JRC	Joint Research Center
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
MS	Member State
NGO	Non-Governmental Organization
NL	Netherlands
OECD	Organisation for Economic Co-operation and Development
SDG	Sustainable Development Goal
S-LCA	Social Life Cycle Assessment
SMART	Specific, Measurable, Achievable, Relevant, Time-Bounded
UK	United Kingdom
USA	United States of America
WRAP	Waste and Resources Action Programme
WRI	World Resources Institute

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Annex 1. Reporting template/survey for food waste prevention actions

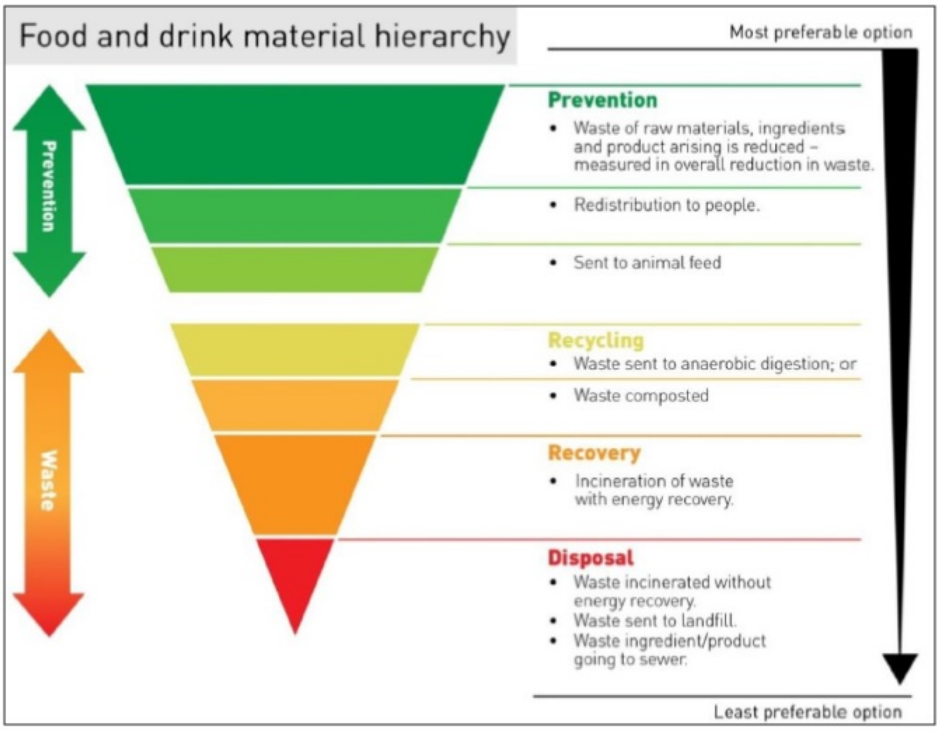
Food waste prevention: reporting on key initiatives

1. Introduction

Food waste prevention: reporting on key initiatives

Thank you for participating in this survey on food waste prevention, initiated by the 'Action and Implementation' sub-group of the EU Platform on Food Losses and Food Waste (FLW). The objectives of this survey are (1) to collect and share, in a common format, relevant information on both ongoing and completed food waste prevention initiatives and (2) to carry out analyses of their effectiveness in order to define "best practices" and lay down key recommendations for action for each stage of the food supply chain. Through this assessment, the European Commission aims to support all actors in defining effective measures needed to prevent food waste and facilitate sharing of experience and best practice in order to accelerate the EU's progress towards Sustainable Development Goal (SDG) 12.3 targets, in line with the mandate of the EU Platform on FLW.

The survey allows information to be collected on any type of food waste prevention initiatives regardless of their scope and size, as long as these qualify as **food waste prevention actions**. For further guidance on what type of initiatives qualify as preventive actions, please see below the food and drink material hierarchy elaborated by WRAP (WRAP 2018, Food waste measurement principles and resources guide).



On the basis of the information provided through this survey, the Commission will carry out an evidence-based assessment of the effectiveness and efficacy of the various initiatives taking into account their economic, environmental and social impacts.

Outcomes of the survey and analysis carried out by the Commission will then be further assessed by the sub-group which will agree criteria to be utilised in order to define "best practice" in food waste prevention. Based on this work and other relevant findings, the sub-group will propose recommendations for action at each stage of the food value chain: primary production, processing and manufacturing, retail and other distribution of food, restaurants and food service sector and households. Following review and validation by the EU Platform on FLW, the recommendations will be published by June 2019. For more information on this, please see the Roadmap of the sub-group 'action and implementation' published on the EU Platform on FLW website.

Please note that this reporting template and activity to collect and analyse food waste prevention initiatives are part of a pilot exercise. At the end of the exercise, the Commission, together with members of the sub-group on 'Action and Implementation', will assess whether there is the need to introduce any changes for the future use of the survey. The Commission intends to continue collecting and analysing food waste prevention initiatives beyond the completion of this first exercise in 2019.

Instructions to fill in the survey

The survey can be used to report information for single and multi-component food waste prevention initiatives (e.g. national food waste prevention programs), either completed or ongoing.

The survey consists of two parts: the first part (section 2) is designed to collect general information about the action (e.g. actors, objectives, etc.), while the second one (section 3) aims to collect information on the implementation and results (e.g. economic, environmental and social indicators, audience impact, etc.).

You are encouraged to provide as much information and data that you have available in regard to the indicators included in the survey in order to allow for an evidence-based assessment of the initiative. It is particularly relevant to provide information on the amount and economic value of food waste prevented due to the implementation of the prevention action (section 3.2) as this will enable a more comprehensive assessment of the action. Where such information is missing, the Commission and sub-group members, will define the best way to assess the effectiveness of these initiatives. This could include the use of proxies obtained from assessment of similar initiatives (e.g. WRAP or REFED) and/or information gathered from European statistics (e.g. the value of food across Member States).

The information provided on the implementation and results of the action (section 3) should correspond to the duration of the action, as specified under section 2.8.

The following categories of fields are introduced:

- Fields marked with * are mandatory. If you do not indicate this information, the analysis cannot be carried out.

- Fields marked with ** are highly recommended to fill in, but they are not mandatory. The initiative can be assessed for its overall effectiveness if no information is provided in these fields; however the analysis of impacts and benefits will be less comprehensive and less accurate.

The survey offers the possibility to upload supporting documents at the end of the document/by certain sections, where relevant.

Please send back your filled in survey by 27th of July 2018.

Should you have any questions regarding the survey, please send us an e-mail at: **SANTE-FOOD-WASTE@ec.europa.eu**

2. General information

***2.1 Title of the food waste prevention action**

Is this action concluded or ongoing?

- ☐ Concluded
- ☐ Ongoing

***2.2 Type of action**

If the action includes different types of actions, please select the predominant action type and provide in the box below additional information on other associated activities.

- ○ Food redistribution
- ○ Gleaning
- ○ Production of animal feed
- ○ Supply chain efficiency (e.g. manufacturing/processing optimisation, cold chain management, inventory management, storage and handling, improving canteen/food service efficiency, logistics)
- ○ Packaging (e.g. innovation to increase shelf life, facilitate use, different formats e.g. single-serve etc…)
- ○ Innovation (e.g. value-added processing; marketing)
- ○ Date marking
- ○ Awareness/educational campaigns (e.g. consumer communications, conferences, events)
- ○ Digital tools (e.g. websites, apps)
- ○ School programmes (e.g. educational materials)
- ○ Training
- ○ Awards/certification
- ○ Public procurement (e.g. improving logistics in public procurement)
- ○ Fiscal incentives
- ○ Voluntary/framework agreements
- ○ Regulatory frameworks/policies
- ○ National food waste prevention programme
- ○ Other

If you selected other, please specify

If relevant, please add here additional information

500 character(s) maximum

2.3 Objectives

*Reason and objectives of the action

Please introduce here the rationale for implementing the action and the main goals pursued including, where relevant, any specific objectives and/or information related to the target audience(s) (e.g. number of households/ individuals targeted,etc.).

**Food waste prevention target

If applicable, please introduce the food waste reduction target defined for the action.This information should correspond to the duration of the action.

%

**Baseline

Please introduce information on the baseline against which progress towards the goal of the action was assessed (e.g. food waste levels and/or data on consumer understanding, behavior etc prior to the launch of the initiative).

*2.4 Short Summary

1500 character(s) maximum

Please include here a summary of the implementation of the action (e.g. policy measures, training programmes, campaigns implemented, funds allocated etc)

*2.5 Actor(s) involved in implementation

Multiple answers possible

- ☐ National government
- ☐ Regional government
- ☐ Municipalities
- ☐ NGOs
- ☐ Trade associations
- ☐ Professional organisations
- ☐ Farmers
- ☐ Processors/manufacturers
- ☐ Wholesalers
- ☐ Retailers

- [ ] Food service
- [ ] Waste collection companies
- [ ] Restaurants/hospitality sector
- [ ] Healthcare
- [ ] Schools
- [ ] Academia/research
- [ ] Consumers
- [ ] Opinion leaders (e.g. high profile media, celebrities, chefs)
- [ ] Multi-stakeholder
- [ ] Other (e.g. please indicate under this section if the actors who were involved in the implementation were SMEs)

If you selected other, please specify

*From the list above, which of the actors were responsible for the implementation?

In case of multiple actors, please identify the lead and/or coordinator with overall responsibility for the initiative.

***2.6 Target audience**

Multiple answers possible

- [ ] National government
- [ ] Regional government
- [ ] Municipalities
- [ ] NGOs
- [ ] Trade associations
- [ ] Professional organisations
- [ ] Small and medium enterprises
- [ ] Entrepreneurs
- [ ] Farmers
- [ ] Processors/manufacturers
- [ ] Wholesalers
- [ ] Retailers
- [ ] Food service
- [ ] Restaurants/hospitality sector
- [ ] Healthcare
- [ ] Schools
- [ ] Academia/research
- [ ] Consumers
- [ ] Multi-stakeholder
- [ ] Other (e.g. please indicate under this section if the action targeted specifically SMEs)

If you selected other, please specify

If relevant, please add here additional information on the target audience

* **2.7 Geographic coverage**

- [ ] Local
- [ ] Regional
- [ ] National
- [ ] International

Please specify further (e.g. National: France)

2.8 Timeline

* Start date

* Duration (months)

* Frequency

- ( ) Single action
- ( ) Recurring action (e.g. repeated every summer)

If you selected recurring action, please specify the frequency

* **2.9 Type of funding**

- [ ] Private
- [ ] Public
- [ ] Private-public
- [ ] Crowd-funding
- [ ] None
- [ ] Other

* **2.10 Contact information**

Contact person

* Email

3. Implementation and results

*** 3.1 Was there a monitoring system put in place to measure efficiency and/or efficacy of the action?**

- ○ Yes
- ○ No

If you selected yes, please describe it.

500 character(s) maximum

3.2 Information on food waste prevented by the implemented action

****** Amount of food waste prevented

You can report this amount either in kg or in number of meals donated. In case you choose the latter, proxies to determine the amount in kg (e.g. the weight of a typical meal used by WRAP - 500g) will be used.
Preferably, this amount should refer to the total amount of food waste prevented due to the implemented action. This information is very important for a comprehensive assessment of your action. In case you are not able to provide this information, proxies based on measured outcomes of similar initiatives might be used.

kg

Number of meals donated

Period to which the amount prevented refers to

months

* Stage(s) of the supply chain where food waste was prevented

- ☐ Primary production
- ☐ Processing and manufacturing
- ☐ Retail and other distribution of food
- ☐ Restaurants and food services sector
- ☐ Households

**Composition of the food waste prevented

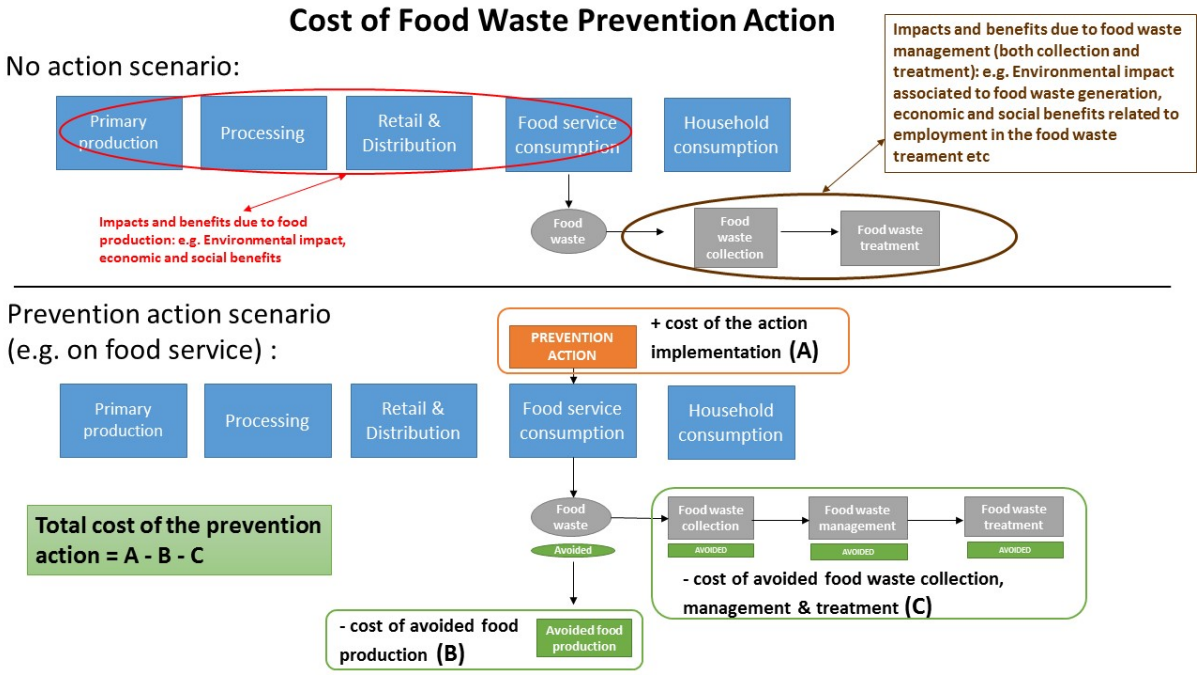
If known, please include here the main composition of the food waste prevented according to the following categories.

	Amount (%)	Additional information (e.g. cereals, bread)
Beverages		
Cereal based products		
Coffee		
Dairy		
Eggs		
Fish		
Fruit		
Meat		
Vegetable oils		
Pre-prepared meals		
Vegetables		
Mixed food		
Other		

3.3 Economic indicators

3.3.1 Costs

As illustrated in the figure below, the total cost of the food waste prevention action should be determined considering: (A) the cost of the prevention action, (B) the cost of avoided food production (if applicable), and (C) the cost of avoided food waste treatment.



*(A) Total cost of the action implementation

Include here the total cost associated with the implementation of the prevention action

Euros

**(B) What is the value of the avoided food waste?

If you do not have this information, it will be calculated by using proxies. Proxies for this value will be obtained from existing studies on the value of food or European statistics. This information should correspond to the duration of the action.

Euros

**(C) Had food waste been generated, what would be the treatment process?

This information will help determine the costs and environmental burdens avoided by the action.

- Anaerobic Digestion
- Composting
- Incineration
- Landfill
- Other
- Unknown

If you selected other, please specify

3.3.2 If you wish to provide additional information on the economic assessment of your initiative or in case you have used other economic indicators (e.g. financial benefits), you can include it in the space provided below or upload a document with a brief description of the assessment done (e.g. innovation - number of new products introduced on the market from food which would otherwise have been wasted, % growth for the commercial business linked to food waste prevention etc.). Please provide concise documents.

Upload file

The maximum file size is 1 MB

3.4 Environmental indicators

The environmental impacts of the prevention action should be determined using the same rationale as the total cost calculation. JRC will calculate the total environmental impacts of the prevention action based on the information provided on the action implemented, amount of food waste prevented, the type of food waste prevented, and the food waste treatment avoided.

* 3.4.1 Have you considered environmental indicators to assess the action?

- ○ Yes
- ○ No

If yes, please specify which ones and the results.

3.4.2 If you wish to provide additional information on the environmental assessment of your initiative, you can upload a document here with a brief description of the assessment done.

The maximum file size is 1 MB

3.5 Social indicators

**3.5.1 Please insert in the table the social indicators

	Value	Additional information
Poverty - number of meals donated		
Unemployment - number of jobs created		
Social inclusion - involvement of individuals and groups in the initiative either as person responsible for its implementation or as target audience with the aim to improve their situation in the society		
New skills – number of people who developed new competences while taking part in the initiative (either as person responsible for its implementation or as target audience)		

3.5.2 If you wish to provide additional information on the social assessment of your initiative or in case you have used other social indicators not included in 3.5.1, you can include it in the space provided below or upload a document with a brief description of the indicator(s) used, the value(s) obtained and how the assessment was conducted. Please provide concise documents.

Upload file

The maximum file size is 1 MB

*** 3.6 Outreach and target audience impact**

Please describe here the outreach and target audience impact by including relevant findings from quantitative and/or qualitative research wherever possible e.g. % audience reach; changes in awareness; understanding and/or behaviour; number of people mobilised by the action. Please indicate how the impact was assessed and include findings pre- and post-intervention, should these be available.

*** 3.7 What is the level of transferability of your action?**

- Transferability has not been considered. The action has been implemented for the geographic level selected in 2.7 and transferability was not considered in its design.
- Ready for transfer, but the practice has not been transferred yet. The action has been developed for the geographic level selected in 2.7. Transferability was considered in its design and recommendations in this regard have been presented; however, the action has not been transferred yet.
- The action has been transferred/replicated within the same country/region.
- The action has been transferred to/replicated in another country.

If the action has been transferred, please use the space below to explain how it was done, the barriers and/or facilitators that you have identified and how you have addressed these.

*** 3.8 Was the action up-scaled?**

- Yes
- No

If yes, please use the space below to explain how the action was up-scaled, the barriers and/or facilitators that you have identified and how you have addressed these.

*** 3.9 Key learning regarding the implementation**

Please introduce here positive elements, difficulties, challenges that you have encountered in the implementation of the action and what was done to overcome them.

3.10 Action follow-up

If the action is concluded, please provide information on the follow-up plan, detailing how you ensure that the achievements and behavior changes are maintained.

4. Additional information

If you would like to share additional information please upload your file here

The maximum file size is 1 MB

* Do you agree to publish your initiative in the Digital Network of the EU Platform on Food Losses and Food Waste?

- Yes
- No

* Do you agree to publish the personal data (contact details) provided under section 2.10 in the Digital Network of the EU Platform on Food Losses and Food Waste?'

- Yes
- No

* Please, indicate from which Member of the EU Platform on Food Losses and Food Waste you received the questionnaire

Annex 2. List of sources used in the food waste prevention actions calculator

A range of sources of data were used to collect food prices and are listed in the following.

A. Prices at farm gate were taken from four main sources for all EU countries, when available. Additionally an EU generic price was calculated as an average of the available prices. For all the countries where no price was available, the average value was used as a proxy.

Food product	Source	Reference year
BEEF	[1]	2017
PORK	[1]	2017
POULTRY	[1]	2017
EGGS	[1]	2017
MILK	[1]	2017
BUTTER	[1]	2017
CHEESE	[1]	2017
BEANS	[1]	2017
TOMATOES	[1]	2017
ORANGES	[1]	2017
APPLES	[2]	2015
OLIVE OIL	[1]	2017
SUGAR	[1]	2017
RICE	[2]	2015
POTATOES	[2]	2015
ALMONDS	[2]	2015
WINE	[2]	2015
COD	[3]	2016
SALMON	[3]	2016
SHRIMP	[3]	2016
BANANAS	[4]	2017

B. Prices at factory gate were taken from three main sources for all EU countries, when available. Additionally a EU generic price was calculated as an average of the available prices. For all the countries where no price was available, the average value was used as a proxy.

Food product	Source	Reference year
ALMONDS	*Table above*	
APPLES	*Table above*	
BANANAS	*Table above*	
BEANS	[5]	2016
BEEF	[5]	2016
BEER	[5]	2016
BISCUITS	[5]	2016
BREAD	[5]	2016
BUTTER	[5]	2016
CHEESE	[5]	2016
CHOCOLATE	[5]	2016
COD	[5]	2016
COFFEE	[5]	2016
EGGS	*Table above*	
MEAT BASED DISHES	[5]	2016
MILK	*Table above*	
MINERAL WATER	[5]	2016
OLIVE OIL	[5]	2016
ORANGES	*Table above*	
PASTA	[5]	2016
PORK	[5]	2016
POTATOES	*Table above*	
POULTRY	[5]	2016
RICE	[5]	2016
SALMON	[5]	2016
SHRIMP	[5]	2016
SUGAR	[5]	2016
SUNFLOWER OIL	[5]	2016

TEA	[5]	2016
TOFU	[6]	2016
TOMATOES	*Table above*	
WINE	[5]	2016

C. Retail prices were taken from Eurostat [7] corresponding to the year 2015, whenever available, for each EU country. For eight food products, different sources were used (and are reported in the following table). Additionally a EU generic price was calculated as an average of the available prices. For all the countries where no price was available, the average value was used as a proxy.

Food product	**Source**	**Reference year**	**Food product**
ALMONDS	[8]	2015	Average price in the US
BEANS	[8]	2015	Average price in the US
BISCUITS	[8]	2015	Average price in the US
COD	[9]	2011	Average price in the UK
MEAT BASED DISHES	[10]	2013	Average price in the UK
ORANGES	[8]	2015	Average price in the US
SHRIMP	[11]	2015	Average price in France
TOFU		2018	No official source available-supermarket website

References

[1] European Commission, Directorate general for Agriculture and Rural Development, Report EU market prices for selected representative products since January 1991. Available at: https://ec.europa.eu/agriculture/markets-and-prices/price-monitoring/monthly-prices_en

[2] EUROSTAT, 2015. Selling prices of crop products (absolute prices) - annual price (from 2000 onwards) [apri_ap_crpouta]. Available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=apri_ap_crpouta&lang=en

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[10] Remnant, J. and Adams, J., 2015. The nutritional content and cost of supermarket ready-meals. Cross-sectional analysis. Appetite, 92, pp.36-42.

[11] EUMOFA, 2017. Cooked shrimp in France. Price structure in the supply chain. Available at: https://www.eumofa.eu/documents/20178/105319/Cooked+shrimp+in+France.pdf/590a0862-2b17-46c0-b350-4bd6732bc0ad?version=1.1

Annex 3. Impact categories used in the Life Cycle Assessment

Impact category	Indicator	Unit
Climate Change	Radiative forcing as Global Warming Potential (GWP100)	kg CO_2 eq
Ozone depletion	Ozone Depletion Potential (ODP)	kg CFC-11 eq
Human toxicity, non-cancer effects	Comparative Toxic Unit for humans (CTU_h)	CTU_h
Human toxicity, cancer effects	Comparative Toxic Unit for humans (CTU_h)	CTU_h
Particulate matter	Human health effects associated with exposure to $PM_{2.5}$	Disease incidences
Ionizing radiation, human health	Human exposure efficiency relative to U^{235}	kBq U^{235}
Photochemical ozone formation, human health	Tropospheric ozone concentration increase	kg NMVOC eq
Acidification	Accumulated Exceedance (AE)	mol H+ eq
Terrestrial eutrophication	Accumulated Exceedance (AE)	mol N eq
Freshwater eutrophication	Fraction of nutrients reaching freshwater end compartment (P)	kg P eq
Marine eutrophication	Fraction of nutrients reaching marine end compartment (N)	kg N eq
Freshwater ecotoxicity	Comparative Toxic Unit for ecosystems (CTUe)	CTUe
Land use	Soil quality index	Pt
Water use	User deprivation potential (deprivation weighted water consumption)	m^3 world eq. deprived
Resource use, fossil	Abiotic resource depletion – fossil fuels (ADP-fossil)	MJ
Resource use, minerals and metals	Abiotic resource depletion (ADP ultimate reserves)	kg Sb eq

Environmental Footprint impact categories, table taken from Fazio et al. (2018)

Annex 4. List of actions submitted through the European Platform on Food loss and Waste

Redistribution

R1 Boroume

Organization: Boroume

Country: Greece

Short summary: Redistribution organization in charge of putting in contact donors of surplus food and charitable organizations and coordinating the collection and distribution.

R2 Christmas Surplus

Organization: Stop wasting food

Country: Denmark

Short summary: Yearly initiative where surplus food is collected from supermarkets before the Christmas holidays and donated to families in need.

R3 Transformar.te

Organization: SONAE MC

Country: Portugal

Short summary: Retailer undertaking a range of activities to prevent in-store food waste, donate surplus food, create new products (e.g. jams) from food no longer fit for sale, raise customers' awareness on food waste issues.

R4 Fondation Partage (foodbank)

Organization: Fondation Partage

Country: Switzerland

Short summary: Food bank collecting surplus food from retailers in Geneva and distributes them to charitable organizations, which assist people in need.

R5 Buon Fine Coop 2017

Organization: ANCC

Country: Italy

Short summary: Redistribution initiative coordinated by ANCC, the association representing all consumer cooperatives in Italy associated with the Coop brand (a supermarket chain managed by the cooperatives). The initiative includes collecting and sorting surplus food from the supermarkets and donating it to charitable organisations.

R6 Integrated approach to increasing redistribution in the UK

Organization: WRAP

Country: United Kingdom

Short summary: WRAP is working with retailers, manufacturers, hospitality and food service providers, and redistribution organisations, together with trade bodies and governments to identify ways of increasing the redistribution of surplus food to people. This is done through the provision of new evidence, guidance and tools and a dedicated Redistribution Working Group under the Courtauld Commitment 2025.

R7 Food without Waste

Organization: Fundación Alimerka

Country: Spain

Short summary: Alimentos Sin Desperdicio/Food without waste is a redistribution program run by the corporate foundation of the Spanish retailer Alimerka (Fundacion Alimerka). Besides redistributing food surpluses, the foundation provides training on food safety to the recipient charities and contributes to raising awareness on food waste related issues.

R8 Zero Desperdício (Zero Waste)

Organization: Associação DariAcordar

Country: Portugal

Short summary: Association facilitating the collection of collecting surplus food from restaurants, hotels, caterers to be redistributed via charitable organisations. DariAcordar is not only in charge of managing the logistical aspect but also of verifying the fulfilment of the food donation guidelines agreed with the national food authorities.

R9 Project "Food Support Network"

Organization: Municipality of Espinho

Country: Portugal

Short summary: Daily collection of surplus meals from three schools in the city of Espinho, to serve them to people in need on the same day. This initiative is coordinated by the Municipality of Espinho with the support of the Espinho Delegation of the Portuguese Red Cross, the Espinho Parish, and the NGO CerciEspinho.

R10 Fight against foodwaste and precariousness

Organization: Banques Alimentaires (association of French food banks)

Country: France

Short summary: The French federation of Food Banks coordinates 79 Food Banks. Every day, volunteers of the 79 Food Banks collect surplus food from supermarkets and redistribute it to partner associations.

R11 Stockholms Stadsmission/Matcentralen

Organization: Stockholms Stadsmission

Country: Sweden

Short summary: Redistribution program run by Stockholms Stadsmission, a social enterprise active in Stockholm. Through this program, surplus food donated by the industry is redistributed via food banks, social supermarkets and a food waste restaurant.

R12 FEBA - European Food Banks Federation

Organization: European Food Banks Federation (FEBA)

Country: EU level

Short summary: The European Food Banks Federation (FEBA) is a European umbrella non-profit organization and works in collaboration with 24 members and 4 projects in European countries. For more than 30 years, FEBA mission has consisted in representing its membership at European and international level, supporting and strengthening food banks in Europe by providing training, sharing best practice and knowledge, and developing partnerships, and fostering the creation of new food banks.

R13 Direct food surplus redistribution

Organization: Hungarian Food Bank Association

Country: Hungary

Short summary: Redistribution organization in charge of putting directly in contact donors of surplus food and charitable organizations, coordinating the collection and distribution, ensuring quality control to minimize risks related to food safety.

R14 Rete Banco Alimentare Onlus

Organization: Fondazione banco alimentare ONLUS

Country: Italy

Short summary: Redistribution organisation recovering surplus food from the food supply chain and redistributing it to charitable organizations across the country.

R15 Maisto bankas

Organization: Lithuanian food bank

Country: Lithuania

Short summary: Maisto bankas operates across Lithuania as a mediator collecting surplus food donated from retailers, producers, farmers or general public and providing them to the poor through the network of social non-profits, which donate it to people in need.

R16 The fresh food program initiative

Organization: Albanian food bank

Country: Albania

Short summary: Collection of fresh food donations from two of the biggest markets of fresh food in the country and distribution of it within the day to 10 partnering NGOs which distribute it to families or cook it in their soup kitchens.

R17 Solidarity bread

Organization: Italian Red Cross

Country: Italy

Short summary: Local project in charge of redistributing surplus food (mainly bread and baked products) from 8 shops to families in need.

R18 The bread of everyday, Brother Galdino, Emporiums

Organization: Caritas diocesi Biella

Country: Italy

Short summary: Local project in charge of redistributing surplus food to families in need in 4 solidarity stores.

R19 Cibus

Organization: Caritas diocesana Matera-Irsina

Country: Italy

Short summary: Local project in charge of redistributing surplus food to families in need.

R20 Operazione Quattro Province

Organization: Charitable association Joseph ONLUS

Country: Italy

Short summary: Regional project in charge of redistributing surplus food from producers, wholesalers, and retailers to charitable organizations donating it to people in need.

R21 Una sola famiglia umana, cibo per tutti

Organization: Caritas diocesana Oristano

Country: Italy

Short summary: Local project in charge of conducting awareness raising activities on the topic of food waste and redistributing surplus food from wholesalers and retailers to people in need.

R22 Life food waste stand up

Organization: Federalimentare (association of Italian food manufacturers)

Country: Italy

Short summary: The main objective of this initiative is to raise awareness on surplus food management and food waste prevention among three key actors of the food supply chain - agro-food companies, food retailers and consumers – through a coordinated information campaign carried out at national and European level.

R23 Emporio della Solidarietà

Organization: Caritas diocesana Prato

Country: Italy

Short summary: Solidarity store donating surplus food to families in need.

R24 Restolho

Organization: Entrajuda

Country: Portugal

Short summary: Gleaning activity organised by Entrajuda (non-profit) in collaboration with a large group of farmers. The products collected are then donated to a number of food banks.

R25 Food Bank

Organization: Banco Alimentar – Portuguese food banks association

Country: Portugal

Short summary: Association coordinating the operations of the 21 Portuguese Food Banks. Activities focus on the logistical processes that safeguard food safety and hygiene conditions (from retrieval to distribution) and on collaborating with agricultural producers' organisations to manage and distribute withdrawals of fruits and vegetables.

R26 Donation of food to different social organisations

Organization: Axfood

Country: Sweden

Short summary: Retailer donating surplus food to charitable organizations.

R27 Distribuição de refeições que sobram em refeitórios de uma escola e da CerciEspinho (ONG)

Organization: CerciEspinho

Country: Portugal

Short summary: Daily collection of surplus meals from three schools in the city of Espinho, to serve them to people in need on the same day. This initiative is coordinated by the Municipality of Espinho with the support of the Espinho Delegation of the Portuguese Red Cross, the Espinho Parish, and the NGO CerciEspinho.

R28 Food Banks of the Netherlands, Voedselbanken Nederland

Organization: Association of Dutch food banks

Country: Netherlands

Short summary: Food banks collecting surplus food from the food industry and retailers and redistributing it to people in need.

R29 Mercato amico & caritas agrigento: no waste

Organization: Caritas Agrigento

Country: Italy

Short summary: Weekly collection of unsold fruit and vegetables from the street market to be used in soup kitchens and distributed to people in need.

R30 Nestlé food donation activities in Europe

Organization: Nestlé

Country: International

Short summary: Collaboration with food banks to distribute in-date, quality surplus food to vulnerable people.

R31 Food donations

Organization: Colryut

Country: Belgium

Short summary: Colryut is a retailer donating surplus food to charitable organizations.

R32 Reuse of school food canteen waste

Food valorisation

L1 Recupero del pane invenduto e produzione di birra

Organization: Fiesa Conferescenti

Country: Italy

Short summary: Ongoing project coordinated by Fiesa Conferescenti, a trade association of Italian food stores, including bakeries. This initiative foresees the development of a brewery to produce beer using unsold bread collected across the Italian territory.

L2 Nutritional and technological utilization of old bread

Organization: University of Zagreb

Country: Croatia

Short summary: The aim of this project is to develop a new process to treat unsold bread and use it as a component of animal feed for broilers.

Consumer behaviour change

B1 Chef save the food

Organization: Casa del Consumatore, CODICI Centro diritto per il cittadino, AU Assoutenti

Country: Italy

Short summary: Chef Save the Food is a project run by three consumer associations: Casa del Consumatore, CODICI Centro diritto per il cittadino, AU Assoutenti. It aims to teach families how to avoid wasting food through a 10 episode cooking show where professional chefs have to create a meal out of leftovers found in people's kitchen.

B2 Zu gut für die Tonne! "Too good for the bin!"

Organization: BMEL (Federal Ministry of Food and Agriculture)

Country: Germany

Short summary: Consumer awareness campaign on food waste reduction conducted by the Federal Ministry of Food and Agriculture of Germany (BMEL) providing targeted information to increase consumers' awareness on the true value of food and to raise the profile of this topic in the media and amongst the public.

B3 "CutFoodWaste2020". Communication campaign towards guests

Organization: Matvett

Country: Norway

Short summary: Consumer awareness campaign on food waste reduction towards guests of the hospitality sector, run by Matvett, a Norwegian company that aims to prevent and reduce food waste in the food and catering industry.

B4 "Brukopp-leksikon" - A guide for consumers on how to store and reuse food

Organization: Matvett

Country: Norway

Short summary: To reduce household food waste, a book titled "Kunsten å ikke kaste mat" (the way not to waste food) was launched in 2017, providing a photo collection of 70 different food items close to their expiry date with clear guidance on how to store and reuse them. This information is also available as an online digital guide, providing tips of durability and storage of different food items, and a database of leftovers recipes.

B5 Do not waste it, take what is yours!

Organization: Resíduos do Nordeste

Country: Portugal

Short summary: This initiative took place in two Portuguese municipalities, where 245 reusable plastic boxes were distributed across four restaurants by Resíduos do Nordeste (a Portuguese waste management company) to enable their customers to take home their leftovers; with the aim of reducing the amount of food waste generated by restaurants, and the costs associated with its collection and treatment, and of raising awareness amongst customers.

B6 Date marking campaign

Organization: Ministry of Environment and Food

Country: Denmark

Short summary: Awareness campaign run by the Danish Veterinary and Food Administration and the Danish Consumer Council to increase consumers' knowledge on the different meaning of the two date marks: "use by" and "best before".

B7 Menos Olhos que Barriga - "Less Eyes than Belly"

Organization: University of Minho

Country: Portugal

Short summary: Awareness campaign taking place in all the food outlets of the University of Minho (Portugal). It is run by the University Social Services (in charge of the catering services at the University) and involves student volunteers. The campaign is based on a series of specific actions with the main goal of raising awareness on the issue of food waste and reducing the food waste generated on the University premises.

B8 Additional date labelling

Organization: Matvett

Country: Norway

Short summary: Initiative aiming to tackle household food waste caused by increasing consumers' awareness of "use by" date, by providing additional labelling ("Best before … often good after") promoting the use of senses when deciding if a food item can still be consumed.

B9 No tires la comida "Do not waste food"

Organization: Organización de Consumidores y Usuarios (OCU)

Country: Spain

Short summary: Awareness campaign run by the Spanish consumer association OCU on food waste, providing advice to consumers on ways to reduce their food waste generation and to retailers and authorities on how to implement actions to reduce household food waste generation.

B10 Doggy bag for restaurants

Organization: Fipe – Italian association of bars and restaurants

Country: Italy

Short summary: Lunch box are given to consumers for them to take home leftovers (practice that is not common in Italy), to raise their awareness on the importance of not wasting food.

B11 Solidarity Tray

Organization: Banco Alimentar

Country: Portugal

Short summary: Awareness campaigns directed towards customers of catering companies active in universities, schools, hospitals and businesses.

B12 Green chef - school contest

Organization: DECO – Portuguese consumer association

Country: Portugal

Short summary: Green Chef project invites schools to produce videos with culinary recipes made from food leftovers and/or culinary recipes with better food use, with the objective of sensitize young consumers to prevent food waste and the adoption of responsible consume behaviour.

B13 Coleção Zero Desperdício - "Zero Waste Collection"

Organization: Associação DariAcordar

Country: Portugal

Short summary: The "Zero Waste Collection" is a collection of 4 books that aims to prepare the next generation to fight against food waste, and changing their attitude and behaviour. This action completes other programs developed by Zero Desperdício/DARiACORDAR (action **R8**) focused on food redistribution, with the inclusion of a pedagogical-training component targeting at the younger generations.

B14 EFFECT

Organization: Federation of Polish Food Banks

Country: Poland

Short summary: Two-year European project aiming at developing an innovative multifunctional platform, hosting informative and educational content to raise awareness on food waste and encouraging citizens to actively reduce their food waste generation.

B15 Hrana i zajednica - "Food and Community"

Organization: Association CeKaDe and Faculty of Economics, Faculty of Humanities and Social Sciences of the University of Rijeka

Country: Croatia

Short summary: Implementation of lifelong learning programmes on food donation and food prevention at the University of Rijeka.

B16 Food waste cook book and TV show

Organization: University of Applied Science Velika Gorica

Country: Croatia

Short summary: Awareness campaign providing educational material on the issue of food waste giving tips on how to prepare new meals from leftovers.

B17 Cartoon book and puppet show: Harry the hedgehogs and his friends

Organization: University of Applied Science Velika Gorica

Country: Croatia

Short summary: Awareness campaign providing educational material on the issue of food waste to school pupils, by developing a cartoon book for kids between 4 and 15 years old.

B18 World Food Summit - Better food for more people

Organization: Ministry of Environment and Food

Country: Denmark

Short summary: Yearly conference on food related topics including food waste.

B19 Food waste challenges

Organization: Consumentenbond

Country: Netherlands

Short summary: Awareness campaign launched by Consumentenbond (a Dutch non-profit focusing on consumer protection) to reduce food waste in households based on consumers taking part in a challenge, and in return being provided with tips and tools to reduce their food waste generation at home.

B20 Every crumb counts food waste challenge

Organization: Nestlé

Country: International

Short summary: The Every Crumb Counts challenge was put in place to raise the awareness on the issue of food waste and to assess food waste behaviours amongst Nestlé employees from 6 R&D sites. Based on its results, Nestlé should be able to prioritize actions aiming to reduce consumers' food waste.

B21 Ação Social - "Social Action"

B22 Food Waste

Supply Chain efficiency

S1 Guidelines on FW reduction in hospitality

Organization: HOTREC and FEBA

Country: EU level

Short summary: HOTREC, the umbrella Association of Hotels, Restaurants, Bars, Cafes and similar establishments in Europe, published in 2017 a set of guidelines for its members to help hospitality businesses prevent and reduce food waste. This brochure also contained joint recommendations with the European Food Banks Federation (FEBA) to help hospitality businesses willing to partner with local food banks on the donation of unused food.

S2 Fruta Feia

Organization: Fruta Feia

Country: Portugal

Short summary: Fruta Feia is a Portuguese cooperative that purchases weekly from local producers the too small, big or misshaped products that they cannot sell in the regular market and organizes a delivery service of seasonal fruit and vegetable boxes with these products for its members.

S3 CutFoodWaste2020 – employee training program

Organization: Matvett

Country: Norway

Short summary: CutFoodWaste2020 is a three-year project led by Matvett, a Norwegian company that aims to prevent and reduce food waste in the food and catering industry, by developing a training program for employees of the hospitality sector to teach them how to measure food waste and how to implement actions to reduce it.

S4 WasteWatch powered by LeanPath

Organization: Sodexo

Country: International

Short summary: Program to prevent and reduce food waste run by Sodexo, a multinational corporation providing food services and facilities management in 80 countries. It is focused on tracking food waste, monitoring performance, taking actions to drive reduction, and communicating success.

S5 The Gothenburg model for reduced food waste

Organization: City of Gothenburg

Country: Sweden

Short summary: Procedure/tool developed by the City of Gothenburg in 2016, that provides tips and actions to reduce food waste in the public food sector (approximately 520 public kitchens) during procurement, storage, preparation, and serving of the meals. This includes the monitoring of food waste generated by each kitchen to track the progress towards the target of reaching a 50% reduction in food waste generated.

S6 Food Losses in the Flemish Food Industry

Organization: Fevia Vlandeeren

Country: Belgium

Short summary: Project led by Fevia Vlaanderen, the Flemish food industry professional organization, that aims to improve the knowledge on quantities and causes of food losses in the food industry by performing audits and questionnaires and identify possible solutions to reduce such losses. The findings of this work were presented in a brochure, providing tips and practical steps to achieve a food waste reduction, which was distributed among the food companies involved and published online.

S7 Improved shelf life

Organization: Nofima (research institute) and Norges Gruppen (retailer)

Country: Norway

Short summary: Development and implementation of a new packaging technology for minced meat that prolongs its shelf life, now adopted by all meat manufacturers in Norway.

S8 Eating in Hesse

Organization: United against waste

Country: Germany

Short summary: Eating in Hesse is a project, piloted in the State of Hesse, which aims at reducing food waste in canteens. It combines a range of tools to monitor food waste and identify targeted measures to reduce it. Moreover, the project takes a holistic view of health, environmental and economic effects and communicates these effects in ways that are specific to the different target groups.

S9 Systematic price discount for food close to the expiry date

Organization: Matvett

Country: Norway

Short summary: Price discount for food items approaching the expiry date, implemented by all retail chains in Norway, since 2016. The food waste rates were measured through time, showing a reduction in food waste following this initiative, in particular for high value items (fresh meat, sausages and fresh ready-made food).

S10 Reducing food waste in restaurants

Organization: MaRa - Finnish Hospital Restaurant Association

Country: Finland

Short summary: Brochure distributed amongst the members of the Finnish Hospital Restaurant Association MaRa, to raise awareness on the importance of preventing food waste in restaurants and to give them practical tips and examples.

S11 Every Meal Matters

Organization: Food Drink Europe

Country: EU level

Short summary: Guidelines on food donations, developed to help food and drink manufacturers and retailers to put in place internal processes to redistribute surplus food in order to maximize the resource efficiency benefits.

S12 Less food waste in restaurants

Organization: ADEME

Country: France

Short summary: Training program intended to help business owners and their employees to reduce food waste in restaurants. It lasted from 2015 to 2018 and covered twenty restaurants in Brittany (France).

S13 The food waste hunters

Organization: Ministry of Environment and Food

Country: Denmark

Short summary: Training program to help food services reduce food waste in professional kitchens through the implementation of targeted reduction measures and food waste monitoring before and after their implementation.

S14 No food waste campaign

Organization: Horeca Vlaanderen

Country: Belgium

Short summary: Checklist and training programme providing tips to reduce food waste distributed amongst all the members of Horeca Vlandeeren (trade association for the hospitality industry in the Flanders region).

S15 From food waste to food resources

Organization: HORESTA

Country: Denmark

Short summary: Toolbox to support commercial kitchens to measure food waste levels and in implement reduction measures, developed by HORESTA (trade association for the hospitality industry in Denmark).

S16 FBO guidance on date marking

Organization: Danish Veterinary and Food Administration

Country: Denmark

Short summary: Development of guidelines for food business operators to improve date marking according to the type of food product, in collaboration with food safety experts.

S17 Organic Cuisine Label

Organization: Danish Veterinary and Food Administration

Country: Denmark

Short summary: Training programme supporting public kitchens to increase their procurement of organic food products.

S18 Food Waste Challenge App

S19 Measuring and reporting food waste and by-products

Organization: Nestlé

Country: International

Short summary: Measurement of food waste and by-products generated at the manufacturing sites and reporting of these quantities in Nestlé's annual report.

S20 The whole tree

Organization: Mercadona

Country: Spain

Short summary: Initiative implemented by Mercadona, a Spanish retailer, since 1988, which involves redirecting second rate fruit and vegetable products to other suppliers to be transformed into value added products (jams, sauces, juices).

Voluntary Agreements

V1 Voluntary Food Waste Agreement

Organization: Ministry of Climate and Environment

Country: Norway

Short summary: The Norwegian Voluntary Food waste Agreement builds on a five-year collaboration project (ForMat) between the food industry, the retail and wholesale sector, and the Government. The industry organisations are responsible for collecting data from the companies and encourage them to implement food waste reduction actions in the value chain. The authorities are responsible for compiling national statistics after receiving reports from the industry, and provide consumer statistics. Development of guidance for measuring food waste and for date marking are two of the most important actions addressed in the agreement.

V2 Food Supply Chain Roadmap on Food Loss 2015-2020

Organization: Government of Flanders and professional organizations

Country: Belgium (Flemish region)

Short summary: Agreement between the government of Flanders and the food industry to implement concrete actions to reduce food waste.

V3 Voluntary Agreements to reduce supply chain food waste

Organization: WRAP

Country: United Kingdom

Short summary: WRAP developed and delivered collaborative solutions to reduce waste through a series of voluntary agreements with signatories from the food industry (from the retail, manufacturing, and food service sectors). Signatories were required to report results to WRAP on an annual basis, and these data were used to help signatories to develop specific action plans to reduce their waste, including food redistribution, diversion to animal feed, supply chain efficiency, innovation in products, processing and labelling, raising awareness and business behaviour change, and digital tools.

V4 Partnership for Less Food Waste

Organization: Ministry of Environment and Food

Country: Denmark

Short summary: Partnership between businesses, organizations and authorities sharing information and experiences, identifying barriers in legislation and developing new ideas to reduce food waste.

Regulatory framework

F1 Legislation regarding food donation system in Croatia and Ordinance on VAT

Organization: Ministry of Agriculture and Ministry of Finance

Country: Croatia

Short summary: Development of new legislation stating under which conditions food can be donated, which organizations can redistribute food, who are final recipient (people in need) who can receive donated food, and providing fiscal incentives to donors.

F2 The amendment of the Czech Food Law (2018)

Organization: National government

Country: Czech Republic

Short summary: This action refers to the amendment of the Czech Food Law (2018) with the goal to reduce food waste in the Czech Republic. According to the Czech Food law, all retail outlets with a sale surface of more than 400 square metres are from the 1st January 2018 obliged to donate unsold but safe food, to the local food banks, charities and non-profit organisations.

F3 Legislative change regarding possibility of donating and consuming food after the expiration of "best before date"

Organization: Ministry of Agriculture and Ministry of Finance

Country: Croatia

Short summary: The objective of the measure is to clearly define that food after its "best before date" is still fit for consumption for certain time, in order to raise awareness, primarily of consumers, that consuming such food is possible and safe.

F4 The abolition of a national prohibition to sell best before products past their durability.

Organization: Ministry of Environment and Food

Country: Denmark

Short summary: Abolition of the national legislation preventing food business operators from selling food after its “best before” date.

F5 Adoption of the legislative act 'Law no. 217/2016 on the reduction of food waste'

Organization: National government

Country: Romania

Short summary: Law entering into force on February 1, 2019, which regulates the process of food donation and measures to prevent food waste through the food supply chain.

National food waste prevention plans

N1 LIFE-FOODWASTEPREV / Wasteless

Organization: National government

Country: Hungary

Short summary: Hungarian programme aiming to reduce food waste in households, funded by the EU LIFE programme. It includes: the identification and development of good practices for food waste prevention, public awareness campaigns, the development of educational material for primary schools (distributed to all primary schools in Hungary), school programmes and summer camps, and the transfer of knowledge through a scientific article.

N2 Estrategia Nacional "Más alimento, menos desperdicio"

Organization: National government

Country: Spain

Short summary: National strategy to reduce food waste across the supply chain. The strategy includes the promotion of good practices and awareness raising activities, the analysis and review of regulatory aspects, the promotion of new technologies, and the implementation of sector specific agreements.

N3 Integrated action to reduce household food waste

Organization: WRAP

Country: United Kingdom

Short summary: National intervention aimed at reducing household food waste coordinated by WRAP. This involves three main types of activities: national/large scale communications initiatives (awareness raising and enabling behaviour change at national level), community engagement & support (awareness raising and enabling behaviour change at a local level) and changes to products, packaging & labelling to make it easier for people to waste less food.

N4 Denmark without Waste II - A Waste prevention strategy

Organization: Ministry of Environment and Food

Country: Denmark

Short summary: The Waste Prevention Strategy aims to reduce wastage of resources and to prevent valuable resources from becoming waste in households and businesses throughout Denmark, by using a wide range of approaches: training programmes for public and private food services, an assessment of waste generated in fisheries and aquaculture sector, the development of a protocol for measuring and reporting food waste, the improvement of the regulation on shelf life labelling, development of awareness campaigns. The avoidable food waste generated by households will be monitored to track progress.

N5 Food Waste Prevention Plan of the Republic of Croatia

Organization: Ministry of Agriculture and Ministry of Finance

Country: Croatia

Short summary: National intervention aimed at reducing food waste throughout the food supply chain, by improving the food donation system, encouraging food waste reduction, promoting social responsibility of the food sector, raising awareness and informing the consumers, encouraging and investing in research and innovations for food waste prevention models and monitoring the implementation and evaluation of the results achieved.

N6 Awareness of Hotels, cafes and restaurants for separating, collecting and recycling organic wastes

Organization: GNI-SYNHORCAT

Country: France

Short summary: Initiative run by the professional organisation for the hospitality industry in France, which aims to encourage professionals of the hospitality sector to separate, collect and recycle their organic waste.

Annex 5. List of actions collected through a literature review

Redistribution

R33 FoodCycle

Organization: FoodCycle

Country: UK

Short summary: FoodCycle is a UK charity that combines surplus food, spare kitchen spaces and volunteers to create three-course meals for people at risk of food poverty and social isolation.

R34 Too Good To Go

Organization: Too Good To Go ApS

Country: International

Short summary: Too good to go is a world leader app putting in contact consumers with restaurants and retailers that sell their surplus food for very low prices before closure.

R35 Avanzi popolo 2.0

Organization: Avanzi popolo 2.0

Country: Italy

Short summary: Avanzi popolo 2.0 is a project managed by the volunteering association "Farina 080" Onlus, which aims to activate Bari's citizens against food waste. Its main goals are to prevent food from being wasted at primary production, food services and household level, raise awareness on the problem of food waste, and give access to fresh food to people in need.

R36 Espigoladors

Organization: Fundació Espigoladors

Country: Spain

Short summary: Espigoladors (Gleaners) is a Catalan, non-profit and social business that collects produce that would be left to rot in the fields (either for cosmetic criteria or overproduction etc.) and distributes it to food banks and social entities.

R37 NoFoodWasted

Organization: NoFoodWasted

Country: Netherlands

Short summary: NoFoodWasted is an App that gives live updates to users on offers on food put by supermarkets on products close to their expiry date. It has won the award for most impactful start up in the Netherlands in 2017.

R38 Local Food Waste Hub

Organization: Municipality of Milan

Country: Italy

Short summary: Local Food Waste Hub is a pilot project to redistribute surplus food in two local neighbourhood of Milan.

Food valorisation

L3 Toast Ale

Organization: Toast Ale

Country: International

Short summary: Toast Ale is a certified social enterprise and B-corporation, which produces beer made with surplus fresh bread collected from bakeries and sandwich manufacturers. All profits go to charities campaigning to reduce food waste.

Consumer behaviour change

B22 De mon assiette à notre planète: SIGIDURS project

Organization: De mon assiette à notre planète

Country: France

Short summary: De mon assiette à notre planète is a not for profit association that organizes educational workshops on food waste reduction in schools, universities, social and medical institutions, as well as businesses. The association trains staff to avoid food waste and better match the needs of guests.

Annex 6. Food waste prevention actions presented in factsheets

A. Actions of the type 'Food redistribution'

R1 Boroume
R2 Christmas Surplus
R3 Transformar.te
R4 Fondation Partage (foodbank)
R5 Buon Fine Coop 2017
R6 Integrated approach to increasing redistribution in the UK
R7 Food without Waste
R8 Zero Desperdício (Zero Waste)
R9 Project 'Food Support Network'
R10 Fight against foodwaste and precariousness
R11 Stockholms Stadsmission/Matcentralen
R33 Food cycle
R34 Too Good To Go
R35 Avanzi popolo 2.0
R36 Espigoladors
R37 NoFoodWasted
R38 Local Food Waste Hub

B. Actions of the type 'Consumer behaviour change'

B1 Chef save the food
B2 Zu gut für die Tonne! 'Too good for the bin!'
B3 'CutFoodWaste2020'. Communication campaign towards guests
B4 'Brukopp-leksikon' - A guide for consumers on how to store and reuse food
B5 Do not waste it, take what is yours!
B6 Date marking campaign
B7 Menos Olhos que Barriga - 'Less Eyes than Belly'
B8 Additional date labelling
B22 De mon assiette à notre planète: SIGIDURS project

C. Actions of the type 'Supply chain efficiency'

S1 Guidelines on FW reduction in hospitality
S2 Fruta Feia
S3 CutFoodWaste2020 – employee training program
S4 WasteWatch powered by LeanPath
S5 The Gothenburg model for reduced food waste
S6 Food Losses in the Flemish Food Industry
S7 Improved shelf life
S8 Eating in Hesse

D. Actions of the type 'Food waste prevention governance'

V1 Voluntary Food Waste Agreement
V2 Food Supply Chain Roadmap on Food Loss 2015-2020
V3 Voluntary Agreements to reduce supply chain food waste

F1 Legislation regarding food donation system in Croatia and Ordinance on VAT
F2 The amendment of the Czech Food Law (2018)
N1 LIFE-FOODWASTEPREV / Wasteless
N2 Estrategia Nacional 'Más alimento, menos desperdicio'
N3 Integrated action to reduce household food waste

E. Actions of the type 'Food valorisation'

L3 Toast Ale

REDISTRIBUTION, Surplus food redistribution | **R1**

TITLE: BOROUME | 2012 - ongoing

ORGANIZATION: BOROUME (non-profit) | **COUNTRY:** Greece

SHORT DESCRIPTION

Boroume is a Greek NGO that aims at bridging the gap between the large amounts of food wasted in Greece and the growing number of people facing food insecurity by connecting selected donors (farmers, supermarkets, food manufacturers, and caterers) with nearby recipient charities and municipal social services that help food insecure families. Its main activities include: coordinating on a daily basis charities that collect surplus food from a variety of donors and then redistribute it to people in need; maintaining and constantly enlarging a network of donors and recipient charities; training new volunteers to provide support to the program; organizing events to raise awareness on the issue of food waste amongst the public; save and offer directly to local charities food from farmers markets; inform and inspire kids to reduce food waste and volunteer through a specialized educational program; advocate on national and supranational level changes aiming at reducing food waste and increasing food donations.

Stage of the FSC

Primary production, processing and manufacturing, distribution and retail, restaurants and food services sector

Actors

Donors (farmers, food manufacturers, retailers, catering companies) and charities (food banks, soup kitchens, municipal social services)

1. QUALITY OF THE ACTION DESIGN

Boroume's aim is to facilitate the redistribution of surplus food from different types of organizations to nearby welfare organizations and charities as well as municipal social services who help people with food insecurity. A monitoring plan is implemented to monitor the action impact, using a set of key performance indicators, including: a) the total number of portions of food redistributed, and b) the ratio between the amount of food redistributed and the total operational costs beard.

2. EFFECTIVENESS

The effectiveness of this action could not be determined as no baseline or targets were reported.

3. EFFICIENCY

(Referring to 6 years)

RESOURCES

Cost of the action (C)

600 000 €

Volunteer hours *

3500 volunteer hours

*Only referring to the first 10 months of 2018

RESULTS

Food waste prevented 10 080 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	28 877 316	41 196 846	83 950 292
	(B)	1 151 400	7 693 142	131 254

Social 28 million meals donated

Outreach Since its start, Boroume has held a number of 'Feeding the 5000' events, numerous local events, two food saving festivals together with the WWF, hundreds of presentations and through its website and social media has been the focal point of the food waste discourse in Greece. A part of the awareness raising campaign consisted of an educational programme that reached 16.000 pupils in three years.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution | **R1**

TITLE: BOROUME | 2012 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

To ensure the economic sustainability and due to the lack of funds, the initiative was designed to have low operational costs. Since Boroume depends heavily on donations that change from year to year, the organizers have ensured that the sources of the incoming donations would be very diverse, including foundations, EU programs, companies, individuals and, to a smaller extent, in-house fundraising. The only technology needed to carry out the action consists on a CRM (customer relationship management) software package, which was donated to Boroume. All the procedures performed by the organization are described in written processes and there is constant training of new volunteers in order to ensure the sustainability of the operation over time.

5. TRANSFERABILITY AND SCALABILITY

The action has been transferred to other regions and countries, thanks to the transparency and willingness of Boroume in transferring any know-how regarding the operational aspects.

Boroume has been growing constantly since its beginning in 2012 both in terms of: number of donors and sectors of the food supply chain involved and size and resources invested in the awareness raising campaigns.

6. INTERSECTORIAL COOPERATION

Boroume is a virtual food bank, therefore it acts as a facilitator to ensure the smooth cooperation between two main types of actors: the donors (mostly private companies such as supermarkets, bakeries, food manufacturers, catering services providers etc.) and the recipients (soup kitchens run by religious organizations, municipal social services and charities in charge of redistributing food to the most socially vulnerable members of society).

KEY SUCCESS FACTORS AND BARRIERS

A key learning point of this activity was that it is crucial to make it as easy as possible firstly for the donor and secondly for the recipient charity to donate and receive food. In other words, by trying to accommodate any logistical arrangement required by the donor and always make sure the donations happen at a local level to ensure that it will be easy for the recipient charity to collect them.

Success factors: before the Boroume initiative, nobody was speaking about food waste in Greece and, with the exception of a food bank in Athens, no one was redistributing/donating surplus food. Although there is no research on behavioural change regarding food waste in Greece, and not even a comprehensive research on the levels of food waste generated, in the last few years a change in people's behaviour was noticed, for example it has become common practice for restaurants to give customers their leftovers. Furthermore, thousands of people follow Boroume on social media, and use this platform to donate their surplus food.

ADDITIONAL COMMENTS

REDISTRIBUTION, Surplus food redistribution | **R2**

TITLE: CHRISTMAS SURPLUS national initiative | 2015 - ongoing

ORGANIZATION: Stop Wasting Food (non-profit) | **COUNTRY:** Denmark

SHORT DESCRIPTION

The annual CHRISTMAS SURPLUS national initiative was founded by the Stop Wasting Food movement. Every year, on the 23rd of December, surplus Christmas food is collected by more than 900 volunteers from Stop Wasting Food in collaboration with Danish People's Aid and other NGOs from more than 300 REMA 1000 supermarkets in Denmark and redistributed to food insecure families. This food, traditionally consumed at Christmas, will otherwise go to waste as households only purchase it for the preparation of Christmas meals. Therefore, in each of the supermarkets involved, a team of volunteers meets with approximately 10 food insecure families and donates them the surplus food worth 80-90 Euros per family. In one day, over 30-40 tons of food is saved due to the "Christmas Surplus" national initiative. The annual "Christmas Surplus" national initiative can be replicated at any other Holiday where the supermarkets are closing for Holidays - and it can be replicated all over the EU and the world.

Stage of the FSC
Distribution and retail

Actors
Retailers (REMA 1000), Charities (Stop Wasting Food in collaboration with Danish People's Aid and other NGOs)

1. QUALITY OF THE ACTION DESIGN

The aim of the action is to divert surplus food from being wasted in the supermarkets and donate it to food insecure families. The implementation of a monitoring plan enables to keep track of: (a) the amount of food donated, (b) the number of food insecure families reached, and (c) the outreach of the initiative (e.g. number of media articles and TV features).

2. EFFECTIVENESS

The organizers set a target of reaching 10 000 food insecure families, which was met in 2016, 2017 and 2018. According to this indicator, the action was 100% effective.

3. EFFICIENCY

(Referring to 4 days,
one per each year 2015, 2016, 2017, 2018)

RESOURCES

Cost of the action

0 €

Volunteer hours

900 volunteers each year

RESULTS

Food waste prevented 75 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	1 006 550	305 917	623 393
	(B)	14 475	34 512	2 402

Social 34 thousand food insecure people reached

Outreach

This initiative generated approximately 80 media articles and 10 TV features per year, thus raising awareness about food waste.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution | **R2**

TITLE: CHRISTMAS SURPLUS | 2015 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The initiative was started in 2015 and was repeated in 2016, 2017 and 2018 successfully. In 2018, a growing number of local Danish NGOs joined the initiative. The organizers plan to repeat this initiative every year. The sustainability over time of the initiative depends on the continuous availability of surplus food before Christmas, on the availability of volunteers willing to take part and of resources to brief the volunteers and organize the event each year. The best case scenario is that there is less and less food waste to donate every year, which will mean that the retailers will become better and better at avoiding food waste.

5. TRANSFERABILITY AND SCALABILITY

In 2015 this event was conducted locally, then it was upscaled to national level in 2016 and repeated at national level in 2017 and 2018. This initiative could be transferred to other regions and countries, and was presented at the Meeting of the EU Platform on Food Losses and Food Waste Vilnius on 24th May 2018. Several countries, such as Norway, are planning to replicate the CHRISTMAS SURPLUS national initiative.

Additionally, many other NGO's and retail chains have started to replicate the CHRISTMAS SURPLUS national initiative. As a result, in total over 200 tonnes of surplus food were saved in just one day in 2017 and over 300 tonnes of surplus food were saved in just one day in 2018.

6. INTERSECTORIAL COOPERATION

This initiative is based on the cooperation of several different not for profit organizations (Stop Wasting Food in collaboration with Danish People's Aid, etc.) and a large supermarket chain (REMA 1000). Stop Wasting Food is Denmark's largest non-profit NGO against food waste, while Danish People's Aid is a national humanitarian organization providing aid and assistance to vulnerable people in Denmark. "CHRISTMAS SURPLUS national initiative can involve 1) municipalities, 2) NGO's, 3) civil society, 4) supermarkets and 5) food industry in a common goal to stop wasting food and to feed food insecure people.

KEY SUCCESS FACTORS AND BARRIERS

This initiative is an example of an easy and tangible way to raise awareness about food waste, save food and feed food insecure families.

One success factor of this initiative is the cost-effectiveness, thanks to the support of retailers and volunteers. The only thing that is needed, is 5-6 months of planning ahead. Furthermore it attracts a lot of positive media attention has good potential for collaborations and sponsors.

A learning point from this initiative was that it is important to collaborate with professional NGOs, who have access to approved data of citizens below the poverty line, in collaboration with municipalities and authorities, to ensure that the surplus food is only given to the citizens below the poverty line.

ADDITIONAL COMMENTS

In 2016, the CHRISTMAS SURPLUS national initiative got a Royal support by H.R.H. Prince Joachim of Denmark, H.R.H. Princess Marie of Denmark and the Minister for Environment and Food of Denmark, who helped raising money for the CHRISTMAS SURPLUS national initiative though a Charity Dinner hosted by the Minister for Environment and Food of Denmark, Stop Wasting Food and Danish People's Aid - raising a total of 37 776 Euro that was directly donated to food insecure families.

REDISTRIBUTION, Surplus food redistribution | **R3**

TITLE: TRANSFORMAR.TE | 2016 - ongoing

ORGANIZATION: Sonae MC (retailer) | **COUNTRY:** Portugal

SHORT DESCRIPTION

Transformar.te is a project integrated in Sonae MC's sustainability platform, "Missão Continente". Sonae MC is the market leader in food retail in Portugal. Transformar.te is based on the implementation of a range of actions to prevent in-store food waste, reuse food items that cannot be sold for other purposes, and raise awareness on the issue of food waste. Such activities are currently ongoing thanks to a dedicated team within the company that has been working on food waste prevention in the last 12 years.

Stage of the FSC
Distribution and retail

Actors
Municipalities, NGOs, Processors/manufacturers

1. QUALITY OF THE ACTION DESIGN

Transformar.te has two main aims: to reduce in-store food waste and to raise awareness on the issue of food waste across Sonae's employees, customers and suppliers. The first aim is pursued by: (1) preventing in-store food waste (e.g. through repackaging when part of a unit is not commercially attractive, depreciating products close to their expiry date etc.) and (2) reusing food surpluses (to create value added products like jams and chutneys, to prepare meals served in internal canteens, internal and external catering services, and by donating it to charitable organizations). To raise awareness on the topic of food waste the following activities take place: educational/awareness campaigns, participation in TV shows, conference and events, preparation and distribution of guidelines giving tips on how to reduce household food waste. A monitoring system is in place to track progress towards objective (1) and (2) by registering all the food waste generated (both the origin and destination) in the organization's ERP (enterprise resource planning) system - this is a management software allowing to automate many functions related to technology, services, and human resources. This initiative was initially launched as pilot project, and has now become a process fully integrated in the company's business and sustainability platform "Missão Continente".

2. EFFECTIVENESS

A target of obtaining a 50% food waste reduction against a baseline of 2015 was set; nevertheless, for confidentiality reasons, the total amount of food waste generated in 2015 was not reported and therefore it was not possible to evaluate whether such target had been met. Nevertheless in the years 2016 and 2017 3.6 million meals were donated (equivalent to 1 512 tonnes of food)*.

3. EFFICIENCY

(Referring to 24 months)

RESOURCES

Cost of the action

250 000 €

RESULTS

Food waste prevented 1 512 tonnes

	Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
(A)	6 000 000	6 159 132	12 550 984
(B)	172 140	1 150 163	19 623

Social 3.6 million meals donated

Outreach People reached by awareness campaign: approximately 20% of Portuguese population (equal to about 2 million people) + 20000 employees. 500 000 copies of the 'Guide to fight food waste' were distributed. No measurement of the actual impact of the awareness campaign was reported.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution	R3

TITLE: TRANSFORMAR.TE | 2016 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The food waste reduction initiatives reported were launched as pilot projects, after being tested and validated they became processes, fully integrated in the business operations. As such, they become recurrent and permanent. In this way, these actions are sustainable over time as all the related operational costs are budgeted by the company.

5. TRANSFERABILITY AND SCALABILITY

All the initiatives conducted are always launched as pilot projects in one specific store; as they are tested and validated, they grow out of the "pilot project phase" and become processes. As such, they were upscaled and implemented in the whole network of stores (more than 500 all over Portugal). A proof of the successful upscale of these actions is that in the past 2 years the amount (or percentage) of food rescued was more than doubled, by improving the internal processes and by raising awareness.

6. INTERSECTORIAL COOPERATION

Transformar.te is lead by the retailer Sonae MC, that acts in close cooperation with other sectors of society, such as:

• Several charities, including the Portuguese Red Cross, "Banco Alimentar", "Dariacordar", and "Refood", recipents of their food donations;

• The Portuguese Government, that invited Sonae MC to present Transformar.te in the context of the development of the National Strategy to combat food waste;

• Several stakeholders that took part to a cross-sector working group to discuss collaborative solutions to fight food waste, including: the Portuguese Retail Association (APED); the Portuguese Farmers' Association; the Association of agri-food industries of Portugal; the Association of HoReCa; several waste management operators; the municipalities of Lisbon and Porto;

• The organizers of several seminars and conferences, both organized by the public and the private sectors, where the project Transformar.te was presented, contributing to raise awareness and promoting behavioural change related to food waste issues.

KEY SUCCESS FACTORS AND BARRIERS

It is much easier to throw away than to rescue the wastage. Doing so implies a lot of will, creative solutions, simplification of processes, and strong sponsorship. The main barriers that need to be broken to continue the upscale of the action are regulatory and fiscal.

ADDITIONAL COMMENTS

* The amount of food donated is calculated assuming that each meal weighs 420 grams.

REDISTRIBUTION, Surplus food redistribution | **R4**

TITLE: Fondation Partage | 2005 - ongoing

ORGANIZATION: Fondation Partage - Banque Alimentaire Genevoise (food bank) | **COUNTRY:** Switzerland

SHORT DESCRIPTION

Partage is a food bank active in the Canton of Geneva (Switzerland) since 2005. Partage collects and sorts unsold stock from Geneva's food stores and companies in order to distribute them free of charge to association and social services, which assist and provide food for those in need in Geneva. Through its action, Partage fights against food waste and supports professional rehabilitation.

Stage of the FSC
Distribution and retail

Actors
Regional government, Municipalities, NGOs, Wholesalers, Retailers

1. QUALITY OF THE ACTION DESIGN

The main goal of Partage is to redistribute food surpluses generated by food business operators (e.g. retailers, restaurants, universities) to people in need. No food waste reduction programme existed in the Canton of Geneva prior to the Foundation of Partage, therefore it has pioneered the food waste discussion in this region. Partage monitors and records all quantities of food collected and redistributed.

2. EFFECTIVENESS

Partage has been growing since its start in 2005. In 2010 it redistributed 549 tonnes of food, amount that was almost doubled in 2017, reaching 1 002 tonnes of food redistributed. No baseline or targets were reported, therefore the effectiveness of this action could not be determined.

3. EFFICIENCY

(Referring to 12 months - 2017)

RESOURCES

Cost of the action

4 000 000 €

Volunteer hours

600 volunteers involved
(hours not reported)

RESULTS

Food waste prevented 940 tonnes*

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	6 800 000	3 309 160	6 675 911
	(B)	195 728	32 293	45 979

Social

850 thousand meals donated
12 375 people receiving donations weekly through 57 charities and social services
37 people in professional reintegration involved and 600 volunteers

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution | **R4**

TITLE: Fondation Partage | 2005 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

An operational strategy was defined and its implementation is the responsibility of the operational management. The annual objectives are specified each year to be able to further develop this activity on the basis of the "lessons learned" and quantitative objectives (increase in the quantities collected and redistributed). So far, Partage has proven to be economically sustainable. However, there are a number of intrinsic risks, such as:

1) not finding the necessary private funds for the annual budget (more than 50% of it comes from private donations)

2) losing the support received for the 37 employees in professional reintegration (80% of their salaries is provided by the state). To ensure its long term sustainability, Partage provides professional training to its employees, mainly in the fields of logistics, cooking and administration.

5. TRANSFERABILITY AND SCALABILITY

Transferability of the action was not considered in the design phase.

The action as been growing since the start (with increases in the number of donors, beneficiaries and amounts of food redistributed), but not upscaled to a large geographical region.

6. INTERSECTORIAL COOPERATION

At the beginning, Partage was mostly a private initiative (carried out by 5 associations and a few stores), with the support of the City of Geneva. Today, the private sector provides a very important support, since 54% of the financing of Partage comes from private funds, the public support (Canton of Geneva, City of Geneva) represents 12%, 27% comes from the State for the rehabilitation program, while the remaining comes from service receipts. Partage has agreements with all its main partners (Corporate donors, the Cantonal Employment Office and the beneficiary institutions) and in each of the agreements a number of specific objectives are defined for each partner.

KEY SUCCESS FACTORS AND BARRIERS

Fundraising is always a challenge in this kind of project but Partage has managed to reach its funding goals every year.

ADDITIONAL COMMENTS

*On the quantities of food waste saved: 940 tonnes of food products were redistributed in 2017. Of these 90 tonnes were vegetables processed into soups, and the remaining 850 tonnes were donated as meals. Considering 1 kg per meal (including 400 g of drinks) this is equal to 850 000 meals donated.

REDISTRIBUTION, Surplus food redistribution | **R5**

TITLE: Buon Fine Coop | 2017 - 2018

ORGANIZATION: ANCC-Coop - Associazione Nazionale delle Cooperative di Consumatori -Coop | **COUNTRY:** Italy

SHORT DESCRIPTION

Buon Fine Coop is a project conducted by the Italian association ANCC-Coop, the National Cooperative Association of Consumers-Coop, at national level. ANCC is an association that represents all the consumer cooperatives that are distributed in the Italian territory under the Coop brand (a supermarket chain managed by the cooperatives). This project started at the end of the 90s with the aim of reducing food surpluses from Coop supermarkets and donate them to social voluntary associations, that then donate them as ingredients or use them to prepare meals (soup kitchens) to support people in need. Since then, the action has been repeated every year. All the goods redistributed are maintaining their nutritional qualities and are safe to eat, but are withdrawn from the supermarket shelves because they no longer comply with quality standards (caused by alterations due to transport damages) or because they are approaching their expiry date.

Stage of the FSC
Distribution and retail

Actors
Municipalities, NGOs, Retailers

1. QUALITY OF THE ACTION DESIGN

The aim of this initiative is to reduce food waste and support citizens in need of food assistance. The surplus food generated by 647 Coop supermarkets was collected and donated to more than 930 charitable organizations over the Italian territory. All the food donations are collected and stored according to a set of guidelines to ensure their safety. Each cooperative (coordinating supermarkets at regional/local level) is in charge of maintaining the relationship with the local charitable organizations that receive the food donations and promote the project at regional/local level (these operations are conducted by volunteers that collaborate with the cooperatives). Each cooperative is responsible for training the supermarket's staff on all the procedures to be followed in the (A) selection (considering the needs of the beneficiaries and the shelf-life of products), (B) storage (to ensure food safety), (C) deliver the goods to the voluntary associations, and (D) record the quantity and quality of goods donated. At national level ANCC monitors on a yearly basis the outcomes of the project, based on a number of KPI including: quantity of goods donated, economic value of donations, number of charitable organizations involved, number of meals equivalent donated. This information is then used to produce a report and published on the website of the initiative.

2. EFFECTIVENESS

According to research conducted by the ANCC association, Coop supermarkets waste on average 1.26% of their food, while the other Italian supermarket chains waste on average 2.3% of their food. Assuming that the waste levels of Coop prior to the implementation of this action were aligned with national averages, this and other actions focusing on improving the efficiency of logistical operations, have enabled Coop to almost halve the amounts of food waste generated, and can therefore be considered effective. Nevertheless, for a complete evaluation of the effectiveness of this action, it would be necessary to have a baseline (measured amount of food waste generated before the implementation), one or more targets set before the implementation, and a monitoring system to verify if those targets have been met.

3. EFFICIENCY

(Referring to 12 months)

RESOURCES

Cost of the action

914 760 €

RESULTS

Food waste prevented: 7 000 tonnes

	Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
(A)	33 250 000	28 571 742	58 190 076
(B)	1 083 607	3 337 389	87 707

Social: 8 200 thousand meals donated

Outreach: A web platform was created to present the outcome of this initiative and related information on food waste reduction (www.coopnospreco.it). Here consumers, social voluntary organizations and companies that collaborate with Coop can find useful information on how to prevent food waste and exchange experiences and best practices. The website registered in 6 months 2 212 748 accesses and 31 907 single users.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution	R5

TITLE: Buon Fine Coop	2017 - 2018

4. SUSTAINABILITY OF THE ACTION OVER TIME

This initiative has been repeated each year since the late 90s, all the operational costs are sustained by the cooperatives and are fully integrated in their operations.

5. TRANSFERABILITY AND SCALABILITY

The transferability of the action has not been considered. The actions has been upscaled since its start: for instance between 2015 and 2017, the number of supermarkets adhering to the initiative grew by 60 units.

6. INTERSECTORIAL COOPERATION

This action relies on the cooperation between several actors: the ANCC association (with the role of coordinator at national level), the consumer cooperatives (training the supermarket's staff, and in charge of maintaining and expanding the net of voluntary associations involved), the voluntary associations involved (in charge of collecting the surplus food and redistributing it) and the municipalities and local administration, that can act as facilitators between the cooperatives and the voluntary associations.

KEY SUCCESS FACTORS AND BARRIERS

Key learning points: (1) the importance of training the staff in charge of selecting, storing and preparing the food donations, to teach them to carry out these operations independently in the compliance with the existing regulations, and (2) the importance of raising awareness across the volunteers and the voluntary associations to increase the number of voluntary associations involved in the project.

Barriers encountered: (1) the limited capability of some voluntary associations to collect all the food available (due to lack of funds and human resources, for which they might not be able to collect the surpluses every day, or they might be limited in the types of goods they can collect due to a lack of refrigerated storing facilities), (2) difficulties encountered by these associations in monitoring and reporting their activities, that makes it hard for the cooperatives to report on the social impact of this initiative. Additionally, at the beginning of the action the main barrier was the high costs caused by the time spent by the employees in preparing the food packages due to the excessive the bureaucratic requirements. Thanks to the new anti-waste law approved by the Italian Parliament in 2016, the activities have been significantly simplified and therefore the process has become much simpler and less expensive.

ADDITIONAL COMMENTS

The cost of the action was calculated for the year 2016 based on the number of staff-hours dedicated to this action (31 000 hours equivalent to 770 000 €) as presented in the book "Libro bianco Coop sullo spreco alimentare". From this value, the cost of the action in 2017 was estimated considering that the donations increased by 19% from 2016 to 2017.

REDISTRIBUTION, Surplus food redistribution | **R6**

TITLE: Integrated approach to increasing redistribution in the UK | 2015 - ongoing

ORGANIZATION: WRAP (charity) | **COUNTRY:** United Kingdom

SHORT DESCRIPTION

WRAP is working with retailers, manufacturers, hospitality and food service providers, and redistribution organisations, together with trade bodies and governments to identify ways of increasing the redistribution of surplus food to people. This is done through the provision of new evidence, guidance and tools and a dedicated Redistribution Working Group under the Courtauld Commitment 2025 (C2025).

To meet the C2025 food waste target and UN Sustainable Development Goal (SDG) 12.3, collaborative and concerted efforts to reduce food waste are required. These need to focus on preventing food surplus and waste being generated in the first place, redistributing more surplus food that does arise, and diverting more surplus (that cannot be used to feed people) into animal feed. Preventing food waste at source should always come first, but surpluses can arise for a number of reasons; for example, food incorrectly labelled, over-ordered, over-supplied or obsolete seasonal stock.

Stage of the FSC

Processing and manufacturing, Distribution and retail, Restaurants and food services sector

Actors

National government, NGOs, Trade associations, Processors/manufacturers, Wholesalers, Retailers, Food service, Charitable (e.g. FareShare, Neighbourly) and commercial (e.g. Company Shop, Approved Foods) redistribution organisations

1. QUALITY OF THE ACTION DESIGN

A C2025 Redistribution Working Group, seeks to address the challenge of increasing amounts of food redistributed through: (i) developing strategies for long term, high impact solutions: (ii) sharing best practice: (iii) identifying barriers and opportunities and, (iv) overseeing the development of new resources, research and approaches to monitoring progress.

This working group consists of representatives from all of the major redistribution organisations (charitable and commercial), a wide range of food businesses, food safety regulators, government and trade bodies. To date the following have been delivered:

(i) A Framework for Effective Redistribution Partnerships which provides a structured approach to creating partnerships for redistribution, supports consistent exchange of key information and stimulates a structured approach to identifying surpluses suitable for redistribution; (ii) Tools to support business behaviour change; (iii) Specific guidance around food labelling, safety and redistribution; (iv) A range of case studies.

A methodology for estimating the amount of food surplus being redistributed in the UK was developed with the C2025 Redistribution Working Group. Data were collected by a survey distributed to a list of major organisations whose primary business is redistribution of surplus food. The aim was to quantify the amount of surplus food redistributed to these organisations, and identify which business sector it arose from.

2. EFFECTIVENESS

The baseline (amount of food suitable for redistribution in the UK in 2015) was estimated to be 248 000 tonnes. Of this quantity in 2015, 11% was redistributed (equal to 28 500 tonnes), while in 2017 the 17% was redistributed (equal to 43 000 tonnes). Therefore this action was effective as it enabled an increase in the redistribution of surplus food by 50% compared to 2015. Assuming a linear increase in the amounts of surplus food redistributed from 2015 to 2017, the total amount of food waste prevented thanks to this action was 14 500 tonnes over two years. Nevertheless, there is still potential for increasing the amounts redistributed, as 83% of the estimated surplus food is still not being redistributed. C2025 signatories have committed to doubling the amounts of food they redistribute by 2020 (compared to 2015).

3. EFFICIENCY

(Referring to 24 months)

RESOURCES

Cost of the action

900 000 €

RESULTS

Food waste prevented 14 500 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	50 000 000	59 184 323	120 536 585
	(B)	2 244 614	8 022 909	296 447

Social 35 million meals donated

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution	R6

TITLE: Integrated approach to increasing redistribution in the UK	2015 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

Recently new funding has been provided at national level to support redistribution activities. In particular, funding has been provided for 8 projects to help overcome barriers to increasing redistribution. Additionally, there has been an announcement from Defra of an additional £15 million for FY 2019/2020 to help reduce food waste/increase redistribution. To ensure the continuing/growth of this project, a Food Waste Reduction Roadmap and Toolkit was launched. This will ensure that more large food businesses are measuring and reporting on food surplus and waste, and taking action to tackle both.

5. TRANSFERABILITY AND SCALABILITY

The data for 2015 to 2017 suggest that redistribution increased significantly, with both the charitable and commercial redistribution sectors reporting growth. There were increases in the supply of surplus food to the charitable sector from all of the three food business sectors where data is available (retail, manufacture and HaFS). There is however the potential for further significant increases, of at least another 205,000 tonnes, in particular from retail and manufacture. WRAP is continuing to work with governments, food businesses and the redistribution sector to both facilitate and track progress.

6. INTERSECTORIAL COOPERATION

This action is based on the collaboration between WRAP, retailers, food manufacturers, hospitality and food service providers, redistribution organisations (both charitable and commercial), trade bodies and the UK governments. WRAP has responsibility for managing the Redistribution Working Group (with funding from UK governments), for developing new guidance and tools and for reporting on progress. Food businesses and redistribution organisations are responsible for implementing changes to help increase the amount of food redistributed.

KEY SUCCESS FACTORS AND BARRIERS

Businesses do not want to waste food, and redistribution organisations can effectively take surplus food and make sure it reaches people. Bringing together all key actors through the Working Group has been instrumental in driving change. However, there were several challenges identified through the course of this work, including:

- A lack of awareness amongst some businesses of the amounts of food surplus and waste being generated (guidance and tools aimed at implementing widespread and effective measurement were produced)

- Gaps in understanding what types of food might be suitable / safe / legally permitted for redistribution (WRAP worked with Defra and the Food Standards Agency to update guidance to address this)

- Logistical difficulties / sensitivities around branded products (partnership agreements and case studies help address these)

- Competing destinations for food surplus and waste (addressed through reinforcing the food hierarchy via multiple channels and awareness raising by the sector)

ADDITIONAL COMMENTS

Of the amounts of surplus food redistributed reported 57% came from the retail sector, 37% from food manufacturers, 2% from hospitality and food services sector, and 4% from mixed/other sources. All the results reported include food redistributed by charitable organisations (for free) and food redistributed by commercial redistributors (business that primarily redistribute surplus food for profit).

REDISTRIBUTION, Surplus food redistribution | **R7**

TITLE: Alimentos Sin Desperdicio - "Food without waste" | 2016 - ongoing

ORGANIZATION: Fundación Alimerka (foundation) | **COUNTRY:** Spain

SHORT DESCRIPTION

Alimentos Sin Desperdicio is a redistribution program run by the corporate foundation of the Spanish retailer Alimerka (Fundacion Alimerka). Besides redistributing food surpluses, the foundation provides training on food safety to the recipient charities and contributes to raising awareness on food waste related issues and on advocating sustainable development. The first edition of this program took place in 2017, followed by a second edition ongoing at the time of reporting.

Stage of the FSC
Distribution and retail

Actors
NGOs, Retailers

1. QUALITY OF THE ACTION DESIGN

The aim of this action is to reduce the food waste generated by the supermarkets involved and provide food to people in need. To this end the foundation defined a network of neighbouring charitable organizations and assessed their needs (in terms of quality and quantities required) and put in place a food safety training program for all the recipient organizations. To measure the efficacy of the action, the quantities of food redistributed and the number of recipient organization are monitored, together with the number of supermarkets adhering to the initiative.

2. EFFECTIVENESS

Before the start of the program (baseline situation), 35% of Alimerka supermarkets were donating surplus food to charities. At the moment of reporting the share of supermarkets taking part in the initiative had become 60%. The action can be considered effective as it saw an almost twofold increase in the number of supermarkets taking part in the initiative and donating surplus food.

3. EFFICIENCY

(Referring to 12 months)

RESOURCES

Cost of the action

32 200 €

RESULTS

Food waste prevented 2 866 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	11 069 130	16 709 615	39 772 141
	(B)	443 708	1 800 143	44 606

Outreach

From the start, the organisers took part in a number of events to increase the impact of the program, including:

- Two technical seminars for NGOs managers and staff responsible for giving food surpluses to vulnerable people.
- Three meetings with the media, with the purpose of raising public awareness.
- Taking part in one parliamentary sitting, to inform Spanish politicians on different experiences on food waste reduction.
- Taking part in different conferences and forums in Business Schools, Agrobusiness professional organizations, and publishing two scientific papers.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution	R7

TITLE: Alimentos Sin Desperdicio - “Food without waste”	2016 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The Alimerka Corporate Foundation manages the operational framework of this programme, including its design, implementation and impact evaluation. This action is economically sustainable as reducing food waste is good for business (for both economic and logistical reasons – by avoiding waste management). Both the staff involved in the operations and the recipient organizations were trained and provided a brief manual containing information on food waste reduction and on food safety.

5. TRANSFERABILITY AND SCALABILITY

This type of action can be transferred to different contexts, but this has not been done yet. The action was upscaled from the start, due to the growing number of supermarkets taking part in this initiative.

6. INTERSECTORIAL COOPERATION

The action is the result of a cooperation strategy between the retail company and its foundation. On the other hand, the corporate foundation manages a net of more than 150 NGOs to distribute the surplus food, 63 of whom are already collecting surplus food daily.

KEY SUCCESS FACTORS AND BARRIERS

The main barriers identified were:

1) Food safety rules and legislation does not allow to distribute different groups of food (e.g. fresh fish)

2) It is not always possible to find NGOs next to the company that can pick up the surplus everyday.

3) Some NGOs cannot receive all types of surplus food due to the lack of technology (e.g. cold chain)

4) There are some barriers within the organisation, as bringing attention on food waste generation could be seen as a barrier for marketing and sales activities.

ADDITIONAL COMMENTS

REDISTRIBUTION, Surplus food redistribution | **R8**

TITLE: Zero desperdicio "Zero waste" | 2012 - ongoing

ORGANIZATION: ASSOCIAÇÃO PARA A RECUPERAÇÃO DE DESPERDÍCIO (non-profit citizens association) /ZERO DESPERDÍCIO | **COUNTRY:** Portugal

SHORT DESCRIPTION

In 2011, 9 citizens founded DARIACORDAR, a non-profit association with the ambition of transforming the world by preventing the increasing food waste in all areas of industry, commerce and consumption, by implementing recovery, recycling and innovation of surplus food, with a focus on cooked food and food approaching its expiry date that is channelled it to people in need. In 2012, Zero Desperdício was launched. Its initial work focused on the development of guidelines with the national Food Authorities to make it possible for establishments to donate perishable food as, at the time, the law was misunderstood and people believed it was illegal to donate it. Today, Zero Desperdício redistributes food products - meals, food and beverages – by connecting potential donors with NGOs, Parishes and charitable organizations, who collect the surplus production and distribute it to their beneficiaries, thus complementing other forms of support such as food banks.

Stage of the FSC
Restaurants and food services sector

Actors
Donors: retailers, caterers, schools, restaurants, hotels, hospitals / Receiving entities: NGO, Municipality, Parishes, Charitable organisations /Partners: DGAV, ASAE, JWT

1. QUALITY OF THE ACTION DESIGN

The aim of ZERO DESPERDÍCIO program is to avoid the production of food waste, actively reducing the overall waste production and related CO_2 emissions, recovering economic value and helping people in need. The main purpose of this initiative is to be as a gateway between existing entities (donors, receivers, NGOs, Cities) providing the logistical support and the expertise on best practices and legal requirements to enable the donation process, making sure that it is conducted according to the legislation and following the procedures necessary to guarantee food safety and hygiene. All the donations are registered and categorized in a database that delivers important information and economic, environmental and social KPIs, nowadays communicated and available to all community in the Zero Desperdicio website. Furthermore, qualitative surveys are applied to access the level of satisfaction of all the stakeholders in the programme.

2. EFFECTIVENESS

No baseline or targets were reported, therefore the action's effectiveness could not be determined. Nevertheless, this initiative has been constantly growing since the start: it started as a pilot project in 1 municipality in 2012 and now is present in 22 municipalities, and the total number of meals donated in the year 2018 was about 1.7 times higher than in the year 2013.

3. EFFICIENCY

(Data collected between 2013 and March 2019)

RESOURCES

Cost of the action

400 000 €

Volunteer hours

Not reported

RESULTS

Food waste prevented: 3 183 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	16 063 106	12 991 979	26 459 859
	(B)	662 064	109 233	155 526

Social: 6 365 962 equivalent meals donated, 412 volunteers (in 2018), 3 941 families supported (in 2018) and 8 799 beneficiaries supported (in 2018).

Outreach: Present in all of Portugal including Madeira and Açores. At the moment the program has 488 donors and 215 receiving entities.

To raise awareness Zero Desperdício has two book collections for kids and schools to use and learn about sustainability, healthy diets and zero waste.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution	R8

TITLE: Zero desperdicio “Zero waste”	2012 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

When Zero Desperdício started, a strategic plan was defined with the help of a strategy and innovation consulting firm. This plan was fundamental for the first years of operations. Nowadays, DARiACORDAR is developing a new web app in the context of the Horizon 2020 FORCE – Cities Cooperating for Circular Economy project, and therefore it is moving to a new digital business model that will allow Zero Desperdício to offer a service to its partners. The innovation of the project focuses on the development of the first digital platform fully dedicated to the management and implementation of production and distribution models according to the Circular Economy Concept. As a management platform for cities, this tool will be scalable for the management of several waste streams (e.g. food, plastics, medicines, textiles) and adaptable to diverse cities and territories.

5. TRANSFERABILITY AND SCALABILITY

At the international level, the program was replicated by the Hungarian Food Bank, in the context of the Fusions Project. The action was also upscaled nationally, with a global presence in all the country through the new protocols established with several retail networks. Also with the FORCE project, it is now possible to exploit and replicate the program in three European cities – Genoa, Copenhagen and Hamburg. The new model and program will be more digital, scalable and sustainable, with new features and adoption possibilities. DARIACORDAR is also replicating its model under the PT2020 and in partnership with LIPOR sustainably, to the North of Portugal.

6. INTERSECTORIAL COOPERATION

There has been extensive collaboration between the private, public and different sectors of society throughout the action’s lifetime. The action is managed by a private non-profit association, DARIACORDAR, playing the role of facilitator between donors and receivers organizations, training, monitoring, adjusting supply with demand, assuring that all the legal and food security requirements are respected, and optimizing the overall operational model. The receiving organizations can be public entities, such as councils and parishes, or NGOs, in charge of collecting, storing and redistributing the surplus food and responsible for its safety and for reporting the amounts received by the donors and that reached the community. The donor organizations are food business operators or producers. They are both private (manufacturers, retailers, HoReCa) and public institutions (hospitals, schools), among others. They are responsible for the quality/safety of food up to the point of donation. Local authorities, Municipal Councils, Parish Councils and other similar local authorities, might help identifying potential donors and receiving entities, acting in the ways as co-managers of the network. Besides all this, there are several entities that support the Zero Waste programme with funds, operational support and other strategic areas (e.g. legal advice, communication, campaigns, etc.).

KEY SUCCESS FACTORS AND BARRIERS

Donors are generally receptive to the idea of donating their food surplus. However, the surplus food not always matches the needs of the beneficiaries, both in terms of its geographical location and its nature (for instance there is an overabundance of pastry and cakes that, at a given point, can no longer be recovered for human consumption without endangering public health). For these reasons, sometimes, donations have to be refused. To ensure that the receiving entities are aware of this challenge, it is necessary to continually invest in training programs.

Nowadays, food waste and food surpluses are hot topics as well as circular economy and sustainability. As Zero Desperdício has been active in this filed since 2010 and has gathered enough knowledge to develop an app that connects all variables and waste streams, this represents a great opportunity to grow further.

ADDITIONAL COMMENTS

REDISTRIBUTION, Surplus food redistribution | **R9**

TITLE: Rede de apoio alimentar "Food support network" | 2012 - ongoing

ORGANIZATION: Espinho câmara municipal (municipality) & Cerciespinho (non-profit) | **COUNTRY:** Portugal

SHORT DESCRIPTION

This project started in 2012, when the City Council of Espinho (Portugal) with the support of the Espinho Delegation of the Portuguese Red Cross, the Espinho Parish, and the NGO CerciEspinho started to coordinate the daily collection of surplus meals from three schools in the city, to serve them to people in need on the same day.

Stage of the FSC
Food services

Actors
Municipalities, NGOs, Schools, Church

1. QUALITY OF THE ACTION DESIGN

The aim of this project is to prevent unnecessary food waste from school canteens, and use this surplus food to support people and families in need, within the framework of the work done by the Parish of Espinho to support those in need. The work is conducted by one salaried person supported by a group of volunteers (approximately 9). A thorough monitoring of the quantities of food redistributed is not implemented, but an estimation of the number of meals delivered daily was provided.

2. EFFECTIVENESS

No baseline or target was reported, therefore the effectiveness cannot be evaluated with current data provided.

3. EFFICIENCY

(Referring to one school year / 160 days)

RESOURCES

Cost of the action *

1 200 €

Volunteer hours

5 360 volunteer hours

RESULTS

Food waste prevented 3 276 kg

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	10 653	15 208	30 974
	(B)	577	2 102	69

Social 7 800 meals donated

9 new skills (volunteers)

Outreach

This initiative reached several members of society: a number of different entities, the city council, the red cross and the parish, that started collaborating towards a common goal; the school canteen staff members and the volunteers involved, that became more aware of the issue of food waste; and the families beneficiaries of the program, that thanks to it could have one full meal a day.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution | **R9**

TITLE: Rede de apoio alimentar "Food support network" | 2012 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

This action is supported by Espinho city council, Espinho delegation of the Portuguese red cross (providing one volunteer that collects the meals) and the parish of Espinho (in charge of the redistribution). To ensure its sustainability over time, all volunteers receive training on food handling and hygiene and food safety. It is economically sustainable because the costs are maintained low, as it is mostly carried out by volunteers.

5. TRANSFERABILITY AND SCALABILITY

The transferability of the action was not considered during the design phase, and the action was non upscaled since the start.

6. INTERSECTORIAL COOPERATION

Rede de Apoio Alimentar is the result of a cooperation between the private, public and community sectors, involving three municipal schools, the city council, CerciEspinho, the red cross and the parish. All different actors work jointly to reach a common goal: to avoid wasting food, making it possible for economically deprived people to have access to a complete and nutritionally balanced meal. This action has made all the participants more aware of the problem of food waste and the potential of turning it into a resource to help people in need.

KEY SUCCESS FACTORS AND BARRIERS

A key success factor was the cooperation of different actors towards a common goal, giving priority to the interest of the people in need.

The main barrier identified was the bureaucratic work needed to implement the action.

ADDITIONAL COMMENTS

* the cost of the action does not include the staff salaries

REDISTRIBUTION, Surplus food redistribution | **R10**

TITLE: Fight against food waste and precariousness | 1984 - ongoing

ORGANIZATION: Banques Alimentaires (association of French food banks) | **COUNTRY:** France

SHORT DESCRIPTION

The French federation of Food Banks coordinates 79 Food Banks. Every day, volunteers of the 79 Food Banks collect surplus food from supermarkets and redistribute it to partner associations.

Stage of the FSC
Primary Production, Processing and manufacturing, Distribution and retail

Actors
Donors (farmers, food manufacturers, wholesalers, retailers), Food banks, NGOs

1. QUALITY OF THE ACTION DESIGN

Food bank missions:
- Fighting against food waste
- Collecting, sorting and stocking, while respecting health and safety requirements
- Delivering food stuffs to 5 400 associations
- Ensuring that people in need have access to a varied and balanced diet

A monitoring system is put in place by each food bank to record the quantities collected and redistributed, the food types, and the source (farmers, manufacturers, retail and distributions).

2. EFFECTIVENESS

No baseline levels or targets were provided, therefore it is not possible to evaluate the effectiveness of this action with the current data available. Of the food redistributed by the food banks in 2017, 65% was surplus food, while the remaining share was either donated from the industry, from the public sector, or from individuals during an annual collection. A target could be set on increasing this percentage (in order to increase the efficiency of the overall supply chain and avoid producing food items for donations when there is surplus food available).

3. EFFICIENCY

(Referring to 12 months, in 2017)

RESOURCES

Cost of the action
22 000 000 €

Volunteer hours*
35 000 000 €

RESULTS

Food waste prevented 73 000 tonnes

	Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
(A)	232 969 100	297 962 453	606 839 360
(B)	11 300 469	24 948 721	2 359 622

Social

147 million meals donated

6070 volunteers were involved, and 276 people were employed with a subsidised contract for long-term unemployment/professional reintegration.

In 2017 The Food Banks helped 2 million food insecure people (considering the overall food donations, not only those related to surplus food).

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution	R10

TITLE: Fight against food waste and precariousness | 1984 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

This activity has been running since 1984, it involves 500 paid staff members and 6070 volunteers. A long term strategy is in place, including a financial plan, which is presented in yearly reports.

5. TRANSFERABILITY AND SCALABILITY

This action has been transferred to a different context: as part of a cooperation between France and Malaysia, the Federation visited Malaysia to share its experience. Furthermore, France is where the first food bank in Europe was created, nowadays there are 388 food banks in Europe. No information on an upscale of this initiative was reported.

6. INTERSECTORIAL COOPERATION

This action is the result of the collaboration of different sectors: the French federation coordinates the food banks, which are responsible for the collection, the storage and transportation of food products from private donors to the food banks, and the redistribution of products to charities. Finally the charities are in charge of the distribution of food products to the beneficiaries. There is no direct interaction between the donors and the receiving charities and beneficiaries.

KEY SUCCESS FACTORS AND BARRIERS

In order to provide a varied and balanced diet to the beneficiaries, it is key to ensure the nutritional quality of the products donated and that the relative share of the different food types follows the national nutritional recommendations. To this end, in the last 5 years, the share of fruit and vegetables donated increased from 18% to 25% of the total donations.

ADDITIONAL COMMENTS

(*) In the evaluation of the cost of the action, the estimation of the financial value of the volunteers working time was made considering the total hours worked by the volunteers and the gross minimum hourly wage in France.

REDISTRIBUTION, Surplus food redistribution | **R11**

TITLE: Matcentralen | 2015 - ongoing

ORGANIZATION: Stockholms Stadsmission (non-profit) | **COUNTRY:** Sweden

SHORT DESCRIPTION

Matcentralen is a social enterprise redistributing surplus food; it started in 2015 and it is run by Stockholms Stadsmission (Stockholm City Mission) an NGO active in Stockholm (Sweden). Through this program, surplus food donated by the industry is redistributed via food banks, social supermarkets and a food waste restaurant. In parallel, Matcentralen offers a programme of labour integration.

Stage of the FSC
Processing and manufacturing, Distribution and retail

Actors
NGOs, Retailers

1. QUALITY OF THE ACTION DESIGN

Matcentralen has three main aims: (i) reducing food waste, (ii) offer support to people in need and (iii) offer a labour integration programme for people in long-term unemployment. A monitoring system is put in place to record the quantities and types of food donated, the number of meals, and the number of people per week that receive support.

2. EFFECTIVENESS

A target was set on redistributing 600 tonnes of food in 2018, increasing the amount redistributed in 2017 (565 tonnes). This action was effective in meeting such target, as the total amount redistributed in 2018 was 617 tonnes.

3. EFFICIENCY

(Referring to 12 months in 2017)

RESOURCES

Cost of the action

359 000 €

Volunteer hours*

17 600

RESULTS

Food waste prevented 565 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	2 532 883	4 861 322	5 452 619
	(B)	109 045	259 989	18 095

Social

1 130 000 meals donated

18 payed employees

44 persons in labour integration programme

Outreach

On average, 6468 people each week received food donations. It was reported that their health and financial stability was improved thanks to this action, which gave them free access to healthy and more diverse food.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution	R11

TITLE: Matcentralen | 2015 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

Stockholms Stadsmission runs this activity, providing the human resources, managing the finances, and providing a long term strategic plan. Funds are collected by a variety of sources (private, public and crowdfunding) and additionally from the revenue of the social supermarkets. The financial plan of Matcentralen is to break even in the second half of 2020.

5. TRANSFERABILITY AND SCALABILITY

Transferability of the action was considered in the design phase, however the action has not been replicated elsewhere so far.

The action is currently being upscaled. A new cooperation with 8 more City Missions based in other cities started in the autumn of 2018, with the aim of putting in place a national logistics system for the redistribution of surplus food. One of the goals of this cooperation is to find long term funding for the food resitribution actions conducted at local level on one side, and for creating a new entity at national level on the other, that would provide a coordination between donating companies, logistic companies and receiving organizations. This project will run until the end of 2020 but the final goal is to make it become a permanent initiative.

6. INTERSECTORIAL COOPERATION

This action started as a cooperation between Stockholms Stadsmission (NGO) and Axfood (private company), a major food retail company in Sweden, with the launch of the first Social supermarket. As the action was growing, it increased its network. Today, Matcentralen is cooperating with 8 other NGOs and has signed donor agreements with 50 private companies in the food industry. It is also in close dialog regarding its development (business models, routines, national guidelines) with both the food industry, authorities, and NGOs. Finally it collaborates with different universities on a number of research projects.

KEY SUCCESS FACTORS AND BARRIERS

A key learning point was the need to establish easy routines to facilitate the donation process for companies.

ADDITIONAL COMMENTS

* the “volunteer hours” were calculated for both volunteers and people in labour integration programme (10 FTE in 2017).

REDISTRIBUTION, Surplus food redistribution | **R33**

TITLE: FoodCycle | 2008 - ongoing

ORGANIZATION: FoodCycle (charity) | **COUNTRY:** UK

SHORT DESCRIPTION

FoodCycle is a UK charity that combines surplus food, spare kitchen spaces and volunteers to create three-course meals for people at risk of food poverty and social isolation. FoodCycle operates from London, England, but has operations throughout the United Kingdom.

Stage of the FSC
Retail

Actors
FoodCycle (charity)

1. QUALITY OF THE ACTION DESIGN

The aims of this action are: to strengthen communities by bringing people together around a healthy meal, to encourage friendships by creating spaces for people from all backgrounds and walks of life to have fun together, to improve nutrition and reduce hunger by cooking healthy meals for those in need, and to change attitudes to food by cooking with surplus ingredients and spreading the passion for food and the environment.

A monitoring system is in place to measure the impact of this action: surveys are conducted to assess its social impact and the amount of food collected and meals served is recorded.

2. EFFECTIVENESS

No specific targets were set in relation to food waste, therefore the effectiveness of this action cannot be measured.

3. EFFICIENCY

(referring to the full duration)

RESOURCES

Cost of the action (C)

731 724 €*

Volunteer hours

227 069 volunteer hours

* only referring to 2017

RESULTS

Food waste prevented 424 895 kg

	Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
(A)	1 214 834	1 736 000	3 530 000
(B)	65 774	235 000	8 690

Social 1 011 655 meals donated, 1 100 volunteers

Isolated individuals are given an opportunity of socialise and be part of the community. From the guests (beneficiaries) surveys it resulted that:

- 85% have met people from different backgrounds
- 79% feel more part of their community
- 81% have tried new foods
- 76% eat more fruit and vegetables
- 77% have made friends

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

* converted from 636 600 Pound Sterling considering the average rate for 2017 of 0.87

REDISTRIBUTION, Surplus food redistribution	R33

TITLE: FoodCycle | 2008 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The action is ongoing. The operational costs are kept low thanks to the involvement of volunteers (since the start of the programme approximately 2 million pound sterling were saved thanks to the work of volunteers).

5. TRANSFERABILITY AND SCALABILITY

The project was started with two pilot hubs (Imperial College London and London School of Economics) in 2009. There are now 37 projects across England with over 1 100 enrolled volunteers, serving 1 500 guests a week.

6. INTERSECTORIAL COOPERATION

FoodCycle works with partner organisations for venue space, guest outreach and food supply. They do not own any venues but make use of spare kitchen space, in some cases for free in others they pay a rental service.
The project in London School of Economics partners with the charity the Food Chain to deliver meals to their service users, who are living with HIV. Another project in Dalston partners with the Happy Baby Community who support refugee and asylum seeker mothers who have been trafficked. Both of these projects are closed groups due to the nature of the beneficiaries.
FoodCycle collaborates with supermarkets in the local area to collect the surplus food. These relationships are built on a national level, but the store level relationship is key (the personal relationship with supermarkets' staff is very important). Additionally, in London some of the projects now partner with food redistribution charities, The Felix Project and City Harvest.
There are also 6 franchise partners who pay to be a FoodCycle. These are community centres, individuals or faith groups who want to set up a FoodCycle and benefit from its brand, infrastructure and resources. They manage the projects directly but are supported by FoodCycle for training, outreach, marketing, and fundraising.

KEY SUCCESS FACTORS AND BARRIERS

At FoodCycle, success is providing a safe, welcoming space for vulnerable people to enjoy a tasty, community meal. Food waste is a vehicle that enables to achieve this goal and to have a positive environmental impact.

A key barrier is access to food waste in certain areas of the country. There are more charities looking to make use of surplus food and a more joined up approach is needed to ensure all those who need it, can access it.

ADDITIONAL COMMENTS

REDISTRIBUTION, Digital tool for redistribution | **R34**

TITLE: Too Good To Go | 2015 - ongoing

ORGANIZATION: Too Good TO Go ApS | **COUNTRY:** International

SHORT DESCRIPTION

Too good to go is a world leader app putting in contact consumers with restaurants and retailers that sell their surplus food for very low prices before closure. At this moment 25 000 food retailers and +10 000 000 registered consumers saved food to be wasted in 11 countries in Europe.

Stage of the FSC
Retail, Food services

Actors
Too Good TO Go ApS

1. QUALITY OF THE ACTION DESIGN

Too Good To Go is a marketplace that puts in contact retailers (supermarkets, hotels, restaurants, bakeries) with the final consumers to reduce the food that will be lost at the end of the day.
Several KPIs are monitored to track the success of this initiative (see box 2).

2. EFFECTIVENESS

Effectiveness of this actions can be measured considering the following goals to be reached by 2020:

- Save 100 million meals in Europe (on track at time of reporting)
- To inspire 50 million people to reduce food waste – measured in terms of registered users (in July 2019 this was at 32%)
- Collaborate with 75 000 businesses (in July 2019 this was at 51%)
- Collaborate with 500 education centres (schools and universities) to organise conferences, lecturers, events and supported research (in July 2019 this was at 9%)
- Support a change in regulation on food waste in at least 5 countries (in July 2019 this was at 60%)

3. EFFICIENCY

(from 2015 to May 2019)

RESOURCES

Cost of the action (C)

-

(operational costs include the salary of 300 full time employees)

RESULTS

Food waste prevented 16 000 tonnes

	Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
(A)	240 000 000	65 300 000	133 000 000
(B)	2 476 815	7 130 000	348 000

Outreach

Raise awareness regarding food waste among their 10+ million registered users

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Digital tool for redistribution	R34

TITLE: Too good to go	2015 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

To Good To Go is based on a sustainable business model that generates a gross merchandise value over 100 million € in 2019. 5 out of 11 markets are profitable and this positive trend is expected to continue in the next months.

5. TRANSFERABILITY AND SCALABILITY

Too Good To Go is a fully scalable start up, currently present in 11 countries. It is a fully scalable technology in the European territory.

6. INTERSECTORIAL COOPERATION

Too Good To Go is a marketplace that puts in contact retailers (supermarkets, hotels, restaurants, bakeries) together with the final consumers to reduce the food that will be lost at the end of the day, it is therefore based on the cooperation between different actors.

KEY SUCCESS FACTORS AND BARRIERS

Success factor: fast escalation of the market place combined with a good commitment between partners and clients.

ADDITIONAL COMMENTS

REDISTRIBUTION, Surplus food redistribution | **R35**

TITLE: Avanzi popolo 2.0 | 2015 - ongoing

ORGANIZATION: Association Farina 080 Onlus | **COUNTRY:** Italy

SHORT DESCRIPTION

Avanzi popolo 2.0 is a project managed by the volunteering association "Farina 080" Onlus, which aims to activate Bari's citizens against food waste. Its main goals are to prevent food from being wasted at primary production, food services and household level, raise awareness on the problem of food waste, and give access to fresh food to people in need.

Stage of the FSC

Primary production, Food services, Households

Actors

Association Farina 080 Onlus, businesses, charities, local authorities, citizens

1. QUALITY OF THE ACTION DESIGN

The main activities are 1) to manage a food sharing web-platform where anybody can post information on food not consumed at home; 2) to save food that risks to be wasted (from fields, weddings, and conferences buffets) and redistributing it to associations supporting families in need; 3) to manage the installation of community fridges and public social stores in suburbs where families in need can buy food using a virtual currency; 4) to educate, train and raise awareness on food waste (including activities with kids). Key performance indicators such as the amount of food redistributed, the number of businesses donating surplus food, the number of charities receiving food, and the number of volunteers are tracked in time.

2. EFFECTIVENESS

In 2017 6985 kg of food were redistributed, 115 businesses were donating surplus food, 37 charities were receiving food and 50 volunteers were involved. Against such baseline, the following targets were set: to increase by 10% the amount of surplus food redistributed and to increase by 20% the number of businesses involved, charities and volunteers by 2019 (effectiveness in meeting those targets is yet to be assessed). The most important result of the action is the creation of a stable network of businesses, charities, citizens, local municipalities addressing the problem of food waste.

3. EFFICIENCY

(referring to 1 year)

RESOURCES

Cost of the action (C)

27 540 €

Volunteer hours

7 280 volunteer hours

RESULTS

Food waste prevented 6 985 kg

	Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
(A)	35 000	28 500	58 100
(B)	1 081	3 330	87

Social 37 charities receiving food, 50 volunteers involved, 6 985 kg of food donated to people in need (including in refugee camps)

Outreach

Education towards kids and adults on food waste

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution | **R35**

TITLE: Avanzi popolo 2.0 | 2015 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The action is ongoing and growing. The strategy to ensure its long-term sustainability is based on:
- keeping the costs low, not replicating what other actors already do, but adding only what is missing;
- increasing more and more the network, acting as a "server" to put in contact different stakeholders;
- building “unusual alliances” (e.g. the local skater association supports in recovering food from the shops);
- demonstrating to local communities and businesses the importance of fighting food waste by showing the economic benefits;
- giving visibility in exchange of excess-food;
- giving people a chance to play their part.

5. TRANSFERABILITY AND SCALABILITY

This initiative is easily replicable in urban contexts of medium dimensions with an active context in terms of the private and social sector. Wherever there is food that risks to be wasted and people that need it, mechanisms that aim to create linkages have good chances to be effective.
Working with a network of partners on both the sides of the issue (businesses and charities) allows to drastically to reduce logistic problems. Moreover, the project does not need big investments as usually it does not directly deal with the food distribution, but just puts in contact the actors.
A vademecum is available for other formal or informal groups willing to start similar projects in other cities, containing information about how it started, which problems were faced and what were the success factors. Since the start, the project has grown from one to four groups of volunteers active in two districts of the city and two surrounding towns.

6. INTERSECTORIAL COOPERATION

The network between local Administrations, private sector and civil society is the main strength of the action in addressing food waste. This kind of partnership is particularly evident in the case of food recovering actions (where the association acts as an intermediary between businesses and charities) and in the social store management where it manages a public service, attracting resources coming from the private sector (food, equipment, toys, clothes) and the civil society (volunteers, used goods).

KEY SUCCESS FACTORS AND BARRIERS

A key success factor is the availability of potential stakeholders to be involved in the network.
As fighting food waste needs mostly a cultural revolution, the main barrier is the resistance to change by all the stakeholders involved: most private businesses don't know the fiscal benefits coming from the new national law against food waste and are worried to be considered responsible for potential food contamination that could occur after the donation; many charities are not properly organized to efficiently manage large quantities of food and relate with businesses; most people have to overcome a cultural barrier before considering food-sharing (that is giving and taking food by strangers) as a real and feasible option.
Being conscious of these problems, this association acts as an intermediary, realizing that businesses and charities are not used to communicate and sometimes speak different languages, needing a “translator”. They also organize educational activities in schools to spread the message and to give people a chance to experience food-sharing in different ways.

ADDITIONAL COMMENTS

REDISTRIBUTION, Gleaning | **R36**

TITLE: Espigoladors | 2014 - ongoing

ORGANIZATION: Fundació Espigoladors | **COUNTRY:** Spain

SHORT DESCRIPTION

Espigoladors (Gleaners) is a Catalan, non-profit and social business that collects produce that would be left to rot in the fields (either for cosmetic criteria or overproduction etc.) and distributes it to food banks and social entities. The volunteers involved in the collection (gleaning) come from different sectors of society, including those in a situation of vulnerability. A small part (5-10%) of the produce recovered is used to make jams, pâtés, sauces, creams. This creates employment for people in social disadvantage and the profits are used to finance the rest of the project. Finally, they organize workshops and activities for all kinds of publics, but especially for kids, to raise awareness on the problem of food waste.

Stage of the FSC
Primary production

Actors
Espigoladors

1. QUALITY OF THE ACTION DESIGN

Objectives: fighting food waste generated at primary production, by giving people in a situation of vulnerability access to healthy and nutritious fresh food, and giving job opportunities to the same group of people.

Implementation: 1) gleaning on the fields and canalisation of fresh produce from producers and distributors; 2) canalisation of fresh produce to social entities in order to feed people in need, 3) transformation of part of the produce into preserves under the brand *es im-perfect*® favouring job inclusion of vulnerable groups, and 4) awareness raising projects on the topic of food waste such as workshops, campaigns and corporate social responsibility activities.

Monitoring: each area of Espigoladors monitors their own impact indicators and puts them in a spreadsheet every month in order to track KPIs.

2. EFFECTIVENESS

Effectiveness of this action can be measured considering the following target: to increase by 20% the amount of food recovered and redistributed in 2019 against the baseline of 2017 (190 000 kg of food recovered and redistributed in 2017).

3. EFFICIENCY

(from 2015 to May 2019)

RESOURCES

Cost of the action (C) *

435 000 €

Volunteer hours

8937 volunteer hours

* only referring to 2018 (63% is related to staff salaries)

RESULTS

Food waste prevented 690 246 kg

	Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
(A)	312 775	81 140	1 882 733
(B)	58 157	121 500	1 795

Social 63 job and training opportunities generated (from 2015 until May 2019)

Outreach

23.755 participants in 822 awareness-raising activities (from 2016 until May 2019)

10.273 followers on social media

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Gleaning	R36

TITLE: Espigoladors	2014 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The action is ongoing. In order to ensure its long-term sustainability, there is a strong focus on communication, commercial and marketing operations to ensure that the sales of products and services are sufficient to guarantee the economic sustainability. In this way, the initiative does not depend on other external funds such as private and public grants. Another activity is the study of the replication system (probably in social franchise model) in order to generate more impact and income to expand, grow and reach a maturity level.

5. TRANSFERABILITY AND SCALABILITY

The project started in 2014 as a pilot project and later in 2015 it was expanded to the Metropolitan Area of Barcelona, from then it grew and expanded within the same territory as network and cooperation with farmers and social entities. In 2019 there is the first possibility to study and perform an analysis of a replication in another geographical area of Spain.

6. INTERSECTORIAL COOPERATION

This action is based on the cooperation between the following sectors of society:

- Gleaners' communities: groups of volunteers, people at risk of social exclusion, beneficiaries from food banks or social services from the local administration, young people with disabilities from education centres and job reinsertion programmes.
- Farmers, food distribution companies: farmers are joining the network of Espigolards and taking steps towards not throwing food away.
- Younger generation: through education, a mind-set change among them is achieved to promote a new generation that already has the fight against food waste as a core value.
- Central kitchen workers: young people as well as women of all ages who are at risk of exclusion.

Furthermore, it reaches the following sectors:

- Consumers: the social brand *es-imperfect*® reaches the final consumer and creates awareness of the zero waste culture and also of a local and sustainable way of consumption.
- Beneficiaries from the social food banks: they receive gleaned fresh produce through other social entities.
- Society: apart from gleaning, society is reached through awareness raising activities, such as public seminars and workshops.

KEY SUCCESS FACTORS AND BARRIERS

Success factors:

• Team consolidation through trust and empowerment

• Professionalisation of the team and the practice

• Networking and establishment of key partnerships

• Indicators driven: show expansion capacity, social and environmental value added

• Resilience: adaptation to changes allows to evolve and to take new opportunities

Barriers

• Funding: the initiative has been launched from almost zero investment, its speed depends on the injection of money. Grants and entrepreneurship programs allow it to grow.

• Gleaning: new activity in Spain, very sensitive in the primary sector. Overcome by the professionalism and giving guarantees and trust to the farmers.

ADDITIONAL COMMENTS

REDISTRIBUTION, Surplus food redistribution | **R37**

TITLE: NoFoodWasted | 2015 - ongoing

ORGANIZATION: NoFoodWasted | **COUNTRY:** Netherlands

SHORT DESCRIPTION

NoFoodWasted is an App that gives live updates to users on offers on food put by supermarkets on products close to their expiry date. It has won the award for most impactful start up in the Netherlands in 2017.

Stage of the FSC
Retail

Actors
Private company "NoFoodWasted"

1. QUALITY OF THE ACTION DESIGN

The aim of NoFoodWasted is to contribute to a reduction of food waste by 50% by 2030. It focuses on the end consumers who are responsible for a large share of food waste. In order to make consumers conscious of the (magnitude of the) food waste problem, they are provided a tool to directly help them reduce the amount of food they waste.

The amount of products diverted from waste in a day are monitored to identify trends.

2. EFFECTIVENESS

No baseline levels or targets were provided related to this specific action, therefore it is not possible to evaluate the effectiveness of this action with the current data available.

3. EFFICIENCY

(referring to one year)

RESOURCES

Cost of the action (C)

300 000 €

RESULTS

Food waste prevented 2.7 million products

	Economic benefits (€)	Environmental savings* Climate Change (kg CO_2 eq)	Environmental savings* Water Use (m^3 eq)
(A)	2 000 000	4 270 000	7 580 000
(B)	227 489	200 000	38 000

* calculated assuming the average weight of 1 product is 500 g

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution	R37

TITLE: NoFoodWasted	2015 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The action is ongoing. The team consists of trained people and the action is economically sustainable as NoFoodWasted receives transaction costs per order sold.

5. TRANSFERABILITY AND SCALABILITY

Since the start the initiative has expanded to over 200 locations, and there are now (July 2019) over 80.000 active users of the app. It keeps expanding to different cities and aims for coverage in as many cities as possible. Also there are aspirations to expand the App to other countries.

6. INTERSECTORIAL COOPERATION

This initiative is based on the cooperation between: the organisation NoFoodWasted, the Municipality of 's-Hertogenbosch, Agrifood Capital, Ondernemerslift and other partners of NoFoodWasted supporting in increasing its exposure as well as the amount of locations.

KEY SUCCESS FACTORS AND BARRIERS

Success factors:

- Increased awareness on the food waste problem, so people are more willing to contribute
- The App is an easy tool for consumers to directly waste less food

Barriers:

- Competition
- Unwillingness of food providers (in some cases) to put the effort in using the App.

ADDITIONAL COMMENTS

REDISTRIBUTION, Surplus food redistribution | **R38**

TITLE: Local Food Waste Hub | 2019 - ongoing

ORGANIZATION: Municipality of Milan | **COUNTRY:** Italy

SHORT DESCRIPTION

Local Food Waste Hub is a pilot project to redistribute surplus food in two local neighbourhood of Milan. This initiative started in January 2019, when, in order to support food recovery under the framework of circular economy by small and local players, the Municipality of Milan entered into an agreement with a university lab of the Politecnico di Milano, to design a model and data analysis for food losses and waste management, the private sector union "Assolombarda", that represents supermarkets and companies with canteens, and the philanthropic Cariplo Foundation, which will cover the costs of infrastructures. The "Local Food Waste Hubs" will be hosted in a space owned by the Municipality of Milan and managed by a local food bank.

Stage of the FSC
Retail

Actors
Municipality of Milan, Politecnico di Milano, Assolombarda, Cariplo Foundation, Banco Alimentare della Lombardia

1. QUALITY OF THE ACTION DESIGN

During the course of the pilot year of implementation (2019), the incoming and outgoing donations in the hub will be monitored and the knowledge will also be spread among 35 local organizations, mapped by the Food Policy working on food donations. According to a preliminary analysis, each hub will be able to gather and redistribute approximately 60 tonnes of food per year (160 kg per day). The monitoring system for the initiative is being carried out by the University Politecnico di Milano. The goal is to scale up the model to all 9 neighbourhoods of the city in 2020, using the lesson learned in the pilot project, to connect the institutional drivers of the main partners of the initiative.

2. EFFECTIVENESS

This is part of a number of initiatives conducted by the City of Milan with the target of halving food waste by 2030, under the framework of SDG target 12.3. At the time of reporting, the effectiveness of this action could not be assessed yet.

3. EFFICIENCY

(results refer to the 1st year)

RESOURCES

Cost of the action (C)

40 000 €* + 1 salaried staff member

Volunteer hours

2 600 volunteer hours

* cost of space renovation in the first year

RESULTS

All the following results are projections for the first year

Food waste prevented 60 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
🍎	(A)	380 000	190 000	337 000
🗑	(B)	10 111	16 000	303

Social 160 kg of food redistributed each day

Outreach

Supermarkets involved in the initiative are becoming more aware of the amount of food waste generated and the hope is that they can reduce the food waste within their supply chain

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

REDISTRIBUTION, Surplus food redistribution	R38

TITLE: Local Food Waste Hub	2019 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The Local Food Waste Hub was launched with the idea of creating a permanent hub in the city to better redistribute surplus food, this is why the Municipality provided a previously unused space and committed to maintain the project without a rent for the Hub manager. The initiative is economically sustainable as long as the manager is capable of providing volunteers that recover and redistribute surplus food to local charities. The best option to guarantee its development is to extend the network, maintaining the current geographical area but increasing the number of actors.

5. TRANSFERABILITY AND SCALABILITY

A first pilot involving a food bank with a local hub started in 2016, but the project was not economically sustainable due to the rent demand. Alongside, the Municipality of Milan coordinated an agreement between strategic actors able to develop a logistic model for a new local food waste hub. The initiative area was then selected, together with the local actor for the management. Thanks to the deep knowledge gathered through the monitoring of the Local Food Waste Hub, the Municipality is willing to replicate the same logistic model in other parts of the city that need support in recovering food for donation.

6. INTERSECTORIAL COOPERATION

The Municipality of Milan has identified an unused public space in the neighbourhood and made it available as hub for the storage and distribution of food recovered by the non-profit organizations of the territory. The Politecnico di Milano developed a study of the network and will monitor the operation of the hub and the impacts generated by the project for 12 months, building an expandable and replicable logistics model in others districts of the city. Assolombarda involved some local companies and promoted with the other partners the initiative logo. A food bank (Banco Alimentare della Lombardia) will guarantee the operational and daily management of the model developed by the Politecnico, recovering food surpluses and distributing them to the charities of the neighbourhood. The QuBì Program - the recipe against child poverty, which already started a similar hub in another neighbourhood, joined the project by financing the setting up and management of the hub and favouring the connections with the networks of the territory.

KEY SUCCESS FACTORS AND BARRIERS

Municipalities can act on the food system by facilitating the relations between the players involved and playing the role of community leader and not just of administrative power. The Food Policy Office works for the integration among departments, agencies, urban and multilevel actors engaged in the Food System. Furthermore, it engages the relevant local stakeholders (horizontal integration) and it connects with Metropolitan and Regional authorities (vertical integration), in order to better identify innovative intervention areas. The Local Food Waste Hub is proving to be a successful model for neighbourhood redistribution of surplus food and will be scaled up in other 4 districts around the city thanks to new funding actors.

ADDITIONAL COMMENTS

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign | **B1**

TITLE: Chef Save the Food | 2017 - ongoing

ORGANIZATION: Casa del Consumatore, CODICI Centro diritto per il cittadino, AU Assoutenti (consumer associations)

COUNTRY: Italy

SHORT DESCRIPTION

Chef Save the Food (www.chefsavethefood.com) is an Italian project run by three consumer associations: Casa del Consumatore, CODICI Centro diritto per il cittadino, AU Assoutenti. It aims to teach families how to avoid wasting food through a 10 episode cooking show where professional chefs have to create a meal out of leftovers found in people's kitchen. The best recipe is then voted by the audience. In total, in the first season, 500.000 people voted. The first season took place between October and December 2017 on the Facebook official page of the project. The second season will be aired in spring 2019 on Food Network, a digital TV channel.

Stage of the FSC
Households

Actors
Consumer associations, local authorities, local chefs, families

1. QUALITY OF THE ACTION DESIGN

The aim of this project is to use a common form of entertainment, a cooking competition show, to teach the population new ways to use leftovers, and to raise awareness on the value of food and the need to use resources efficiently in order to protect the environment and their territory. No specific monitoring system was implemented to assess the impact of the action, other than the number of visualisations of each episode and the number of votes.

2. EFFECTIVENESS

No food waste reduction target was reported against which to measure effectiveness. The effectiveness of this action could be measured using other KPIs, such as measures the outreach level - e.g. access to the website (www.chefsavethefood.com) and the Facebook page or the total number of votes for each recipe – however no targets were set on these KPIs.

3. EFFICIENCY

(Referring to 12 months)

RESOURCES

Cost of the action

30 000 €

RESULTS

Outreach

In total 500 000 people were reached by this show.

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign	B1

TITLE: Chef Save the Food	2017 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The main challenge to ensure the continuation of this initiative is to collect funds for the production of the show. So far it has mainly relied on the support of local authorities.

5. TRANSFERABILITY AND SCALABILITY

While the first season was presented on the Facebook page of the project, and advertised mainly at local/regional level, the second season will take place on a national digital television channel, thus potentially reaching a larger audience. The action was not transferred to a different context.

6. INTERSECTORIAL COOPERATION

This activity was organized by three consumer associations with the support of the local authorities. To produce the show a number of professional figures were involved: video makers, a director, a presenter, technicians, social media advertisers. Furthermore, local families and chefs took part in the shows.

KEY SUCCESS FACTORS AND BARRIERS

The main barrier was the difficulty in collecting funds.

ADDITIONAL COMMENTS

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign | **B2**

TITLE: Zu gut für die Tonne! "Too good for the bin!" | 2012 - ongoing

ORGANIZATION: BMEL (Federal Ministry of Food and Agriculture) | **COUNTRY:** Germany

SHORT DESCRIPTION

"Too good for the bin!" is a consumer awareness campaign on food waste reduction conducted by the Federal Ministry of Food and Agriculture of Germany (BMEL). This initiative was launched in March 2012. Since then it has been providing targeted information to increase consumers' awareness on the true value of food and to raise the profile of this topic in the media and amongst the public.

Stage of the FSC
Households

Actors
National government, Regional government, Municipalities, NGOs, professional organisations, manufacturers, retailers and distributors, charities

1. QUALITY OF THE ACTION DESIGN

The main goal of the initiative is to increase the awareness of the value of food in order to reduce food waste generated by households. Thus, there are two main indicators to monitor the results:

- The level of awareness amongst German citizens with respect to the campaign measured via surveys in the year 2014 and 2016.

- The amount of food waste avoided in households in Germany thanks to this initiative.

The household food waste from a representative sample of households in Germany was monitored and recorded in the years 2016 and 2017, and this activity will be repeated in 2020.

Additional indicators used to measure the results of this initiative are media coverage, subscription to the newsletter, website accesses, downloads of the app. developed.

2. EFFECTIVENESS

Out of a sample of 1000 people interviewed, 73% knew the overall goal of the campaign in 2016. Furthermore, 28% were aware of the main causes of food waste in 2016 as opposed to 14% in 2014. Thus, in terms of increasing the awareness of German citizens on the issue of food waste, this action proved to be effective. However, so far no result was provided on food waste reduction, hence it is not yet possible to state whether the campaign was effective in terms of reaching such goal.

3. EFFICIENCY

(Referring to the full action)

RESOURCES

Cost of the action

5 500 000 €

RESULTS

Outreach

The visibility of the campaign was measured using a range of KPIs.

- The number of visits to the website was over 220 000 in one year.
- At time of reporting, the email newsletter had approximately 2 500 subscribers and almost 1 700 users had shared the news on the campaign via twitter.
- Since its release the app. had been downloaded over 800 000 times, making it the Federal Government's most popular ever app.

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign	B2

TITLE: Zu gut für die Tonne! "Too good for the bin!"	2012 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

At the time of reporting, a joint strategy to reduce food waste was being developed by the federal and state governments, involving all actors in civil society, business and research, to ensure the long term sustainability of this campaign. For the implementation of this campaign a coordination office is installed within the Federal Office of Agriculture and Food (three people) operating by order of the ministry and with an assigned yearly budget (for 2019: 1.8 million €).

5. TRANSFERABILITY AND SCALABILITY

The action has been focused at national scale and has not been upscaled nor transferred to a different context, although it is considered potentially transferrable.

6. INTERSECTORIAL COOPERATION

The action is a federal initiative by the BMEL. Different sectors were involved in its implementation, including: Slow food Deutschland e.V., Tafel Deutschland e.V. (Association of German Food Bank), religious associations, trading companies, the WWF, food-sharing entities. One-day events with Slow Food Deutschland and Tafel Deutschland have been held in more than 15 cities. Best-of-the-leftovers boxes were developed for different types of restaurants, and these boxes were distributed via Metro Cash&Carry Deutschland (a wholesale company). The initiative has also been presented at trade fairs and exhibitions. Since 2016, several stakeholders from the food supply chain (e.g. production, trade, gastronomy) and the civil society have been involved through an award scheme that gives prizes for the commitment in fighting food waste to those presenting the best ideas.

KEY SUCCESS FACTORS AND BARRIERS

Key learning points:

- According to the latest research, a review of the existing means of communication used by this initiative is necessary. Firstly it is important to focus the information provided to consumers mainly on foodstuffs that are wasted the most, and to reach out to newly identified target groups.

- The initiative needs to reach out more specifically to the younger generation since the abovementioned study has shown that the elderly generally throws away less foodstuffs.

- The information available on the reduction of food waste needs to be channelled and to be provided to the consumers in layman's terms and using modern communication methods.

ADDITIONAL COMMENTS

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign | **B3**

TITLE: CutFoodWaste2020 – communication campaign towards guests | 2017 - ongoing

ORGANIZATION: Matvett (company) | **COUNTRY:** Norway

SHORT DESCRIPTION

CutFoodWaste2020 is a three-year project led by Matvett, a Norwegian company that aims to prevent and reduce food waste in the food and catering industry. This project started in 2017 and aims to engage the hospitality sector in measuring and preventing food waste. Based on feedback from the hospitality sector, the two most critical factors to succeed in preventing food waste are to engage the employees (which is the focus of action S3) and to involve the guests (which is the focus of this action). To this end, Matvett decided to run an awareness campaign towards food services' guests. The campaign is divided into two main stages: the first phase is focused on the canteen sector, while the second, which will take place in 2019, will target the hotel and restaurant sectors. In June 2018, approximately 1700 sites from hotel chains, canteen chains and restaurants, had joined the program.

Stage of the FSC
Restaurants and food services sector

Actors
Private company (Matvett), food services, restaurants/hospitality sector

1. QUALITY OF THE ACTION DESIGN

The overall goal of the project is to reduce food waste by 20% by 2020, against a baseline of 2017.

The awareness campaign used the following tools: videos for internal and external social media channels, T-shirts and buttons, posters, buffet cards and doggie bags for leftovers. Additionally, the waiters were encouraged to offer guests smaller portions and doggie bags for leftovers.

Monitoring of the results: the KPI used to measure the impact of this action is the amount of edible food waste generated divided by the number of guests. This is measured daily and reported twice a year to Ostfold Research (a national research institute in charge of the data collection and analysis). Additionally, a breakdown of food waste generated at preparation, serving (buffet), and consumption (plate waste) stages is reported. This enables to measure if the campaign was effective in reducing the plate waste generated. Furthermore a survey was conducted in 5 canteens (201 respondents) to evaluate the impact of the communication campaign on customers awareness and resulting behaviour.

2. EFFECTIVENESS

Common to actions B3 and S3 (supply chain efficiency):

An objective was set to reduce food waste (grams of edible food waste generated for each guest) by 20% by 2020 against a baseline of 2017. Therefore, it is still not possible to say whether this action has been effective in achieving this objective.

3. EFFICIENCY

(Referring to 12 months,
resources are common to this action and action S3)

RESOURCES

Cost of the action

7 000 €

Working time invested

2.6 full time equivalent

RESULTS

Outreach

Out of 201 guests that completed the survey, 148 reported to have paid attention to the campaign, and 130 reported an increase in consciousness about food waste.

Awareness raising

A survey conducted among guests showed that the following results:
- 74% of the guests paid attention to the campaign
- 50% noticed the information at the dining table, 29% at the entrance/exit, 14% at the buffet
- 88 % regarded the campaign as positive, interesting and informative
- 65 % reported an increase in consciousness about food waste

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign	B3

TITLE: CutFoodWaste2020 – communication campaign towards guests	2017 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

Answer common to actions B3, S3, and B4

The long-term objective for cutting food waste in Norway is both secured by the 3-year long CutFoodWaste2020 project and furthermore, by the voluntary agreement where leading companies have committed to the target of 50 % reduction of food waste in line with the SDGs 12.3.

5. TRANSFERABILITY AND SCALABILITY

Answer common to actions B3, S3, and B4

The action has been focused at national scale but transferability was considered during its design phase.

6. INTERSECTORIAL COOPERATION

Answer common to actions B3 and S3

This action is based on the cooperation between Matvett and the hospitality business that participate to the program and Ostfold research, in charge of collecting and analysing the data.

KEY SUCCESS FACTORS AND BARRIERS

Barrier: The main project resources are used to develop the campaign. However, there is low media budget and therefore the advertisement of the campaign needs to be secured using the actors' own channels (websites, menus, social media, posters).

ADDITIONAL COMMENTS

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign | **B4**

TITLE: "Brukopp-leksikon" -A consumer guide on how to store and reuse food | 2017 - ongoing

ORGANIZATION: Matvett (company) | **COUNTRY:** Norway

SHORT DESCRIPTION

According to Matvett, a Norwegian company that aims to prevent and reduce food waste in the food and catering industry, 2/3 of the edible food waste comes from households. The main reason for wasting food is that it has passed its expiry date, and the most wasted food items are, in terms of percentage of the total waste:

- Fruit and vegetables (13 %)
- Bread (27 %)
- Leftovers from cooking at home (31 %)

For this reason, a book titled "Kunsten å ikke kaste mat" (the way not to waste food) was launched in 2017, providing a photo collection of 70 different food items close to their expiry date with clear guidance on how to store and reuse them. Matvett took part in the production of this book, and bought the rights to transform it into a digital guide to be published on their website. For each food item presented there are three main sections: general tips, durability, and storage. Furthermore, all the ingredients are linked to a database of leftovers recipes. The guide can be accessed here.

Stage of the FSC
Households

Actors
Private company (Matvett), research/academia

1. QUALITY OF THE ACTION DESIGN

The aim of this action is to increase people's knowledge on how to store food correctly, how to deal with food that is getting closer to its expiry date, and how to reuse leftovers. In this way, it is expected that households will generate less food waste. Monitoring of the results: Ostfold Research, a research centre, has been monitoring household food waste on behalf of Matvett since 2010. Additionally, to measure the outreach impact of this initiative, the number of visitors to the guide on the Matvett website is tracked.

2. EFFECTIVENESS

The food waste generated by households in 2016 (including only edible food waste) was 42.3 Kg per capita. When new data is available on food waste generated after introducing this measure, it will be possible to assess the effectiveness of this action. Nevertheless, the generation of household food waste is most likely influenced also by other actions and other external factors. Another measure of the action effectiveness could be linked to the outreach impact of the action (e.g. access to website).

3. EFFICIENCY

(Referring to 12 months)

RESOURCES

Cost of the action

10 000 €

RESULTS

Outreach

Number of website visitors is tracked, but the total figure for 2018 was not yet available at the time of reporting (November 2018).

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign	B4

TITLE: "Brukopp-leksikon" -A consumer guide on how to store and reuse food	2017 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

Answer common to actions B3, S3, and B4

The long-term objective for cutting food waste in Norway is both secured by the 3-year long CutFoodWaste2020 project and furthermore, by the voluntary agreement where leading companies have committed to the target of 50 % reduction of food waste in line with the SDGs 12.3.

5. TRANSFERABILITY AND SCALABILITY

Answer common to actions B3, S3, and B4

The action has been focused at national scale but transferability was considered during its design phase.

6. INTERSECTORIAL COOPERATION

This action is based on the cooperation between Matvett and Ostfold Research, in charge of collecting and analysing the data.

KEY SUCCESS FACTORS AND BARRIERS

Barrier: A critical factor is to build enough interest both in the Matvett website and the guide. An instruction video on how to use the guide is promoted on Facebook to increase the number of visitors to the website and the guide.

ADDITIONAL COMMENTS

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign | **B5**

TITLE: Do not waste it, take what is yours! | Nov-Dec 2014

ORGANIZATION: Resíduos do Nordeste EIM, S.A. (waste management company) | **COUNTRY:** Portugal

SHORT DESCRIPTION

"Don't waste it! Take what's yours!" is an initiative of Resíduos do Nordeste EIM S.A., a Portuguese waste management company. It was run for three weeks in 2014, during the European Week for Waste Reduction (EWWR) and in two following weeks. This initiative took place in two Portuguese municipalities, where 245 reusable plastic boxes were distributed across four restaurants, to enable their customers to take home their leftovers. This action had two main goals. On one side it aimed at reducing the amount of food waste generated by restaurants, and reducing the costs associated with its collection and treatment. On the other, it aimed at raising awareness amongst customers on the issue of food waste and introducing the habit of taking home and reusing leftovers, that so far has been seen as a sign of low economic resources. Finally, the decision of providing leftovers in a reusable container rather than using a conventional doggy bag was taken to avoid the production of packaging waste and introduce the habit of using such containers also at home.

Stage of the FSC
Restaurants

Actors
Municipalities, Restaurants, Waste treatment company

1. QUALITY OF THE ACTION DESIGN

The main goals of this action were:

- to demonstrate the importance of recovering leftovers, in order to significantly decrease food waste generated by restaurants;
- to eradicate preconceptions associated with taking home leftovers from restaurants and instead turn this into a normal habit;
- to test this action in 2 municipalities and afterwards replicate it in the 13 municipalities of Resíduos do Nordeste, EIM, S.A.

To this end, restaurant staff members were trained before the action (both to approach the customers and offer explanations and to measure the amounts of food waste throughout the action). Customers were informed by providing them a leaflet explaining this initiative. Additionally, the initiative was advertised on television, on the website of the municipalities and in the restaurants, by presenting it on posters. In order to measure the results of the initiative a monitoring system was put in place. Restaurant staff members were asked to measure each day: the total food waste generated (split by food type), its associated cost, and the number of portions prepared and served, during the 3 weeks of the action. A KPI used to measure the impact of the action was the average waste per plate.

2. EFFECTIVENESS

This action enabled to reduce the average waste per plate generated from 187 g (measured the first week) to 128 g (measured the third week), this is equal to a 32% reduction in week 3 compared to week 1. Although no food waste reduction target was reported, this initiative can be considered effective as it achieved a reduction in the food waste per plate generated during the course of the action.

3. EFFICIENCY

(Referring to the full action)

RESOURCES

Cost of the action

700 €

RESULTS

*(measured in week 2 and week 3, against week 1)**

Food waste prevented 280 kg

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	2 352	1 143	2 328
	(B)	43	158	5

Outreach Approximately 600 people, corresponding to 40% of the customers, agreed to take away their leftovers.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of the food diverted from waste

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign	B5

TITLE: Do not waste it, take what is yours!	Nov-Dec 2014

4. SUSTAINABILITY OF THE ACTION OVER TIME

The main barriers to the uptake of this action as a daily practice are: the cost of the reusable lunch boxes and the lack of human resources to perform the monitoring of food waste. This hinders the sustainability of the action over time.

5. TRANSFERABILITY AND SCALABILITY

A long term goal was to upscale it to the 13 municipalities where Resíduos do Nordeste is active, but no information was provided to confirm that this upscale took place.

6. INTERSECTORIAL COOPERATION

This action was based on the cooperation between the company Resíduos do Nordeste, the municipalities of Alfandega da Fé and Mirandela and the four restaurants taking part.

KEY SUCCESS FACTORS AND BARRIERS

Barriers encountered:

- The regional custom of serving large portions, which means that customers expect to be served more than what they can eat.
- The preconception of taking home the leftovers, and the lack of trust of some customers that did not believe that they were given the leftovers and the lunch box for free.
- The cost of reusable lunch boxes as opposed to disposable ones.
- A resistance in some restaurants staff to report information on the number of portions prepared and the cost (as it was felt as sensitive information). This was overcome by explaining them the importance of collecting accurate data.

ADDITIONAL COMMENTS

* As no information was provided on the amounts of surplus food taken home by customers but only on the amounts of food waste disposed, the avoided food waste was calculated assuming the waste generated in the first week as a baseline, and estimating the avoided food waste for the second and third week in line with what presented in **Annex 6** of the report.

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign | **B6**

TITLE: Date marking campaign | 2014

ORGANIZATION: Ministry of Environment and Food | **COUNTRY:** Denmark

SHORT DESCRIPTION

The Danish Veterinary and Food Administration and the Danish Consumer Council conducted in 2014 a two-month campaign to increase consumers' knowledge on the different meaning of the two date marks: "use by" and "best before". The campaign was repeated also in 2015 and 2017.

Stage of the FSC
Households

Actors
National government, NGOs, professional organisations, retailers, SMEs

1. QUALITY OF THE ACTION DESIGN

The main goal of the campaign was to increase the level of knowledge of consumers on the difference between "use by" and "best before" date marking in Denmark. A survey was conducted before and after the first run of the campaign in order to measure the impact of this initiative.

2. EFFECTIVENESS

The surveys showed that the share of consumers that knows the difference between the two date marks increased from 75% (before the campaign) to 76% (after the campaign). No target was set before starting the campaign. Nevertheless the small increase in consumer awareness shows that the campaign was not truly effective in achieving its goal.

3. EFFICIENCY

(Referring to the full campaign – 2 months)

RESOURCES

Cost of the action

30 000 €

RESULTS

Outreach

The outreach impact of this campaign was measured by conducting a survey before and after the initiative. This showed that the share of the Danish population that could tell the difference between the two date marks had increased by 1% after the running of the campaign.

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign	B6

TITLE: Date marking campaign	2014

4. SUSTAINABILITY OF THE ACTION OVER TIME

This action was concluded, but it might be repeated in 2020 or 2021. The plan is to identify more effective ways of educating consumers in the meaning of the two date marks in order to achieve a more successful result from the campaign in the future.

5. TRANSFERABILITY AND SCALABILITY

The action was conducted at a national scale but its format could be used for an EU-wide campaign.

6. INTERSECTORIAL COOPERATION

This initiative was run thanks to the cooperation between the Danish Veterinary and Food Administration (Danish Government) and the Danish Consumer Council. Additionally private companies and NGOs (e.g. Stop Wasting Food) helped with spreading the information in supermarkets, through social media etc.

KEY SUCCESS FACTORS AND BARRIERS

Potential reasons for not achieving a larger increase in the awareness of consumers on this topic are that due to a low availability of resources the information was not spread enough, that the media channels used were not effective or that the information was not communicated in an understandable way.

ADDITIONAL COMMENTS

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign | **B7**

TITLE: Movimento Menos Olhos que Barriga "Less Eyes than Belly" | 2013 - ongoing

ORGANIZATION: University of Minho | **COUNTRY:** Portugal

SHORT DESCRIPTION

This campaign, ongoing since in 2013, takes place in all the food outlets of the University of Minho (Portugal). It is run by the University Social Services (in charge of the catering services at the University) and involves student volunteers. The campaign is based on a series of specific actions with the main goal of raising awareness on the issue of food waste and reducing the food waste generated on the University premises.

Stage of the FSC
Restaurants and food services sector

Actors
Food service; Academia/research

1. QUALITY OF THE ACTION DESIGN

The main goal of this campaign is to change the behaviour of the academic community to achieve a food waste reduction. Furthermore, it aims at shaping the mind-set of students so that, when they finish their studies, they can take these values to other institutions and expand these principles to other communities and organizations. To this end, the main objective is to develop a set of awareness raising activities that promote the reduction of food waste by encouraging the users of the food service outlets to take only the amount they intend to eat. The activities conducted include providing cutlery paper bags with messages on food waste, setting up a photo competition and creating a Facebook page to promote the campaign.

In order to measure the results of the initiative, the total amount of food waste generated by the University food outlets was recorded before the start of the campaign and during its development. This was done by weighing each day the organic waste collected from the University canteens and recording these quantities.

2. EFFECTIVENESS

Before the start of the campaign, the University was generating 4 tonnes of food waste per year. After five years of implementing the campaign, this quantity was reduced to 2 tonnes per year. Although no initial target was set, the action can be considered effective in achieving a 50% reduction of food waste.

3. EFFICIENCY

(Referring to 5 years, 2013-2018)

RESOURCES

Cost of the action

500 €

Working time invested

800 volunteer hours each semester

RESULTS

Food waste prevented 5 tonnes*

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	14 296	20 408	41 657
	(B)	774	2821	92

Outreach This campaign has reached almost the entire academic community which is approximately 20000 people each year. Behavioural change was not assessed through surveys, but due to the reduction of food waste generated by the University canteens, it is possible to say that the academic community changed its behaviour.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of the food diverted from waste

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign	B7

TITLE: Movimento Menos Olhos que Barriga "Less Eyes than Belly"	2013 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The sustainability over time of this action is ensured by the fact that it is part of a broader strategy to improve the sustainability of the University of Minho. A strategic sustainability plan was developed in 2018 consisting of 17 short, medium and long-term programs focused on the three sustainability pillars. A Sustainability Office was also established with a full-time person responsible for the operationalization of the whole program. Thus, this year, in addition to the improvement in the efficiency of the organic and inorganic waste produced, specific measures to reduce energy and water consumption were implemented. A process to eliminate all types of disposable plastic was initiated and awareness and social impact campaigns were implemented. Furthermore, a sustainability report will be published in 2019 in order to achieve the ISO 14001:2015 Environmental Management System certification - becoming the country's first social services to do this.

5. TRANSFERABILITY AND SCALABILITY

The action has been conducted at local scale and has not been upscaled nor transferred to a different context, although it is considered potentially transferrable.

6. INTERSECTORIAL COOPERATION

The action is internal to the University, being the result of a partnership between the internal catering service provided of the University of Minho and the University of Minho’s academic Social Science Institute.

KEY SUCCESS FACTORS AND BARRIERS

The main challenges encountered were the following:

- Operationalization of the whole process: with three canteens and so many daily users, it was necessary to create many work teams and the overall coordination of the entire process was very challenging.

- Raising people's awareness to the food waste problem is not always easy, requiring a lot of effort and dedication.

ADDITIONAL COMMENTS

*The total food waste avoided was calculated considering that the food waste generated was reduced gradually from 4 tonnes per year to 2 tonnes per year during the course of 5 years (between 2013 and 2018), leading to a total food waste reduction of 5 tonnes.

CONSUMER BEHAVIOUR CHANGE, Date marking | **B8**

TITLE: Additional date labelling | 2018 - ongoing

ORGANIZATION: Matvett (company) | **COUNTRY:** Norway

SHORT DESCRIPTION

Previous research has shown that consumers are responsible of 2/3 of the food waste generated in Norway, and that 42% of the food wasted by households is discarded as it has passed its expiry date. To tackle this issue and increase consumer awareness on the meaning of "use by" dates, Matvett, a Norwegian company that aims to prevent and reduce food waste, started the project "Additional date labelling". The use of additional date labelling was first introduced in 2017 by the dairy company, Q Meieriene. Matvett has been leading a project for aligning the initiative across the food sector and for developing a common, consistent sentence to be used: "Best before … often good after".

Stage of the FSC
Households

Actors
Matvett, national government, food manufacturers, food authorities

1. QUALITY OF THE ACTION DESIGN

The aim of this project is to develop a common additional date labelling, to be used across the food sector, to increase consumer understanding of the meaning of "best before" dates. The additional date marking is voluntary and is only relevant on "best before" labelled products (not highly perishable products), regardless their shelf life, or whether they are fresh or frozen. It should be used consistently to avoid consumer confusion. A common symbol that encourages the consumers to "look, smell and taste" the food to see if it is ok, is under development as an extra guidance. Furthermore dynamic date labelling was introduced for milk products (longer shelf life during winter).

The Norwegian Food Authorities support the additional date marking providing that: it follows current legislation and it is consistent, explicit and not confusing to the consumer.

To monitor the impact of this action, surveys have been conducted yearly asking consumers what are their resons for discarding food and if they "always throw away food past its expiry date".

2. EFFECTIVENESS

This initiative is conducted within the Norwegian sector agreement between the government and the food sector that has set a 50% reduction target of food waste (across the full supply chain) by 2030 against a baseline of 2015. No specific target on food waste reduction linked to this specific action was set. Nevertheless, the action's effectiveness can be measured considering the results provided by the surveys on consumer awareness. For instance in 2017 a lower percentage of respondents stated that they always discard food past its expiry date compared to the average of the years 2010-2015 (26% compared to 30%).

3. EFFICIENCY
(Referring to 12 months)

RESOURCES

Cost of the action

16 000 €

RESULTS

Outreach

As a result of this action 7 out of 10 consumers declared to be more confident in using their senses and regard the food as edible after purchasing products providing additional information on the packaging.
Especially high awareness to the initiative among young people <30yrs
Additionally 9 out of 10 understand the purpose of the additional marking:

- Milk can be consumed even if the date is expired
- Regard the information as additional guidance
- Use their own senses to consider the quality of the product to a larger extent

CONSUMER BEHAVIOUR CHANGE, Date marking	B8

TITLE: Additional date labelling	2018 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

To ensure the durability of this action, a network with 20-25 leading companies was established, to better align the implementation of the additional date labelling. Furthermore, optimal date labelling is one of the strategic focus area in the negotiated agreement between the government and the food sector.

5. TRANSFERABILITY AND SCALABILITY

This action has been upscaled: from being a single initiative, additional date labelling is now aligned at a national level.

6. INTERSECTORIAL COOPERATION

Examples of inter-sectorial cooperation:

- This initiative is part of an agreement between the government and the food sector on food waste reduction.
- Matvett established a network with 20-25 leading companies to better align the implementation of the additional date labelling.
- Food authorities support this initiative provided that the information is consistent, explicit and not confusing to the consumer.

KEY SUCCESS FACTORS AND BARRIERS

It was key to involve some leading companies to be first to implement the additional labelling system.

A challenge was to make all companies agree on a common sentence to use for the additional labelling.

ADDITIONAL COMMENTS

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign
SUPPLY CHAIN EFFICIENCY, Process innovation

B22

TITLE: De mon assiette à notre planète: SIGIDURS project

2012 - ongoing

ORGANIZATION: De mon assiette à notre planète

COUNTRY: France

SHORT DESCRIPTION

De mon assiette à notre planète is a not for profit association that organizes educational workshops on food waste reduction in schools, universities, social and medical institutions, as well as businesses. The association trains staff to avoid food waste and better match the needs of guests. De mon assiette à notre planète also teaches and promotes taste education as a resource to reduce food waste.
In collaboration with SIGIDURS, an organization based in Sarcelles (Val d'Oise – France) collecting and treating waste in in a number of cities in Val d'Oise and Seine-et-Marne departments, they run a project on the prevention of food waste in 30 schools and 2 retirement homes.

Stage of the FSC
Food services (school canteens)

Actors
De mon assiette à notre planète, SIGIDURS, local schools, retirement homes

1. QUALITY OF THE ACTION DESIGN

The aim of this project is to reduce both kitchen and plate waste in the canteens of the schools taking part in the initiative.

To monitor the impact of this initiative, plate leftovers as well as kitchen surpluses were measured before and after the campaign.

2. EFFECTIVENESS

Before the campaign the average waste per meal was of 180 g (150 g of plate leftovers and 30 g of kitchen surpluses). The target was to reduce this amount by 30-50%. The average waste per meal has been reduced to 117 g, 35% lower, therefore the action was effective in achieving such target.

3. EFFICIENCY

(Referring to 7 years)

RESOURCES

Cost of the action

110 500 €

Volunteer hours

350

RESULTS

Food waste prevented 661 500 kg

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	1 323 000	2 700 000	5 500 000
	(B)	102 401	226 000	21 400

Outreach

10 500 persons (including school children and retirement home staff) reached by the campaign

85% of the school children targeted state that they are now more careful about wasting food

80% state that they taste their food before rejecting it and that they are less reluctant to taste new and unfamiliar foods

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

CONSUMER BEHAVIOUR CHANGE, Awareness/Educational campaign
SUPPLY CHAIN EFFICIENCY, Process innovation

B22

TITLE: De mon assiette à notre planète: SIGIDURS project

2012 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The action is ongoing. Schools and institutions that De mon assiette à notre planète has accompanied are now autonomous to further develop practices and implement new actions. To ensure the long-term sustainability of the project the staff is regularly trained.

5. TRANSFERABILITY AND SCALABILITY

The first large scale project run by De mon assiette à notre planète was "Manger autrement dans les collèges des Bouches-du-Rhône" that started in 2006. This triggered new projects nationwide and in overseas French departments.

6. INTERSECTORIAL COOPERATION

The work of De mon assiette à notre planète is based on the cooperation with different local and regional authorities, as well as the French Ministère de l'Agriculture et de l'Alimentation. It triggered the funding of a social enterprise that collects and redistributes food surpluses from catering companies: Excellents Excédents: www.excellents-excedents.fr.

KEY SUCCESS FACTORS AND BARRIERS

Success factors:

- Understanding the urgency of reducing food waste, and the impacts of food waste on sustainable development.
- Gathering people with different backgrounds, needs and representations around common objectives.
- Setting accurate diagnosis and choosing relevant ratios to communicate the results. These ratios should be adjusted to the different actors' professional backgrounds.
- Select appropriate "anti-waste" actions that are geared to the school needs and culture.
- Select short, medium and long term goals: succeeding in achieving simple and effective short term actions triggers the motivation to further develop new medium and long term actions.
- Share results, good practices, difficulties, tips and tricks with other institutions involved in food waste reduction programs.

ADDITIONAL COMMENTS

SUPPLY CHAIN EFFICIENCY, Training & Guidelines	S1

TITLE: Guidelines on food waste reduction and donations in the hospitality sector | 2017

ORGANIZATION: HOTREC (trade association) and FEBA (food banks federation) | **COUNTRY:** Europe

SHORT DESCRIPTION

HOTREC, the umbrella Association of Hotels, Restaurants, Bars, Cafes and similar establishments in Europe, published in 2017 a set of guidelines for its members to help hospitality businesses prevent and reduce food waste. This brochure also contained joint recommendations with the European Food Banks Federation (FEBA) to help hospitality businesses willing to partner with local food banks on the donation of unused food. The brochure was developed considering that the hospitality sector is composed largely by micro-enterprises facing specific challenges (e.g. non-standardised production methods and dishes, handling of small quantities of ingredients, difficulty to assess in advance expected occupancy of a restaurant, small operational margins making any business sensitive to administrative burdens). HOTREC therefore decided to help these businesses by setting concrete guidelines to implement in their daily operations to prevent and reduce food waste and to donate surplus food.

Stage of the FSC
Restaurants and food services sector

Actors
HOTREC, FEBA, national hospitality associations and their member businesses

1. QUALITY OF THE ACTION DESIGN

The overall goal of this action was to support hospitality businesses willing to reduce food waste, by improving their processes or engaging in food donations, through the establishment of concrete guidelines and recommendations that any hospitality business can use and implement. To communicate the guidance, HOTREC relied on its network of members and partners. The HOTREC brochure was distributed (hard copy + electronic version) to all HOTREC members (43 national hospitality associations in 30 countries) who were asked to inform all their members about it. The HOTREC brochure is also available permanently on the HOTREC website/extranet and on the Refresh - Community of Experts portal. It was also presented to HOTREC members during the HOTREC General Assembly held in spring 2017, as well as to European policy makers in an event held in the European Parliament on 31 January 2017 to which several HOTREC members participated. There was no monitoring of the food waste reduction achieved thanks to this initiative, for logistic and budget reasons (there are 2 million hospitality businesses in Europe, 90% of which being micro-enterprises).

2. EFFECTIVENESS

No measurable objectives were set and therefore the effectiveness of this action in reducing food waste cannot be evaluated.

3. EFFICIENCY

(Referring to 12 months)

RESOURCES

Cost of the action

4 500 €

Working time invested

0.5 full time equivalent for 4 months

RESULTS

Outreach

Audience reached: all HOTREC members (43 national hospitality associations in 30 countries).

SUPPLY CHAIN EFFICIENCY, Training & Guidelines	S1

TITLE: Guidelines on food waste reduction and donations in the hospitality sector	2017

4. SUSTAINABILITY OF THE ACTION OVER TIME

As this action consisted of a single initiative (the development and distribution of a brochure) which could potentially have a long lasting effect, its sustainability over time is mainly linked to the durability of the impact of the action. To ensure its durability, HOTREC members are regularly reminded of the existence of the brochure and of the set of recommendations it contains to help reduce food waste in hospitality establishments. Economically, the brochure had a cost for HOTREC (which is a trade association composed of national hospitality associations). However, HOTREC firmly believes that the guidance and recommendations contained in the brochure will positively influence food waste reduction efforts in the hospitality sector.

5. TRANSFERABILITY AND SCALABILITY

This action was the result of transferring similar initiatives from national hospitality associations at international level. Some examples are: *No Food to Waste*, a brochure developed by the Flemish association Horeca Vlaanderen in collaboration with the Flemish government, and *From food waste to resource*, a set of guidelines and tools developed by HORESTA, the Danish hospitality association, in collaboration with the Danish Food Administration. Additionally, this initiative could favour the development of similar guidelines at national level in those countries where such guidelines have not been developed yet.

6. INTERSECTORIAL COOPERATION

The HOTREC brochure on food waste was developed in cooperation with HOTREC's members associations (national hospitality associations), which provided their own recommendations on both food waste prevention and food donations, and showcased their own best-practices. Besides, HOTREC cooperated with the European Food Bank Federation (FEBA) to develop a list of recommendations to help businesses engage in food donations and establish possible partnerships with food banks at local level. HOTREC was responsible for distributing the brochure to its member associations, while HOTREC's member associations were responsible for informing their member enterprises about the guidelines. Furthermore, in terms of public-private cooperation, HOTREC partnered with the UN World Tourism Organization (UNWTO) to distribute its brochure on the occasion of the launch of the 2017 International Year of Sustainable Tourism for Development, and organized an event at the European Parliament to promote to EU institutions, stakeholders and Member States the content of the brochure.

KEY SUCCESS FACTORS AND BARRIERS

The main barriers/obstacle to overcome were linked to the composition of the sector and its heterogeneity: 90% of hospitality businesses are micro-enterprises, often operating on low profit margins and with limited resources available. They need simple solutions that do not imply costs or burdens.

Success factors of this actions were that hospitality businesses are welcoming guidance documents with a focus on simple tips and recommendations to be easily introduced in daily operations, and that micro-enterprises particularly welcome the link made with cost-savings due to the prevented food waste, as well as the possible marketing benefits towards clients.

ADDITIONAL COMMENTS

SUPPLY CHAIN EFFICIENCY, Imperfect product sale | **S2**

TITLE: Fruta Feia | 2013 - ongoing

ORGANIZATION: Fruta Feia (cooperative) | **COUNTRY:** Portugal

SHORT DESCRIPTION

Fruta Feia is a Portuguese cooperative founded in November 2013 that purchases weekly from local producers the too small, big or misshaped products that they cannot sell in the regular market and organizes a delivery service of seasonal fruit and vegetable boxes with these products. The users of the service pick them up at the end of the day at fixed delivery points (spaces granted by an already existing association), for a fixed price (depending on the size of the box).

Stage of the FSC
Primary Production

Actors
Municipalities, NGOs, Farmers, Schools, Consumers

1. QUALITY OF THE ACTION DESIGN

This project aims to fight the market inefficiency caused by aesthetic standards of fruit and vegetables, by changing consumption patterns and creating an alternative market for "ugly" fruits and vegetables. To this end, it connects consumers with farmers giving the former the opportunity to purchase fresh, local and seasonal products and enabling the latter to sell products - that would otherwise go to waste - for a fair price. A monitoring system of the food waste avoided is implemented by recording the amount of products purchased each week from the farmers.

2. EFFECTIVENESS

Although no target was provided, when Fruta Feia was upscaled from having one delivery point to eleven, the amount of fruit and vegetables redistributed increased from 400 kg/week to 14.6 tons/week. This action can therefore be considered effective in increasing the amounts of products redistributed in time.

3. EFFICIENCY

(Referring to 12 months)

RESOURCES

Cost of the action

562 000 €

Working time invested

3 300 volunteers hours

(excluding the 487 volunteers involved in the assembly of boxes)

RESULTS

Food waste prevented 672 tonnes

		Economic benefits (€)*	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	648 500	438 046	1 977 114
	(B)	76 608	511 861	8 733

Social 11 jobs created & 487 new skills (volunteers)

Outreach

Number of stakeholders involved in the initiative: 157 farmers per year, 4735 registered consumers (at time of reporting), 11 local associations where new delivery points were opened, 487 volunteers involved in the boxes assembly, 4200 school pupils engaged through awareness raising activities. Fruta Feia's approach was disseminated through the participation in events and press articles release, and by collaborating with other projects and entities. The growing number of registered consumers since the start of the initiative is signalling a change in consumers' attitude towards ugly fruit and vegetables, nevertheless no empirical evidence was reported that demonstrates such a behavioural shift.

(A) Revenue from the sale of imperfect products / Environmental impacts linked to the production of food replaced by the imperfect products sold

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

SUPPLY CHAIN EFFICIENCY, Imperfect product sale	S2

TITLE: Fruta Feia	2013 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

Fruta Feia Co-op is financially self-sustainable, which means that the money coming from selling the boxes is enough to cover all the costs: buying the products from farmers, paying for the transportation costs and paying the salaries to the employees of the co-op.

5. TRANSFERABILITY AND SCALABILITY

Fruta Feia has been upscaled since its start in 2013, through the launch of new delivery points. Eleven delivery points were launched in Lisbon and Porto regions, reaching 4 different districts (Lisbon, Setubal, Porto and Braga) and increasing the food wastage reduction from 400 Kg/week (in 2013) to 14.6 ton/week (in 2017). Furthermore the Fruta Feia model was replicated/transferred abroad as the Fruta Feia team mentored several people and entities interested in replicating their model. This was the case with the Imperfect Produce company launched in the USA. Nevertheless, two main issues were recognized by the team: firstly a lack of acknowledgement of the mentorship received in some cases (due to which they now agree beforehand that anyone launching an initiative similar to Fruta Feia after receiving support from the team will have to acknowledge it by using a special logo) and secondly that some initiatives take the original model behind Fruta Feia and transform it into a model that aims at maximizing profit (disregarding social and environmental considerations at the heart of Fruta Feia).

6. INTERSECTORIAL COOPERATION

Fruta Feia collaborated with Instituto Superior Técnico (University of Lisbon) and Lisbon City Council within the FLAW4LIFE project, but always keeping the co-op's operational and financial independence.

KEY SUCCESS FACTORS AND BARRIERS

The key barriers at national level were to collect the necessary funds for the initial investment and gain the trust of the older farmers.

A key learning point was that to ensure the financial sustainability of the project, all the delivery points need to be located in one of the two main regions of the country – Lisbon and Porto – to ensure a minimum number of customers in each delivery point.

ADDITIONAL COMMENTS

Additional indicators reported: Food Waste reduction (ton/week): 14.6; Reduction of GHG emissions (kg CO_2 eq/week): 13021; Resource efficiency – saved water (m^3/week): 16.054.

A scientific paper was published analysing the sustainability of the business model of Fruta Feia:
Ribeiro, I., Sobral, P., Peças, P., Henriques, E., 2018. A sustainable business model to fight food waste. J. Clean. Prod. 177, 262–275.

SUPPLY CHAIN EFFICIENCY, Process innovation | **S3**

TITLE: CutFoodWaste2020 – hospitality sector employees training program | 2017 - ongoing

ORGANIZATION: Matvett (company) | **COUNTRY:** Norway

SHORT DESCRIPTION

CutFoodWaste2020 is a three-year project led by Matvett, a Norwegian company that aims to prevent and reduce food waste in the food and catering industry. This project started in 2017 and aims to engage the hospitality sector in measuring and preventing food waste. Based on feedback from the hospitality sector, the two most critical factors to succeed in preventing food waste are to involve the guests (which is the focus of action B3) and to engage the employees (which is the focus of this action). To this end, a training program for employees was developed, to teach them how to measure food waste and how to implement actions to reduce it. In June 2018, approximately 1700 sites from hotel chains, canteen chains and restaurants, had joined the program.

Stage of the FSC
Restaurants and food services sector

Actors
Matvett, food services, restaurants/hospitality sector

1. QUALITY OF THE ACTION DESIGN

The overall goal of the project is to reduce food waste by 20% by 2020, against a baseline of 2017. The project implementation consists of 4 building blocks:

1. Increase employees knowledge on the causes of food waste in their business through a training program
2. Measurement - daily measuring of food waste and number of guest
3. National reporting - twice a year food waste amounts are reported to Ostfold Research
4. Identify and implement preventive actions to reduce food waste

In 2017, the project main delivery was a training program targeted to three different roles: the project leader, the expert, and the catering staff. The program consists of a physical course, an e-learning course, presentations and instruction videos. The aim of the training program is to increase the understanding of how to measure food waste.

Monitoring of the results: the KPI used to measure the impact of this action is the amount of edible food waste generated divided by the number of guests (grams per guest). This is measured daily and reported twice a year to Ostfold Research (a national research institute in charge of the data collection and analysis). Furthermore, a breakdown of food waste generated at preparation, serving (buffet), and consumption (plate waste) stages is reported.

2. EFFECTIVENESS

A target of reducing food waste (grams of edible food waste generated for each guest) by 20% by 2020 against a baseline of 2017 was set. At the time of reporting results were available only for hotels: in 2018 the food waste was reduced by 4% compared to 2017 (from 122 grams per guest to 118 grams per guests). It is still not possible to say whether this action has been effective in achieving its targets.

3. EFFICIENCY

(Referring to 12 months, resources are common to this action and action B3)

RESOURCES

Cost of the action

7 000 €

Working time invested

2.6 full time equivalent

RESULTS

Outreach

So far, 322 persons have been taking part in the training courses.

SUPPLY CHAIN EFFICIENCY, Process innovation	S3

TITLE: CutFoodWaste2020 – hospitality sector employees training program	2017 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

Answer common to actions B3, S3 and B4

The long-term objective for cutting food waste in Norway is both secured by the 3-year long CutFoodWaste2020 project and furthermore, by the voluntary agreement where leading companies have committed to the target of 50 % reduction of food waste in line with the SDGs 12.3.

5. TRANSFERABILITY AND SCALABILITY

Answer common to actions B3, S3 and B4

The action has been focused at national scale but transferability was considered during its design phase.

6. INTERSECTORIAL COOPERATION

Answer common to actions B3 and S3

This action is based on the cooperation between Matvett and the hospitality business that participate to the program and Ostfold research, in charge of collecting and analysing the data.

KEY SUCCESS FACTORS AND BARRIERS

A key success factor was that a project group including people from hotels and restaurants was involved in developing the training program. To be part of the CutFoodWaste2020 project, daily measurement of food waste and number of guest is mandatory. The training program addresses the reason why and how to do this.

ADDITIONAL COMMENTS

SUPPLY CHAIN EFFICIENCY, Process innovation | **S4**

TITLE: WasteWatch powered by Lean Path | 2017 - ongoing

ORGANIZATION: Sodexo (company) | **COUNTRY:** Several countries

SHORT DESCRIPTION

WasteWatch powered by LeanPath (WWxLP) is a comprehensive program to prevent and reduce food waste run by Sodexo, a multinational corporation providing food services and facilities management in 80 countries. It is focused on: Tracking Food Waste, Monitoring Performance, Taking Actions to Drive Reduction, and Communicating Success. Preventing food waste is a central focus of Sodexo's corporate responsibility roadmap. Sodexo aims to implement the "WasteWatch powered by LeanPath" (WWxLP) program in 100% of their relevant food sites by 2025 with a 50% reduction target, in line with the UN SDG 12.3.

Stage of the FSC
Restaurants and food services sector

Actors
Food service, Restaurants/hospitality sector, Healthcare, Schools

1. QUALITY OF THE ACTION DESIGN

Sodexo has been implementing the program "WasteWatch" for a few years, helping its sites to track, monitor and analyze food waste to take targeted actions. To boost deployment, in August 2017, a master agreement was signed with LeanPath to equip their sites with a robust tracking system, moving from a manual (WasteWatch) to an automated program (WWxLP). To implement the program, a project manager was appointed at central level in the Corporate Responsibility (CR) team, working closely with regional and country operations. In each region, a team composed of a CR leader and an Operations leader is appointed to deploy the program by setting regional deployment plans and targets, engage senior leaderships, set up training programs, and adapt the system to local specificities. Furthermore WWxLP is being integrated into the DRIVE process, a food management end-to-end process. This means tracking food waste and taking action will be a standard company-wide process. WWxLP training was also integrated in their standard training programmes dedicated to Chefs and Site Managers. In 2019, a new global reporting system is being developed to measure the company's overall performance. As part of this new system, food waste KPIs are integrated using WasteWatch data and results, thus making food waste reduction a key component of the company's performance evaluation. WasteWatch aims at tracking pre- and post-consumer food waste. Reducing pre-consumer waste targets food service operations in all segments in which Sodexo operates (schools, hospitals, corporate, government services, etc.). Tracking post-consumer waste helps to raise awareness amongst consumers on the importance of reducing waste while supporting the improvement of the food service provided.

2. EFFECTIVENESS

The program has a target of reducing food waste by 50% by 2025 and to implement food waste monitoring in all relevant sites by 2025. Results were provided for a pilot exercise conducted in 13 school kitchens across Italy, France, Belgium and the UK between 2015 and 2017. Here, no food waste reduction target was set since the purpose of the pilot exercise was to evaluate the potential reduction. A reduction of 15% of food waste was achieved (from the initial value of 110 g of waste per meal).

3. EFFICIENCY

(Referring to a pilot exercise conducted for two years in 13 school kitchens)

RESOURCES

Cost of the action

Not reported (*)

RESULTS

Food waste prevented 2 800 kg

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	18 200	11 429	23 376
	(B)	433	427	89

Outreach

This program increased the awareness of the leadership, sales teams, operational teams, the clients, and the consumers. It helped to realize how much food is wasted and how much waste can be avoided through simple targeted actions at site level.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of the food diverted from waste

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

SUPPLY CHAIN EFFICIENCY, Process innovation	S4

TITLE: WasteWatch powered by Lean Path	2017 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The program is currently ongoing and fully integrated in normal operations. Current improvements of the program include:

- development of a global Platform to ensure ongoing implementation of the program and reporting
- upgrading of the software to facilitate daily tracking and monitoring by site managers (new functionality, translations, etc.)
- development of an onboarding Dashboard and additional training materials

5. TRANSFERABILITY AND SCALABILITY

After conducting a number of pilot exercises, the program was transferred/upscaled to a many sites worldwide and is being globally deployed.

6. INTERSECTORIAL COOPERATION

WasteWatch powered by LeanPath program is a Sodexo proprietary program. It was developed using a system that is available on the market (Leanpath). The system is being deployed in all markets where Sodexo operates (Healthcare, Schools, Corporate, Sports & Leisure, etc.). In parallel, Sodexo has initiated the creation of the International Food Waste Coalition (IFWC), which is a non-for-profit association that gathers organizations from different sectors (WWF, Ardo, Pepsico, Essity, General Mills, and Sodexo). It is an association of organizations backed by pre-eminent advisory bodies (e.g. FAO) to share knowledge on the topic of food waste and to join forces to make things happen. The IFWC unites the food services industry to build a future without food waste. The experience and knowledge of Sodexo and Leanpath in developing the WasteWatch program has been shared with the IFWC to develop a specific project for the School sector, called "Do Good: Save Food!"

KEY SUCCESS FACTORS AND BARRIERS

Challenges: leadership engagement and operational change management are challenges that were overcame through strong collaboration between Sodexo's Corporate Responsibility teams, Operational teams and LeanPath to demonstrate the value of the program (development of business cases by country and segment, many pilots were carried out to demonstrate benefits). Making food waste a priority for Sodexo helped gain the support of Sodexo's CEO to boost deployment of the program.

Success factors: engagement of on-site teams in the program. People are proud to make a difference and adopt a pro-environmental behaviour. Training helps gaining staff awareness. Consumers are also enthusiastic about the program, especially in schools and universities.

ADDITIONAL COMMENTS

(*) Regarding the cost of the action: in the pilot phase the implementation was free for the sites and costs were only linked to the time invested in training, measuring FW and setting up actions to reduce FW (these values are specific for each pilot and were not reported).

SUPPLY CHAIN EFFICIENCY, Process innovation | **S5**

TITLE: The Gothenburg model for reduced Food Waste | 2016 - ongoing

ORGANIZATION: City of Gothenburg (municipality) | **COUNTRY:** Sweden

SHORT DESCRIPTION

The Gothenburg model is a procedure/tool developed by the City of Gothenburg (Sweden) in 2016, that provides tips and actions to reduce food waste in the public food sector (approximately 520 public kitchens). The City of Gothenburg trained 40 key employees in all city districts to coordinate the development of the program and approximately 1200 employees to implement the model as a daily routine. The aim of this initiative is to obtain a reduction of 50% of the food waste generated during procurement, storage, preparation, and serving of the meals (i.e. excluding plate waste), by December 2018 against a baseline of January 2017.

Stage of the FSC
Restaurants and food services sector

Actors
Local authorities, public food sector

1. QUALITY OF THE ACTION DESIGN

The overarching aim is to obtain a 50% reduction of food waste in public kitchens in the city of Gothenburg. To this end, a procedural tool "The Gothenburg Model for Reduced Food Waste" was created, that provides nine tips for food waste reduction, each underpinning a number of measures (for a total of 54 measures). A training program was implemented, to teach employees how to use the tool, and two surveys were conducted: the first during the training session, and the second a few months later, to establish the effectiveness of the training program (the surveys were mostly focused on which of the 54 measures suggested had been implemented). All public kitchens taking part are asked to measure daily the food waste generated, and register it in a meal planning software system. In this way, it is possible to track the progress towards the goal.

2. EFFECTIVENESS

At the beginning of 2017, on average the food waste generated by the public kitchens was of 30 grams per guest (excluding plate waste). The goal was to halve the food waste generated by December 2018. At the time of reporting (Dec 2018), this level had reached 15 grams per guest, 50% lower compared to the baseline, meeting the original target. Therefore, this action was effective in meeting its target. Additional measures of the effectiveness of this measure were provided: in May 2018 96% of the public kitchens in Gothenburg were measuring and registering their food waste in the system, and the surveys show an overall increase in the number of measures implemented in the months following the training program (the share of measures fully implemented increased from 42% to 56% in the months following the training program).

3. EFFICIENCY

(Referring to 24 months)

RESOURCES

Cost of the action

540 000 €

RESULTS

Food waste prevented * 300 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	1 000 000	1 224 503	2 493 860
	(B)	57 900	138 047	9 608

Outreach

This program increased the awareness of the leadership, sales teams, operational teams, the clients and consumers. It helped to realize how much food is wasted and how much waste can be avoided through simple targeted actions at site level.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of the food diverted from waste

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

SUPPLY CHAIN EFFICIENCY, Process innovation	S5

TITLE: The Gothenburg model for reduced Food Waste	2016 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The economic sustainability of the action is based on the concept that its cost is balanced by the savings from the avoided food purchases (the savings from the reduced purchases since the start of the action - approx. 1 000 000 euros – are more than the cost of the action 540 000 euros).

5. TRANSFERABILITY AND SCALABILITY

This action has been partially transferred. Recently, the Swedish Food Agency has launched a model to reduce food waste which includes parts of the Gothenburg Model for Reduced Food Waste. Furthermore, a number of other municipalities have started implementing the model.

6. INTERSECTORIAL COOPERATION

This action is mainly conducted within the public food service of the city of Gothenburg. Nevertheless, since its start, the different city districts started cooperating towards the common goal of reducing food waste.

KEY SUCCESS FACTORS AND BARRIERS

The whole process has been received very positively. A learning point is that the program would have proceeded more smoothly if the operative managers had been included earlier in the process and the key coordinators had been trained before the remaining employees.

ADDITIONAL COMMENTS

(*) The total food waste prevented was calculated considering that yearly food waste was reduced gradually from 600 tonnes per year to 300 tonnes per year over two years.

TITLE: Accounting food losses in the Flemish food industry | 2012-2014

ORGANIZATION: Fevia Vlaanderen (trade association) | **COUNTRY:** Belgium (Flemish region)

SHORT DESCRIPTION

This project was led by Fevia Vlaanderen, the Flemish food industry professional organization, in 2012. It aims to improve the knowledge on quantities and causes of food losses in the food industry by performing audits and questionnaires and identify possible solutions to reduce such losses. The findings of this work were presented in a brochure, providing tips and practical steps to achieve a food waste reduction, which was distributed among the food companies involved and published online.

Stage of the FSC
Processing and manufacturing

Actors
Regional government, Professional organisations, food manufacturers (including SMEs), Academia

1. QUALITY OF THE ACTION DESIGN

The goal of the project was to increase the awareness on the quantities and causes of food losses in the food industry. This was done by:

1) Drafting an audit scheme on food loss for food processing companies, to allow the quantification of food losses, and the identification of causes and hotspots. Two methods for quantification of the losses were proposed (top-down and bottom-up), from which the companies could choose.

2) Conducting audits within food companies (this task was performed by a university research group).

3) Developing questionnaires, a shorter version of the audit scheme, to distribute amongst food companies and gather responses.

4) Running 5 workshops, led by a lean management consultant, on measures to improve efficiency and reduce food losses.

6) Running a seminar to present the results of the project.

7) Preparation of an online and printed brochure with the results and concrete actions for companies.

8) Making an audit scheme permanently available online.

Monitoring: Throughout the project, the audience reached by each action was recorded.

2. EFFECTIVENESS

A target was set at the beginning of the project, to conduct an audit in 15 to 30 food companies and receive 75 to 100 questionnaires. At the end of the project 23 companies had been audited, 68 had filled in the questionnaire, and 17 companies had taken part to the workshops. Therefore, the action was effective in achieving these targets.

3. EFFICIENCY

(Referring to 17 months)

RESOURCES

Cost of the action

90 000 €

RESULTS

Outreach

In total 23 companies from 7 subsectors were audited, 68 filled in questionnaire, 17 participated in workshops.
Seminar: > 50 participants.
Printed brochure: 500 receivers.
Online brochure > 1000 receivers.

TITLE: Accounting food losses in the Flemish food industry | 2012-2014

4. SUSTAINABILITY OF THE ACTION OVER TIME

The results of the project help the professional organisation and the regional authorities to define a more effective action plan. The audit scheme and brochure are permanently available for companies or new people in companies and can be used as support for training or awareness raising.

5. TRANSFERABILITY AND SCALABILITY

Part of this project was replicated in the Walloon region in Belgium: audits based on the audit scheme implemented were also done in Wallonia.

6. INTERSECTORIAL COOPERATION

Several actors took part in this project: the food industry federation (leading), the food companies, the regional government (part of the steering committee and providing part of the funding), a research group (conducting the audits) and a consultant. Each member had a specific task.

KEY SUCCESS FACTORS AND BARRIERS

The lead in this project was taken by the food industry federation who facilitated the contact with the food companies, including SME's. The collaboration between the federation and the academic partner was constructive and gave origine to an outcome adapted to small companies in various food sectors.

The main challenge was to convince companies to participate in the audits, even though it was free for them. A way to overcome this was to use different channels, and addressing the topic as "material efficiency" instead of "food loss".

ADDITIONAL COMMENTS

SUPPLY CHAIN EFFICIENCY, Product innovation - Packaging	S7

TITLE: Improved shelf life

2015

ORGANIZATION: Nofima (research institute) and Norges Gruppen (retailer)

COUNTRY: Norway

SHORT DESCRIPTION

In 2015, a minced meat manufacturer changed the packaging gas from high oxygen (70% O_2/ 30% CO_2) to a mix of carbon dioxide and nitrogen (60% CO_2/40% N_2) to minimize risk of undercooking and prolong the shelf life of the products, which increased from 9-10 days to 18 days. A large retailer in Norway (Norges Gruppen) registered data of food wastage before and after the change of packaging gas in 629 stores across the country, to document how the amount of food waste was affected by the prolonged durability. Today, all meat manufacturers in Norway use the new type of packaging to ensure a longer shelf life of products.

Stage of the FSC
Retail

Actors
Processors/manufacturers, Retailers, Academia/research

1. QUALITY OF THE ACTION DESIGN

The goal of this action was to implement a new packaging technology to prolong the shelf life of minced meat and reduce food waste at retail and consumption stage. To this end:

1) a research centre identified the ideal packaging gas to prolong the shelf life of minced meat

2) a meat manufacturer implemented the new packaging technology

3) food waste levels were measured in 629 stores across Norway for 8 months in 2014 (before the implementation of the change) and for 8 months in 2015 (after the implementation of the change) to compare the results.

2. EFFECTIVENESS

The food waste was reduced from 8.5% of sold amounts to 2.5%, equal to a 70% reduction for meat wasted at retail stage. No food waste reduction target was set before the beginning of the action, nevertheless the action was effective in achieving a food waste reduction.

3. EFFICIENCY

(Referring to 8 months)

RESOURCES

Cost of the action

Not reported (*)

RESULTS

Food waste prevented 372 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	1 860 000	7 291 114	2 067 244
	(B)	63 240	82 472	- 2 796

Outreach

Consumers were informed of the longer shelf life of the products. It is assumed that this innovation also had an impact on reducing waste levels in households, however this was not monitored.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of the food diverted from waste

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

SUPPLY CHAIN EFFICIENCY, Product innovation - Packaging	S7

TITLE: Improved shelf life	2015

4. SUSTAINABILITY OF THE ACTION OVER TIME

The action is now concluded. All manufacturers in Norway use this packaging, therefore the action has a long term effect.

5. TRANSFERABILITY AND SCALABILITY

The action is at national level, as all manufacturers use this packaging with the mix of carbon dioxide and nitrogen and not the gas mix of high oxygen.

6. INTERSECTORIAL COOPERATION

The action was carried out by private sector (meat manufacturer and retailer) in cooperation with academia/researchers. The change in packaging gas was performed based on advice from the academia/researchers.

KEY SUCCESS FACTORS AND BARRIERS

The CO_2/N_2 packaging gas used for most types of fresh raw meat in Norway gives longer durability by reducing microbiological growth, compared to high oxygen packaging gas. The high oxygen gas mixtures remain common in other countries because the oxygen gives the meat an initial bright red colour. Therefore, in practice it is not possible for a manufacturer alone to change the package gas, since most consumers will choose the product that is packed with high oxygen because of the colour. For this reason, a change in packaging gas must take place simultaneously for all the manufacturers in a country.

ADDITIONAL COMMENTS

(*) Regarding the cost of the action: no cost was reported as the change in packaging gas did not cause an increase in production costs. However, other operational costs - e.g. conducting the research, developing the new system, etc. – were not reported.

SUPPLY CHAIN EFFICIENCY, Process innovation | **S8**

TITLE: Eating in Hesse | 2017 - ongoing

ORGANIZATION: United Against Waste e.V. | **COUNTRY:** Germany

SHORT DESCRIPTION

Eating in Hesse is a pilot project aiming at increasing the sustainability of the catering service and at the same time reducing food waste in canteens (focusing on company canteens, prisons and vocational training centres) run in the Federal State of Hesse. This project is the first to combine a range of instruments enabling the analysis, assessment and optimization of both food waste avoidance and sustainable nutrition (focusing on low impact and healthy dietary choices). Moreover, the project takes a holistic view of health, environmental and economic effects and communicates these effects in ways that are specific to the different target groups.

Stage of the FSC
Food services

Actors
National Government, Regional Government, United Against Waste e.V., Catering sector

1. QUALITY OF THE ACTION DESIGN

This project is based on measuring and monitoring food waste using the United Against Waste Food Waste Management System, and supporting the development of individual measures to reduce food waste generation in the long term. Five steps are included: 1) process analysis on site; 2) first waste measurement; 3) workshop and elaboration of individual measures; 4) implementation of the measures; 5) second waste measurement.
Monitoring system (UAW-Waste-Analysis-Tool): all food waste is collected in the kitchen and sorted in four transparent containers – food waste from the warehouse, production waste, overproduction and plate leftovers. The quantities are measured (in grams) and recorded on a waste card. The daily results are then transferred to the online-based Waste Analysis Tool.
A number of indicators are then used to assess the monetary savings and the reduction of the environmental impact and use of resources. Health indicators are also taken into account.

2. EFFECTIVENESS

Although no target was provided, on average this system enables to reduce food waste by 20-50%. It can therefore be considered effective in achieving a reduction of food waste in canteens.

3. EFFICIENCY

(Referring to one catering company, 2 months)

RESOURCES

Cost of the action

Not provided

RESULTS

Food waste prevented 1 400 kg

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	5 600	5 714	11 683
	(B)	283	150	50

Outreach

450 people reached by the awareness raising activities organised.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of the food diverted from waste

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

SUPPLY CHAIN EFFICIENCY, Process innovation	S8

TITLE: Eating in Hesse	2017 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

This project is ongoing and it is economically sustainable, because thanks to the economic savings achieved through food waste reduction companies can invest in new technologies, staff and quality of the service provided. The sustainability over time of this action is ensured due to the large network of the association United Against Waste (over 100 members including the Association of German Chefs, the Federal Association of the German Food Industry, IKEA, DEHOGA Federal Association, etc.), the collaboration with several actors (see box 6).

To verify the long-term effect of the reduction measures, at regular intervals the waste measurements are repeated with the waste analysis tool (continuous monitoring). This immediately shows which measures are effective and which are not. Following this, further measures against food waste are developed for each company.

5. TRANSFERABILITY AND SCALABILITY

This is a pilot project conducted in the State of Hesse, the scalability was considered in the design stage and the selection of operators will ensure the project's nationwide outreach.

6. INTERSECTORIAL COOPERATION

With more than 100 members (Association of German Chefs, Federal Association of the German Food Industry, IKEA, DEHOGA Federal Association, etc.) United Against Waste has a large market coverage of the food sector.

In addition, United Against Waste has prepared recommendations for policy, research and education on the topic of food waste and relative communication, together with the German Nutrition Society, the World Wide Fund For Nature (WWF) and the Federal Association of the German Food Industry. Furthermore, they are currently working with the WWF to develop a comprehensive action program that will meet SDG target 12.3.

In 2015/16, the study "Situation analysis on food losses in retail, out-of-home catering as well as in private households and on consumer behaviour" was prepared jointly for the German Federal Environmental Foundation (DBU) and it served as the basis for the work of the DBU to avoid food waste in Germany.

In 2017, the United Against Waste interim report 2017 ("one third lands in the bin") was published: Facts and measurement results for Germany-wide Food waste in the out-of-home catering.

UAW conducted waste measurements with its own online-based Waste Analysis Tool in nearly 400 different companies (May 2014 to July 2017) and published the results end of 2017. This interim report provides reliable values for restaurants, hospitals, hotels and schools. On this basis, the development of total food waste in out-of-home catering in Germany is documented and evaluated. Such monitoring creates transparency for the first time and uncovers causes and savings potentials. United Against Waste has the most extensive waste database in Germany with detailed analyzes.

KEY SUCCESS FACTORS AND BARRIERS

A successful strategy against food waste requires the training of all protagonists. In the workshops "Reduce food waste, save costs" in addition to the theory (appreciation of food, ecological footprint, resource consumption) concrete solutions for the long-term reduction of food-waste are suggested. In interdisciplinary working groups, the participants develop their own measures that contribute to the efficient utilisation of food. The great response to the workshops confirms the need to integrate food waste into the training of cooks and service workers. UAW's holistic food-waste-management offers the optimal assistance here.

ADDITIONAL COMMENTS

FOOD WASTE PREVENTION GOVERNANCE, Voluntary agreements | **V1**

TITLE: Voluntary food waste agreement | 2017 - ongoing

ORGANIZATION: Ministry of Climate and Environment (coordinating a steering committee with 12 members from food sector organizations and 4 other ministries).

COUNTRY: Norway

SHORT DESCRIPTION

Norway is committed to contribute to reach the UN's sustainability goals including sub-goal 12.3, stating that global food waste should be halved by 2030. The Norwegian Voluntary Food waste Agreement builds on a five-year collaboration project (ForMat) between the food industry, the retail and wholesale sector, and the Government. It was signed in June 2017 with the active involvement of the food sector (12 organisations) and of the Government (5 ministries). Primary producers, manufacturers, wholesalers, retailers, restaurants, and households are included in the agreement. The industry organisations are responsible for collecting data from the companies and encourage them to implement actions in the value chain. The authorities are responsible for compiling national statistics after receiving reports from the industry, and provide consumer statistics. Development of guidance for measuring food waste and for date marking are two of the most important actions addressed in the agreement.

Stage of the FSC

Processing and manufacturing, Distribution and retail, Food services, Households

Actors

National government, Trade associations, Professional organisations, Farmers, Processors/manufacturers, Wholesalers, Retailers, Food services

1. QUALITY OF THE ACTION DESIGN

The voluntary agreement defines the purpose and the reduction targets to be achieved as well as the roles and responsibility of the contract partners belonging to the food industry and to the authorities. A monitoring system is in place to register levels of food waste for part of the value chain (manufactures, retailers, wholesalers, horeca) and will be in place for the primary production and the seafood industry by the first year of reporting (2020).

2. EFFECTIVENESS

The voluntary agreement sets a reduction target of 50% by 2030 sub-divided into two intermediate sub-targets: 15% reduction by 2020 and 30% reduction by 2025.

The year 2015 is defined as the baseline year against which the food waste reduction target is tracked. In 2015, food waste in Norway (deriving from the food industry, wholesale, retail and households) amounted to 335 000 tonnes (68.7 kilos per capita). Households were responsible for 2/3 of the food waste generation. Food waste measurements will follow in 2020 and 2025.

3. EFFICIENCY

(Referring to 12 months)

RESOURCES

Cost of the action

480 000 €

RESULTS

Food waste prevented

First complete measurement will be done in 2020

Outreach

After two years, 85 leading companies have signed the declaration of endorsement and have committed to reach the target of the agreement and they are measuring their food waste annually and committed to implement actions. The companies represent all the retail chains, over 50 % of the manufactures, and 50 % of the hotel and canteen sector.

FOOD WASTE PREVENTION GOVERNANCE, Voluntary agreements	V1

TITLE: Voluntary food waste agreement	2017 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The duration of this action is defined in the voluntary agreement to be until 2030.

5. TRANSFERABILITY AND SCALABILITY

The action has been transferred to/replicated in the Netherlands and in Finland.

6. INTERSECTORIAL COOPERATION

The voluntary agreement was signed in June 2017 with the active involvement of the food sector (12 organisations) and of the Government (5 ministries). Primary producers, manufacturers, wholesalers, retailers, restaurants and households are included in the agreement. The industry organisations are responsible for collecting data from the companies and encourage them to implement actions in the value chain. The authorities are responsible for compiling national statistics after receiving reports from the industry, and provide consumer statistics. A steering committee has been established with members from the 12 sector associations and 5 ministries, and is coordinated by the ministry of Climate and Environment.

KEY SUCCESS FACTORS AND BARRIERS

Compared to previous initiatives, the actors involved in this voluntary agreement come from more sectors of the food supply chain, e.g. primary production and HoReCa. In this way, food waste reduction efforts at those stages of the value chain were increased thanks to this voluntary agreement.

An example of the effectiveness of the agreement can be seen from the establishing of food banks in Norway. When the voluntary agreement was signed, there was only one food bank in Norway. The Government has contributed with funding for 6 more food banks and the industry is delivering far more food now than before the agreement.

ADDITIONAL COMMENTS

FOOD WASTE PREVENTION GOVERNANCE, Voluntary agreements	V2

TITLE: Food supply chain roadmap on food loss 2015-2020	2015 - ongoing

ORGANIZATION: Government of Flanders and professional organizations	**COUNTRY:** Belgium (Flemish region)

SHORT DESCRIPTION

The Government of Flanders and the food supply chain sectors work together in the Flemish Food Supply Chain Platform for Food Loss, a dynamic platform for coordinated action on the prevention of *food losses**. In 2014, the Government of Flanders and the food supply chain partners signed the declaration of commitment 'Together against food losses'.
Their vision was based on 3 principles: 1) a shared responsibility, 2) prevention as a starting point and the food waste hierarchy as guiding principle, 3) collaboration and consultation.
The partners committed to producing a Food Supply Chain Roadmap 2020, to deliver concrete actions. The roadmap was launched in 2015.

Stage of the FSC	**Actors**
All	Regional government, NGOs, Professional organisations, Waste collection companies, Restaurants/hospitality sector, Academia/research, Multi-stakeholder

1. QUALITY OF THE ACTION DESIGN

The Food Supply Chain Roadmap On Food Loss 2020 includes objectives and actions at sector and food chain level, with the aim to reduce food losses as much as possible and to valorise food waste as highly as possible, in line with European objectives. The roadmap consists of 9 action programmes with more than 60 actions, covering food losses from farm to fork. These are:

1) Supporting companies in reducing food losses.
2) Collaboration in the food supply chain.
3) Raising awareness, inspiration and commitment at company level.
4) Training employees to promote food loss reduction.
5) Raising awareness, inspiration and commitment at consumer level.
6) Building new business models for collaboration between regular and social economy.
7) Promoting and facilitating donation of food surpluses.
8) Investing in research.
9) Monitoring for knowledge.

The monitoring system is the result of a public-private partnership and offers an insight into the efficiency with which the agri-food chain deals with food commodities in 2015. An intermediate measurement is ongoing (to be completed by April 2019) and a final measurement will be done in 2021.

2. EFFECTIVENESS

The action has a target of reducing the edible part of food waste by 15% by 2020 and by 30% by 2025, against a baseline of 2015. In the Flemish agri-food chain, from harvest to consumption, an estimated 3 485 000 tonnes of food waste were produced in 2015, of which 907 000 tonnes were edible and the remaining 2 578 000 inedible food waste.

3. EFFICIENCY

RESOURCES

Cost of the action

Each partner finances its own campaigns and investigations. There is no total budget available.

RESULTS

Food waste prevented

Still to be measured at the time of reporting.

TITLE: Food supply chain roadmap on food loss 2015-2020 | 2015 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The action is supported by the Flemish Government and its duration is defined in the voluntary agreement to be until 2020.

5. TRANSFERABILITY AND SCALABILITY

The action was set up at the Flemish level from the start.

6. INTERSECTORIAL COOPERATION

This action is based on the cooperation between the Government of Flanders and the different actors along the food supply chain (including professional organizations of farmers and the food industry, food services trade associations, retail and consumer organizations).

KEY SUCCESS FACTORS AND BARRIERS

An interim evaluation is ongoing.

ADDITIONAL COMMENTS

***** The term **"food loss"** is used in this factsheet for consistency with the terminology used in this initiative, where it is used to refer to **"edible food waste"**.

FOOD WASTE PREVENTION GOVERNANCE, Voluntary agreements | **V3**

TITLE: Voluntary agreements to reduce supply chain food waste (UK 2010 to 2015) | 2010 - 2015

ORGANIZATION: WRAP (charity) | **COUNTRY:** United Kingdom

SHORT DESCRIPTION

Working in partnership with food businesses, trade bodies, and governments, WRAP developed and delivered collaborative solutions to reduce waste through a series of voluntary agreements, using funds from the governments in England, Scotland, Wales and Northern Ireland. The agreement targets were owned by WRAP and collectively delivered by the signatories. Signatories were required to report results to WRAP on an annual basis, and this data was used to help signatories to develop specific action plans to reduce their waste. Engagement with signatories was via various digital channels, specific events, working groups and on a 1:1 basis. Relevant guidance and tools were developed, and expert support given. The overarching interventions were a series of voluntary agreements with the retail and manufacturing sector (Courtauld Commitment 2 – CC2 and Courtauld Committment 3 – CC3) and the hospitality and food service sector (HaFS Agreement). Nevertheless, underneath this there were different mechanisms employed and areas of focus, including food redistribution, diversion to animal feed, supply chain efficiency, innovation in products, processing and labelling, raising awareness and business behaviour change, and digital tools.

Stage of the FSC
Processing and manufacturing, Distribution and retail, Restaurants and food services

Actors
National government, Trade associations, Professional organisations, Processors/manufacturers, Retailers, Food services

1. QUALITY OF THE ACTION DESIGN

The voluntary agreements were primarily aimed at bringing about reductions in food (and packaging) waste generated by food businesses, and had signatories from retail (representing >90% of their sector), food manufacturing (representing ca. 20% of their sector), and hospitality and food service sector (representing ca. 25% of their sector). Each agreement ran for 2 or 3 years, and had specific targets for the signatories to achieve (collectively). Signatories to the voluntary agreements were required to report to WRAP on an annual basis, providing details of their food and packaging waste. WRAP provided guidance to the signatories and worked with them to validate the data. WRAP synthesised the data to develop baselines and an assessment of progress and achievement against targets (reporting absolute and relative reductions, taking in to account changes in production/sales volumes).

2. EFFECTIVENESS

Targets were defined in each agreement and each had its own baseline:
CC2 - To achieve a 4% absolute reduction in total household food and drink waste by 2012 compared with 2009. An estimated 3.7% absolute reduction in total household food waste was achieved. 92% of the target was achieved.
CC3 -To reduce food and drink waste by 3% by 2015 compared with 2012. The target was achieved.
HaFS Agreement - To reduce food and associated packaging waste by 5% by the end of 2015 compared with 2012. An estimated 11% reduction on food waste was achieved. The target was achieved.

3. EFFICIENCY

(Referring to 72 months)

RESOURCES

Cost of the action

Manufacture: 4 500 000 €

Retail: 1 800 000 €

Hospitality and food service: 700 000 €

RESULTS

	Food waste prevented (tonnes)		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
Manufacturing	72 000	(A)	98 000 000	211 948 561	394 315 941
		(B)	12 132 768	30 833 260	1 474 580
Retail	29 000	(A)	102 000 000	12 418 952	162 799 648
		(B)	4 886 809	91 788 516	593 928
HaFS	12 000	(A)	37 000 000	48 980 129	99 754 415
		(B)	1 857 611	6 639 648	245 335

Outreach Signatories from retail representing >90% of their sector, signatories from manufacture representing ca. 20% of their sector, and HaFS representing ca. 25% of their sector.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food avoided
(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

TITLE: Voluntary agreements to reduce supply chain food waste (UK 2010 to 2015) | 2010 - 2015

4. SUSTAINABILITY OF THE ACTION OVER TIME

The action is concluded but the learnings from the Agreements were used to inform the development of the voluntary agreement Courtauld Commitment 2025 (C2025) that brings together organisations across the food system to make food & drink production and consumption more sustainable that will run for 10 years, with milestone reporting in 2019, 2022 and 2026.

5. TRANSFERABILITY AND SCALABILITY

The intervention (industry voluntary agreements) has been transferred / replicated both within the UK and outside of it. In the UK the learnings from Courtauld 2 and 3 and the HaFS Agreement were used to inform the development of the Courtauld Commitment 2025 (C2025). The evidence of impact and learnings from the earlier agreements were used in multi-stakeholder discussions to develop C2025. In particular it was agreed that the timescale for C2025 should be longer (10 years, with milestone reporting in 2019, 2022 and 2026) to allow more difficult barriers to be addressed, and that one agreement should cover all sectors, from farm to fork, to allow cross sector challenges to be addressed and synergies/learnings to be exploited. Outside of the UK this type of intervention has been successfully piloted and implemented through the EU-funded REFRESH project.

The action has been scaled-up. C2025 has a food waste prevention target that is national rather than just applying to the signatories. Two-thirds of the reduction in food waste required to deliver the C2025 target (and SDG12.3) will need to come from non-signatories, and therefore influencing non-signatories (signatory suppliers, signatory trade body members etc.) is a key part of the agreement. Resources such as *Your Business is Food, Don't Throw it Away* have been developed to support this. Unlike earlier voluntary agreements a wider range of organisations can become signatories, including trade bodies, ensuring a greater reach.

6. INTERSECTORIAL COOPERATION

This action is based on the collaboration between WRAP, retailers, food manufacturers, hospitality and food service providers, redistribution organisations (both charitable and commercial), trade bodies and the UK governments. WRAP has responsibility for managing the Voluntary Agreements (with funding from UK governments and business signatories) and various working groups under this, for developing new guidance and tools and for reporting on progress. Food businesses are responsible for implementing changes to reduce food waste (including preventing food surplus and waste arising in the first place and sending more food surplus to redistribution and animal feed instead of waste).

KEY SUCCESS FACTORS AND BARRIERS

These interventions have led to significant reductions in supply chain food waste at a UK level, in addition to amongst the signatory base. Critical elements of success include having a strong evidence base upon which to set ambitious but realistic targets and to identify where businesses should target action, practical guidance, tools and case studies to help direct action, clear 'ground rules' to allow open (pre-competitive) discussion between businesses to share learnings and systems to ensure the secure management of confidential signatory data. Having a collective target which WRAP owned, and reported against was important. There has been scepticism amongst some NGOs and others about the ability of voluntary approaches to deliver meaningful impact (vs regulation), and therefore having a sufficiently large signatory base covering a significant percentage of each sector was critical for credibility, and being transparent in reporting on collective progress. The support of national governments was also key to success, for funding, credibility and to ensure a close link between policies and the agreement deliverables. Retailers and trade associations played a central role in helping to recruit and reach the widest possible number of suppliers and smaller businesses.

The availability and quality of food waste data was a challenge particularly in the early years, which affected the engagement of some businesses (low levels of awareness around the extent of food waste in their operations, and the benefits of taking action) and the ability to track change over time. Considerable effort has been made to provide practical guidance to build industry capability in this area.

ADDITIONAL COMMENTS

FOOD WASTE PREVENTION GOVERNANCE, Regulatory framework	F1

TITLE: Legislation regarding the food donation system in Croatia | 2015 - ongoing

ORGANIZATION: Ministry of Agriculture and Ministry of Finance | **COUNTRY:** Croatia

SHORT DESCRIPTION

The Republic of Croatia wanted to establish a food donation/redistribution system to emphasise under which conditions food can be donated, which organizations can redistribute food, and who are final recipient (people in need) who can receive donated food. To this end, it was adopted the 'Ordinance on conditions, criteria and modalities of donating food and feed' (Official Gazette, No 119/15). Food that can be donated is: any type of food under the condition that it is safe for consumption; food which is not suitable for the market due to errors in packaging, labelling, weighing or for other similar reasons; food that is close to the expiry date; food produced/prepared in mass caterer - excluding food that has already been served to customers.

After prescribing which food can be donated, in order to encourage food donation, tax incentives were added to the legislative package. The Ministry of Agriculture together with the Ministry of Finance arranged fiscal incentives that were incorporated in the 'Ordinance on Value Added Tax' (OG, No 130/15). Fiscal incentives refer to donation of above mentioned food. According to this Ordinance VAT is not imposed when food is being donated to the registered charity organizations, within the limit of 2% of the donor´s income.

Stage of the FSC

Primary production, Processing and manufacturing, Distribution and retail, Food services

Actors

National government, NGOs, Farmers, Processors/manufacturers, Wholesalers, Retailers, Food services

1. QUALITY OF THE ACTION DESIGN

The action had the aim to establish a food donation/redistribution system in Croatia. This was done by the adoption of the 'Ordinance on conditions, criteria and modalities of donating food and feed' (Official Gazette, No 119/15) and the 'Ordinance on Value Added Tax' (OG, No 130/15). No monitoring system was put in place. So far, only the financial value of food donated was reported.

2. EFFECTIVENESS

There is no target defined for this action and no baseline against which progress can be measured.

3. EFFICIENCY

RESOURCES

Cost of the action

Not reported

RESULTS

Economic benefits

The financial value of the food donated was approx. 1.20 million € in 2016 and approx. 1.44 million € in 2017.

Donors did not have to pay VAT for food they donated to redistribution organizations-charities registered with the Ministry of Agriculture. The related economic benefits were not quantified.

Outreach

Increase in the number of non-profit organizations registered with the Ministry of Agriculture as redistribution organizations. At the time of reporting (summer 2018), about one hundred charities were registered as redistribution organizations.

FOOD WASTE PREVENTION GOVERNANCE, Regulatory framework	F1

TITLE: Legislation regarding the food donation system in Croatia	2015 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

This legislation has been in place for three years. Further steps have been taken to amend the legislation in order to better define certain provisions.

5. TRANSFERABILITY AND SCALABILITY

The action has been implemented at national level (Republic of Croatia) and transferability was not considered in its design. The action was not upscaled.

6. INTERSECTORIAL COOPERATION

The success of this action is based on the cooperation between the government that defines the law and the different entities involved in the food redistribution schemes.

KEY SUCCESS FACTORS AND BARRIERS

Success factors: increasing the awareness of food waste issues, establishing a food donation system and putting in place fiscal incentives to promote it.

Elements that could limit the success of this initiative are: insufficiently clear provisions, possible administrative burden.

ADDITIONAL COMMENTS

FOOD WASTE PREVENTION GOVERNANCE, Regulatory framework	F2

TITLE: Amendment of the Czech Food Law | 2018 - ongoing

ORGANIZATION: National government | **COUNTRY:** Czech Republic

SHORT DESCRIPTION

This action refers to the amendment of the Czech Food Law (2018) with the goal to reduce food waste in the Czech Republic. According to the Czech Food law, all retail outlets with a sale surface of more than 400 square metres are from the 1st January 2018 obliged to donate food which is not quite within compliance with the requirements of this law or the EU regulations, but is safe, to the local food banks, charities and non- profit organisations.

Stage of the FSC
Distribution and retail

Actors
National government, NGOs, Retailers

1. QUALITY OF THE ACTION DESIGN

The aim of amending the Czech Food Law (2018) is to reduce food waste from retail outlets. The amount of food donated is monitored.

2. EFFECTIVENESS

There is no target defined for this action. The total amount of food donated is registered and the baseline is the levels of food donated in the end of 2017 (1 900 tons).
In 2018, 4 127 tonnes where donated representing an increase of 117% compared to 2017. Therefore, compared to 2017, an additional 2 227 tonnes of surplus food were donated in 2018 thanks to this initiative.
Food donated from retail chains in the year 2018 was 3 times more than in the year 2017.

3. EFFICIENCY

(Referring to 12 months)

RESOURCES

Cost of the action
0 €

RESULTS

Food waste prevented 2 227 tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	2 554 909	7 048 725	12 501 890
	(B)	253 878	1 696 300	28 940

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food avoided
(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

TITLE: The amendment of the Czech Food Law | 2018 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The sustainability over time of this action is guaranteed unless changes in the regulation are made. Nevertheless, for the action to be successful there should be enough food donors and redistribution organizations, the latter depending on funding from the government.

5. TRANSFERABILITY AND SCALABILITY

The action has been implemented at national level (Czech Republic) and transferability was not considered in its design. The action was not upscaled.

6. INTERSECTORIAL COOPERATION

The success of this action is based on the cooperation between the government that defines the law and the different entities involved in the food redistribution schemes.

KEY SUCCESS FACTORS AND BARRIERS

ADDITIONAL COMMENTS

FOOD WASTE PREVENTION GOVERNANCE, National Food Waste Prevention Programme	N1

TITLE: Wasteless	2016 - ongoing

ORGANIZATION: Hungarian national government	**COUNTRY:** Hungary

SHORT DESCRIPTION

Wasteless is a Hungarian programme against food waste in households, funded by the EU LIFE programme. It includes: (1) The identification and development of good practices for food waste prevention in the food chain. The Guide for good hygiene practice for hospitality and catering based on the regulation (EC) No 852/2004 was published online. (2) Public awareness campaigns and dissemination of the results. (3) Development of educational material delivering knowledge on FW prevention to primary schools. 274 450 copies of the Wasteless students' book (with an extra awareness-raising poster attached) were transported into all (2666) primary schools of Hungary. The Teachers' guide and the Workbook are also available online. (4) School Programme and Summer Camp. Within the framework of the Wasteless School Programme, the first online quiz competition of 4 rounds (based on the content of the students' book) has been undertaken. 44 primary schools, 1314 children of 61 classes participated in the quiz and 40 short food waste related videos arrived as the task of the fourth round of the competition. The award of two winner classes was a 7-day-long thematic Summer Camp. (5) Transfer of knowledge. The results of the baseline study were published in the British Food Journal, thus becoming the first study on actual food waste measurement in the region.

Stage of the FSC	**Actors**
Households	National and Regional government, NGOs, Trade associations, Professional organisations, manufacturers, Wholesalers, Retailers, Food service, Schools, Academia/research, Consumers, Opinion leaders

1. QUALITY OF THE ACTION DESIGN

The main objectives of the project are: (1) To decrease the proportion of food waste among Hungarian families, through changing consumers' attitude and behavioural patterns - the target value is 8% reduction within 2016-2020. (2) To increase the food waste and food wastage awareness and the level of knowledge of children attending primary school, by our students' book, demonstration tools, online quiz competition and thematic summer camp. (3) To collect good practices which contribute to the prevention of food waste, and based on that, elaborate a guidebook for different stakeholders (catering, retail, industry, primary production and community). (4) To collaborate and cooperate with other EU Member States, in order to contribute to the international implementation of the project's results.

Indicators and related targets were set during the implementation period (table 1). Surveys were conducted to assess behavioural changes (table 1). The baseline indicators are monitored by surveys conducted annually.

2. EFFECTIVENESS

The target for food waste reduction is 8% within 2016-2020. The baseline is the value of food waste for 2016 (68.04 kg/capita/year). The next measurement will be carried out in 2020 so, for now, the effectiveness in terms of food waste prevented cannot be assessed. Nevertheless, the action has shown to be effective when considering different indicators related to its outreach for which targets had been set (table 1). The effectiveness of the communication campaign (e.g. the number of presentations, TV/radio appearances, press releases, online articles, website visitors, reach on Facebook, the advertising equivalent of the collected media broadcasts) are monitored as part of the internal reporting system.

3. EFFICIENCY

RESOURCES

Cost of the action

964 468 €

RESULTS

Food waste prevented

See additional comments

Social

277 000 people (mainly children involved in the School Programme)

Outreach

See table 1

TITLE: Wasteless | 2016 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

After receiving the first project results, the Hungarian government issued a governmental decision determining consumer education as an important activity of the National Food Chain Safety Office (Nébih), which covers food waste prevention and food safety. This resolution and the strong commitment of Nébih's management ensure the long term sustainability of the programme. The costs are planned to be covered partly from internal budget and partly for external funding, to enhance the intensity of the preventive activities. On-the-job training is provided to new staff.
As a LIFE project, Nébih had to develop an After-LIFE Plan for Wasteless for 5 years to ensure the continuing of awareness-raising actions after the official end of the project implementation period. Organizing education programmes for households has become part of Nébih's strategy.

5. TRANSFERABILITY AND SCALABILITY

Transferability was considered in its design and recommendations in this regard have been presented. However, the action has not been transferred yet and was not upscaled.

6. INTERSECTORIAL COOPERATION

The action is carried out in cooperation with several stakeholder groups. The educational materials have been revised by the National Chamber of Teachers. The Hungarian Food Bank Association is involved in every phase of the project, from the preparation of "good practices" guides to the organization of professional events and the participation in the Steering Board of the project.
Representatives of the Hungarian Ministry of Agriculture, the National Food Chain Safety Office, NGOs, duty holders, cross-sectorial organisations, and large, small and medium-sized enterprises were involved in the preparation and completion of the 4 good practices guides for every stakeholder group of the food chain from farm to fork. They worked in sector-specific working groups to find solutions for the specific challenges of the catering, retail, food industry and NGO sectors. The event 'Round Table Discussion on Food Waste Prevention', held in 2018, was of great interest within every sector of the food chain: representatives of retailers, manufacturers, NGOs, public bodies, and cross-sectorial organisations were present and tried to find solutions for the cross-sectorial challenges of the food waste issue. Furthermore, Wasteless organised the 2018 EU LIFE Platform Conference for Food Waste Prevention, with close to 120 participants from 14 European countries, coming from a variety of different organizations and enterprises. Every two years a competition is announced within the framework of the National Agriculture and Food Exhibition and Fair (OMÉK), giving a special prize to companies that present the best practices for food waste prevention.

KEY SUCCESS FACTORS AND BARRIERS

Positive aspects

Instead of the originally planned 3 040 copies, 274 450 copies of the Wasteless students' books (with an extra awareness-raising poster attached) were distributed to 2666 primary schools in Hungary.
The "Guide for good hygiene practice for hospitality and catering" based on the regulation (EC) No 852/2004 (presenting the most essential elements of the guide created by the Working Group of Catering) was published online.
An international LIFE Food Waste Platform Meeting (originally planned as the Mid-term Conference of the project) was held in 8-9 October 2018, Budapest. Remarkable projects of food waste prevention, mitigation and reduction were presented at the conference, to provide concrete suggestions to tackle food waste generation in the different sectors, based on the shared experience of the participants.

Difficulties:

As a commitment, awareness-raising videos were produced and shared, however no professional actor is employed at the National Food Chain Safety Office of Hungary. Therefore, official employees of the Office (who deal with for example risk assessment or administrational tasks within their daily work) were involved in the shooting of the short movies.

ADDITIONAL COMMENTS

The measurement on food waste levels will be carried out in 2020. The Wasteless project aims to decrease the amount of food waste by 8% by 2020 compared to the initial value of 2016, saving approximately 26 000 000 kg food from becoming food waste annually.
The results of the baseline study conducted in the project was published in a scientific journal, becoming the first study on actual food waste measurement in the region: Barbara Szabó-Bódi, Gyula Kasza, Dávid Szakos, (2018). Assessment of household food waste in Hungary, British Food Journal, 120, 625-638.

TITLE: Wasteless | 2016 - ongoing

Table 1: indicators used to monitor the action

		Indicator/monitoring question	Target	2016	2017	2018
	Food waste amount	Food waste reduction based on household panel experiment (kg/capita/year)	8%	68.04		
Behavioural Change	Awareness of food waste	Respondents are aware of how much food they throw away in a year (%)		37.84%	30.86%	
	Food waste related behaviour - shopping	Respondents declaring they always plan how much/what types of food they need before going shopping (%)		84.55%	84.75%	
	Food waste related behaviour - wastage	Respondents declaring that they had thrown away food/meals during the last 7 days (%)		42.50%	40.16%	
	Knowledge on food waste	Respondents stating that they would eat food that has passed its "best before" date by a week (%)		28.03%	41.40%	
Outreach (targets defined)	Population to be affected	Number of individuals	2 000 000		32 771 768	48 761 776
	Duty holders covered	Number of	230		14	40
	Supervisory/enforcement bodies involved	Number of	3		1	3
	NGOs involved	Number of	10		3	8
	Website	Number of individuals	7 500		4 683	15 510
	Printed press	Number of individuals	3 286 000		1 676 910	3 248 894
	Online press	Number of individuals	1 300 000		7 195 072	9 024 527
	Facebook access	Number of individuals	10 000		359 113	1 477 829
	YouTube access	Number of individuals	10 000		74 709	78 535
	Radio broadcasting	Number of individuals	3 000 000		16 168 182	22 709 182
	TV broadcasting	Number of individuals	1 500 000		7 566 150	11 468 050
	Crosslinks from NFCSO's other campaigns sites	Number of individuals	38 400		37 120	23 347
	Surveys regarding awareness	Number of individuals	5 200		1 102	2 102
	Networking	Number of individuals trained	6 202		1 125	4 192
	Entry into new entities	Number	1		0	0
	Entry into new geographical areas	Number	1		0	0
Outreach (no targets defined)	1314 children participated in the first online quiz competition, from which 2 classes, 40 children could take part in the Summer Camp, the award of the competition. The children were also educated in the camp, where their level of knowledge on food waste reached 85%.					
	1218 children and 34 teachers participated in the Wasteless lessons held by the Wasteless team.					
	Approximately 97 000 people were reached via interactive exhibitions of the Wasteless programme.					
	274 450 copies of the students' book (also available online) were delivered into all primary school of Hungary (2666).					
	1405 experts of food waste issues and professionally interested people reached due to presentations held in conferences (organic organization or guest-speaker).					

FOOD WASTE PREVENTION GOVERNANCE, National Food Waste Prevention Programme	N2

TITLE: National strategy "More food, less waste" | 2013 - ongoing

ORGANIZATION: Spanish national government | **COUNTRY:** Spain

SHORT DESCRIPTION

The Strategy is a voluntary framework fostering the collaboration between all sectors of the food supply chain, national and regional administrations and NGOs. It was developed by the Spanish National Government to answer the requirements of the European Parliament in its "Resolution of 19 January 2012 on how to avoid food wastage: strategies for a more efficient food chain in the EU", and to address the problem of food loss and waste in Spain. The first phase of the Strategy took place from 2013 to 2016 and had five main areas of action: 1) review of studies on food loss and waste; 2) spreading and promoting good practices and awareness; 3) analysing and reviewing regulatory aspects; 4) collaborating with other actors; and 5) promoting the design and development of new technologies. The second phase (2017-2020) the Strategy was organized around eight thematic areas: 1) knowledge generation; 2) training and awareness; 3) fostering of best practices; 4) collaboration with stakeholders; 5) sector specific agreements; 6) regulatory aspects; 7) research and innovation; and 8) food waste, environment and climate change.

Stage of the FSC
All

Actors
National and Regional government, NGOs, Trade associations, Professional organisations, manufacturers, Wholesalers, Retailers, Food service, Consumers

1. QUALITY OF THE ACTION DESIGN

The main objectives of the strategy are: (i) to promote transparency, dialogue and coordination between food chain actors and public administrations and (ii) to develop, in an organised, coordinated and structured way, actions that drive real change in the attitude, work procedures and management systems of actors in the food supply chain, thereby limiting food loss and waste and reducing environmental pressures.
There is a monitoring system to measure the amount of food waste generated using the household food waste quantification panel measurement system. The results of the ongoing monitoring can be found on the Strategy's website, www.menosdesperdicio.es under: "Datos y cifras/Panel desperdicio".

2. EFFECTIVENESS

No target for food waste reduction was defined. Nevertheless, household food waste is being monitored. In 2017 household food waste levels were 5.71% lower than in 2016, although the level of food waste seems to have increased in 2018*.

3. EFFICIENCY

(Referring to the period 2013-2018)

RESOURCES

Cost of the action **
1 867 671 €

RESULTS

Food waste prevented 241 thousand tonnes

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	688 855 818	983 013 846	2 003 170 343
	(B)	36 368 105	112 788 000	5 567 100

Outreach

See additional comments

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food avoided
(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

FOOD WASTE PREVENTION GOVERNANCE, National Food Waste Prevention Programme	N2

TITLE: National strategy: mode food less waste	2013 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

The National strategy was developed as a mid-long term framework (running between 2013 and 2016 in its first phase and between 2017 and 2020 in its second phase. It is carried out by the Government, specifically by the Ministry of Agriculture, Fisheries and Food, through the Directorate General for the Food Industry. The human resources and infrastructure involved are those of the Ministry. It has a budgetary assignment within the Directorate General for the Food Industry, and it is included within the sustainability policies of the Ministry.

5. TRANSFERABILITY AND SCALABILITY

The action has been implemented at national level and transferability was not considered in its design. The action was not scaled-up.

6. INTERSECTORIAL COOPERATION

The Strategy is a voluntary framework aiming for the collaboration and participation of all actors in the food supply chain, national and regional administration, consumers and NGOs. All sectors of the food supply chain are involved, as shown by their participation in the Follow up Committee. This is a forum where information on the activities carried out by the different members is shared, the development of the Strategy is monitored, and the next steps are planned. Currently it includes members from the public administration (at national, regional and local level), primary production, industry, distribution, consumers, NGOs and charities, and it is open to new members which represent a sector or stakeholder group aligned with the Strategy and its principles. All actors are free to develop their own actions within the framework of the Strategy, using their own means and funding. The Strategy provides coordination and visibility.

KEY SUCCESS FACTORS AND BARRIERS

ADDITIONAL COMMENTS

(*) Data for the full year 2018 have not been published yet.

(**) The cost reported is related to the actions developed from 2013 to 2018. Even though some actions from stakeholders other than the Ministry of Agriculture, Fisheries and Food have been taken into account, the cost of a number of actions carried out by private entities within the framework of the National Strategy could not be calculated, or has not been reported to the Ministry of Agriculture, Fisheries and Food. Nevertheless, food waste reduction is the result of the combination of all actions (public and private).
The outreach of this action is not directly quantifiable, as the Strategy is a voluntary framework including many actors apart from the Administration. Other data on reach and impact are not available yet, as the Strategy's dedicated website has only been online since December 2017.
Documents with the complete text of the Strategy for both periods can be found at www.menosdesperdicio.es.

FOOD WASTE PREVENTION GOVERNANCE, National Food Waste Prevention Programme	N3

TITLE: Integrated action to reduce household food waste | 2007 - ongoing

ORGANIZATION: WRAP | **COUNTRY:** United Kingdom

SHORT DESCRIPTION

The UK has had large-scale national interventions in place since 2007 aimed at reducing household food waste (HHFW). The strategy that WRAP developed involved three main types of activity: national/large scale communications initiatives (awareness raising & enabling behaviour change), community engagement & support (again awareness raising and enabling behaviour change but at a local level) and changes to products, packaging and labelling to make it easier for people to waste less food. WRAP launched the consumer facing campaign Love Food Hate Waste (LFHW) in 2007 to help deliver practical ways to reduce food waste, and expanded an agreement with the food industry (the Courtauld Commitment) to encompass HHFW. Very little was known about the extent and make-up of HHFW prior to 2007, nor the drivers for its generation. WRAP instigated a series of large research projects and published high profile reports to raise awareness of the need to take action, and where this action needed to be focused. Targets to reduce HHFW were introduced in to national voluntary agreements, to highlight the key role that retailers and other food businesses had to play, alongside national and local governments, community groups and others.

Stage of the FSC
Households

Actors
National and Regional government, NGOs, Trade associations, Professional organisations, Manufacturers, Retailers, Schools, Consumers, Opinion leaders

1. QUALITY OF THE ACTION DESIGN

In the early years, LFHW communicated directly with consumers through high-profile advertising and PR, and funded others to do the same. Over time, the emphasis shifted to providing others with resources to fuel their own communications with customers, residents, members. LFHW retains a strong digital/social media presence and delivers regular 'bursts' targeted at specific behaviours/foods (e.g. #MakeToastNotWaste). Initially there was a strong focus on engaging locally with consumers through events and classes, but this shifted to a 'train the trainer' model, and provision of resources to help local groups. Work with industry also focuses on optimising labelling and packaging to help people buy the right amount, store food correctly and use what was bought.
WRAP has published data on HHFW regularly since 2007, and these have constituted the principle source of UK-level data on this topic. In addition to tracking change at a UK and nation level there have also been studies quantifying the impact of specific interventions, and also modelling work to understand the different influences on HHFW and to estimate the impact of certain types of activity. Links to the various reports can be found here.

2. EFFECTIVENESS

No specific target was defined for the LFHW campaign. Targets were introduced in voluntary agreements (see action V3).

3. EFFICIENCY

(Referring to 96 months between 2007 and 2015)

RESOURCES

Cost of the action
90 000 000 €

RESULTS

Food waste prevented 1 000 000 tonnes*

		Economic benefits (€)	Environmental savings: Climate Change (kg CO_2 eq)	Environmental savings: Water Use (m^3 eq)
	(A)	3 700 000 000	4 078 895 626	8 311 910 314
	(B)	150 905 000	468 000 000	23 100 000

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food avoided
(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

TITLE: Integrated action to reduce household food waste | 2007 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

Further reducing HHFW is a central part of the Courtauld Commitment 2025 and there are ambitious plans to reduce HHFW by 20% per capita by 2025 compared to 2015. LFHW has evolved over time as fresh insights are obtained, and a new strategy was announced following the finding that reductions in HHFW had slowed down after 2012 (click here for more information).
A suite of new resources were developed for partners, which can be found here.

5. TRANSFERABILITY AND SCALABILITY

LFHW has been licenced to a number of other countries (including Canada, New Zealand and Australia), to be deployed at a local, regional or national level. Other countries have made use of the learnings and support from WRAP to develop their own initiatives, such as Saudi Arabia.

6. INTERSECTORIAL COOPERATION

This action is based on the collaboration between WRAP, food and other businesses, consumer and community groups, food regulators, local and UK government. WRAP has responsibility for developing the strategy for reducing food waste at home, developing campaign (LFHW) resources and guidance on changes to labelling and pack design (with funding from UK governments), facilitating partnerships between private and public sector organisations, and for reporting on progress. Whilst Love Food Hate Waste LFHW communicates direct to the consumer through various channels, most of the communication and technical actions are delivered through businesses and others.

KEY SUCCESS FACTORS AND BARRIERS

Key success factors:

- A comprehensive evidence base that helped secure high profile media coverage, the interest of a wide range of partners and consumers themselves. This evidence base helped direct the development of effective resources and recommendations for partners.
- Working with a wide range of partners, who had the trust of consumers and who could reach different groups of the population. This included retailers and large brands, local authorities, community and other groups etc.
- Adopting a positive and helpful tone, and ensuring that messages and benefits were motivating to consumers (e.g. monthly/annual cost savings were much more appealing to most than 'hard' environmental messages) and advice was easy to implement (e.g. 'fruit in the fridge', simple rather than complex recipes).
- Taking a multi-channel and multi-pronged approach. For example helping to dispel myths and concerns around freezing food was made much easier when done in parallel to changing 'official' advice and on-pack labelling.
- Supporting behaviour change work with technical innovations that increased shelf-life, improved labelling, offered more appropriate pack sizes and new functionality that kept food fresh for longer.
- Addressing barriers 'head on' with new evidence and through engagement with influential stakeholders (e.g. the perception that packaging was 'bad' for fresh produce).

One of the major challenges was trying to ensure 'joined up' communication with consumers and businesses on related issues such as food waste recycling, food safety and diet. Working closely with governments and regulators helped mitigate against this risk. Securing sufficient funding/resources from the public and private sector is also not easy, when large scale and difficult behaviour change is needed. Research showing how concerned consumers are about food waste, and what they expect business and others to do to help them, has been helpful.

ADDITIONAL COMMENTS

* Total reduction in household food waste in the UK between 2007 and 2015

FOOD VALORIZATION, Value added processing | **L3**

TITLE: Toast Ale | 2016 - ongoing

ORGANIZATION: Toast Ale (social enterprise)

COUNTRY: International (UK, USA, South Africa, Brazil, Iceland)

SHORT DESCRIPTION

Toast Ale is a certified social enterprise and B-corporation, which produces beer made with surplus fresh bread collected from bakeries and sandwich manufacturers. All profits go to charities campaigning to reduce food waste.

Stage of the FSC
Manufacturing, retail

Actors
Toast Ale, bakeries, sandwich manufacturers

1. QUALITY OF THE ACTION DESIGN

Toast Ale uses surplus fresh bread that would otherwise be wasted in the production process to produce world class craft beer and donate 100% of its profits to food charities campaigning to end food waste.

Its main objective is to raise awareness of the causes of and solutions to food waste.

The amount of bread used in brewing beer is monitored and the associated carbon emissions savings are quantified and reported. The social and environmental impact is ingrained in Toast Ale's mission statement and is a primary measure of their success. As Toast Ale is committed to achieving the highest standards of social and environmental performance, this is fully integrated into their decision making and key performance indicators are set to track whether objectives are achieved.

2. EFFECTIVENESS

So far, this action has saved over one million slices of bread from being wasted, the target is to save one billion slices over the next ten years.

3. EFFICIENCY

(referring to 2 years)

RESOURCES

Cost of the action (C)

-

Volunteer hours

1 280

RESULTS

Food waste prevented 39 269 kg

	Economic benefits (€)	Environmental savings*	
		Climate Change (kg CO_2 eq)	Water Use (m^3 eq)
(A)	60 000	32 100	346
(B)	4 477		507

Social The profits made enabled Toast Ale to donate £25 000 to food charities that are changing the wasteful way food is produced and people are fed. Over 80% of these donations have gone to Feedback, which aims to halve food waste by 2025 and create a world where nutritious food is available for everyone and human activities replenish the environment.

* Calculated considering that less barley is needed to produce beer and that the bread is no longer going to landfill.

(A) Economic value of the food diverted from waste / Environmental impacts linked to the production of food replaced by the donated food

(B) Avoided cost of the waste treatment/ Avoided environmental impacts of the waste treatment operations

TITLE: Toast Ale | 2016 - ongoing

4. SUSTAINABILITY OF THE ACTION OVER TIME

Using surplus fresh bread for brewing beer is a sustainable business model. It is a cheaper alternative to conventional methods and is in abundance, a single sandwich factory discards 13 000 slices of fresh bread every day. The process adds value to bread that would otherwise be wasted and in doing so, reduces other resource inputs like barley and water. In addition, with a growing community of circular practices, using surplus fresh bread gets ahead of future regulation and seeks to meet the growing market for responsible products.

5. TRANSFERABILITY AND SCALABILITY

Since it began in 2016, Toast has continued to upscale its beer production and now brews in seven countries including the USA, South Africa and Iceland. By actively sharing their recipe and business model, they encourage replication by as many brewers as possible. To date, they have directly collaborated with 20 breweries and inspired at least 23 more. In addition, they are building a community of people using the power of beer to change the world. Their open source homebrew recipe has been accessed 44 655 times.

6. INTERSECTORIAL COOPERATION

Producing and distributing Toast beers requires cooperation between a diverse range of stakeholders, including:
Sandwich Manufacturers - Sandwich manufacturers like Adelie Foods create over 3 million Food To Go products a week, including sandwiches that do not use the heel end of the loaf. These fresh slices of bread are segregated and delivered to Toast Ale brewers the next day.
Brewery - Contract with Wold Top Brewery in the UK to produce beer. Its commitment to environmental excellence is demonstrated through practices such as its on-site renewable energy, home grown barley and water, and utilisation of waste products.
Collaborators – Frequently collaborating on exciting new beers, like 'Bread Pudding' created by Wiper and True.
Kegstar – In 2018 they contracted Kegstar, who supply reusable stainless-steel kegs that are collected from stockists for cleaning and re-supplied to breweries.
Distributors –Product distribution is outsourced to Beerhunter, Ware-Logic, and TEF Transport Ltd and sell via distributors nationwide in the UK and in New York.
Food Charities – they collaborate with food charities by donating 100% of their profits and participating in promotion events.
Homebrew Community –They rely on a growing community to access Toast Ale's homebrew recipe and utilise their surplus bread.

KEY SUCCESS FACTORS AND BARRIERS

"Key to our success is demonstrating our positive environmental and social impact through our certification as a social enterprise and B-Corp. Specifics about our charitable donations, emissions savings and utilised surplus fresh bread is publicised on our website and detailed in our 2016-2018 impact report.
As a start-up, we continue to rely strongly on business growth. The more beer we produce and sell, the more surplus fresh bread that can be diverted from landfill and the more profit that can be donated to charities to end food waste.
Our partners are integral to our success. Whether it is the environmentally friendly practices of our brewery partner or leading and activities by our charity partners, we work with our stakeholders to ensure that our impact surpasses what we can do alone.
Toast is operating in a highly competitive and relatively fragmented industry, so access to the market represents a significant barrier. However, Toast produces both award-winning and responsibly produced craft beers which serve an ever-growing population of beer drinkers."

ADDITIONAL COMMENTS

The 39 tonnes of surplus bread diverted from landfill are equal to one million slices, 1.5 the height of Mount Everest.
The barley needed to produce the same amount of beer without using surplus bread would have required 7 football pitches of land to grow.

Annex 7. Calculation of effectiveness and efficiency of a food waste prevention action: a practical example

In food waste prevention actions based on redistribution/reuse, identifying the amount of food waste prevented is straightforward, as it is equal to the amount either redistributed or reused. However, in actions aiming to prevent food waste at source, the calculation of the total quantities of food waste avoided is more complex (as it is a measure of something that was not there in the first place) and needs to be handled with care. The purpose of this Annex is to present in detail the procedure suggested to calculate the total food waste avoided due to a 'reduction at source' prevention action.

It is crucial to ensure that the calculation of food waste reduction is not affected by changes in: productivity levels (at manufacturing stage), amounts sold (at retail), number of meals served (at food services) and population size (at household level). To this end, KPIs used to monitor the success of a food waste prevention action through time should be measuring the food waste generated in a period of time per unit of e.g. amounts produced. Examples of each are provided in Table 9 (for behavioural change actions) and Table 11 (for supply chain efficiency actions) and reported below for each stage of the food supply chain.

- Manufacturing: a = food waste generated /amounts produced
- Retail: b = food waste generated /amounts sold
- Food services: c = food waste generated per meal served
- Households: d = food waste generated per capita

Effectiveness

Each KPI should be measured before the implementation of the action (baseline situation), during the implementation and at the end to track progress towards the targets set and establish whether the action was effective in achieving its goals.

Efficiency

In order to measure the efficiency of an action, the total food waste avoided needs to be calculated. This is equal to the amount of food waste that would have been generated if the waste levels had remained unchanged from the baseline situation minus the amount of food waste that was generated instead. The following equations can be used to calculate the total amount of avoided food waste in year *x* against a baseline of year *y* for the different stages of the food supply chain.

- Manufacturing: $(a_y - a_x)\ Q_x$
- Retail: $(b_y - b_x)\ X\ S_x$
- Food services: $(c_y - c_x)\ X\ N_x$
- Households: $(d_y - d_x)\ X\ P_x$

Where Q_x is the amount produced in year x, S_x is the amount sold in year x, N_x is the number of meals served in year x and P_x is the population of the area under study in year x. The reference period can be different from one year as long as food waste and amounts produced/sold/served refer to the same time.

If the action was ongoing for several years/months/weeks, such operation should be repeated for each year/month/week, and the total food waste avoided corresponds to the sum of the food waste avoided in each period. To measure efficiency, this quantity should be compared with the cost of implementing the action.

Example illustrating a prevention action implemented in a restaurant

Before implementing a food waste reduction action, a restaurant measured for one week the total food waste generated (149 kg) and the number of meals served (810). In the week after implementing the action, the restaurant generated 110 kg of food waste and served 989 meals. Therefore the KPI C - amount of food waste per meal - calculated for each week are:

C_1 = 149000 / 810 = 184 g per meal

C_2 = 110000/989 = 111 g per meal

Effectiveness

Percentage reduction of food waste per meal = (184 -111) / 184 *100 = 39 %

The average waste per meal was reduced by 39%. If the restaurant had defined as objective of this action to reduce by 20% the amount of food waste generated per meal this action would result effective.

Efficiency

The total food waste avoided is equal to:

FW avoided = (184 – 111) X 989 = 72197 g = 72 kg

Even though the measurable reduction in food waste would be equal to 39 kg (149 – 110 kg), this calculation would not consider that in the second week more meals had been served compared to the first and would only partially capture the impact of the action. Therefore, as illustrated in **Figure 16**, one should calculate what would be the total amount of food waste in week 2 assuming that the same levels of food waste per meal in week 1 are maintained, i.e. 184 x 989 = 182 kg. This quantity should then be compared with the real levels of food waste measured in week 2, i.e 111 x 989=110 kg, to calculate the avoided food waste.

Assuming that the action only lasted one week and its implementation cost 100 euros, the efficiency of the action can be measured considering that for each euro spent, 0.72 kg of food waste were saved.

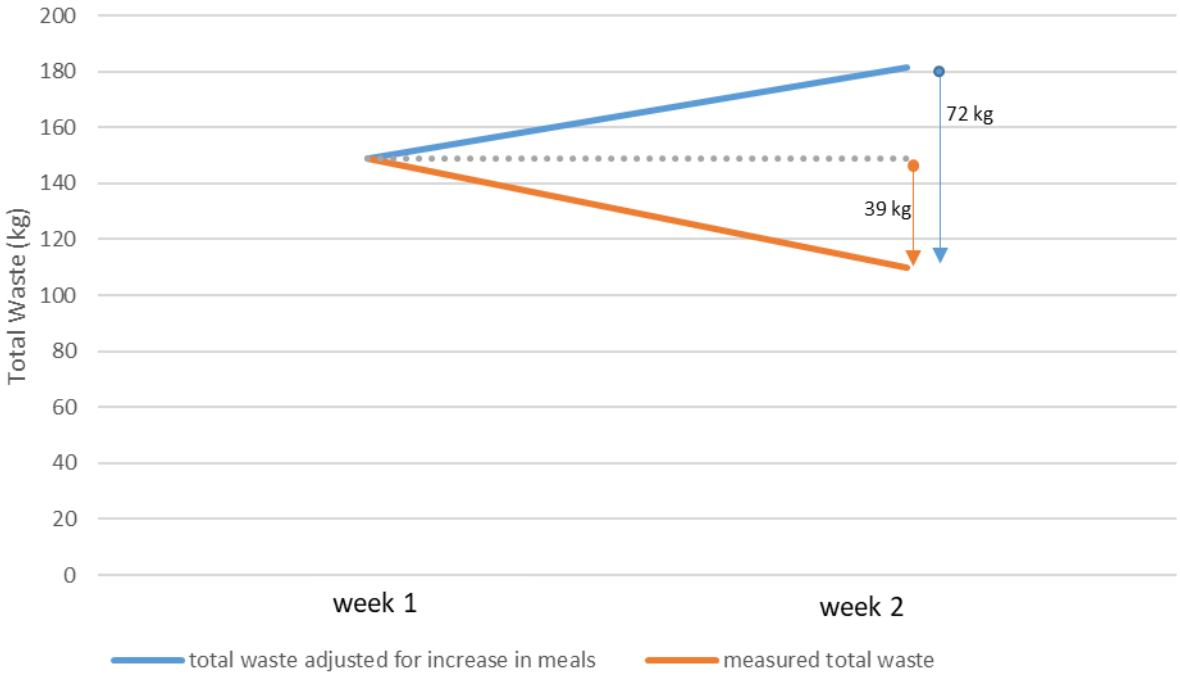

Figure 16: Calculation of the total food waste avoided in one week (week 2) against a baseline (week 1) considering the variation in the number of meals

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