



Prevention and reduction of food and drink waste in businesses and households

Guidance for governments, local authorities, businesses and other organisations

Version 1.0



Project Managers: James Lomax and Fanny Demassieux (UNEP), Richard Swannell and Estelle Herszenhorn (WRAP)

Project Partners: Robert Van Otterdijk and Camelia Bucatariu (FAO)

Written by: Estelle Herszenhorn, Tom Queded, Sophie Eastal and Giles Prowse (WRAP), James Lomax (UNEP), Camelia Bucatariu (FAO)

Edited by: Justin French-Brooks (Word to Dialogue) and Clementine O'Connor (UNEP)

We would like to acknowledge the contributions of a wide range of people who in various ways made it possible to develop this Guidance document, by providing examples and content, as well as FAO's Working Group of the Global Initiative on Food Loss and Waste Reduction – SAVE FOOD, and the Swiss Federal Office for Agriculture for its generous support to the FAO/UNEP Sustainable Food Systems Programme.

Copyright © United Nations Environment Programme, 2014

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. United Nations Environment Programme (UNEP) would appreciate receiving a copy of any publication that uses this publication as a source.

No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the UNEP.

Disclaimer

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of UNEP, nor does citing of trade names or commercial processes constitute endorsement.

UNEP commissioned WRAP (Waste & resources Action Programme) to write this Guidance as a partner in Think Eat Save Campaign based upon demonstrable experience in the UK of engaging with businesses through the Courtauld Commitment and with consumers through Love Food Hate Waste Campaign and the recently launched Hospitality and Food Services Agreement. UNEP acknowledges that this approach cannot contain all the answers in this version 1.0; however, in drawing on this experience in producing this document, it is hoped that users will share experiences in food and drink waste prevention and reduction in other countries, regions and businesses to build on, improve and broaden the methods and approaches that can be taken to prevent and reduce food waste. It is expected that this guidance could be a 'living document' developing over time. All enquiries should be directed to James.Lomax@unep.org.

Recommended citation:

UNEP (2014) *Prevention and reduction of food and drink waste in businesses and households - Guidance for governments, local authorities, businesses and other organisations, Version 1.0.*

Reducing and preventing food and drink waste in businesses and households: A guidance document

ISBN: 978-92-807-3346-4

Job Number: DTI/1688/PA

Prevention and reduction of food and drink waste in businesses and households:

**Guidance for governments, local authorities, businesses and
other organisations**

Version 1.0



Foreword



In a world where over 840 million go hungry every day, it is important to realize that achieving food security goes beyond increasing global food production. The establishment of better food systems, sustainable production and consumption approaches, more efficient policies and smarter investment patterns across relevant sectors is the sustainable path towards achieving food security for all.

Research shows that the world produces enough food. However much food is lost along the supply chain or wasted due to poor consumption decisions.

The Food and Agricultural Organization of the United Nations (FAO) has pointed out in recent years that at least one third, or 1.3 billion tonnes of food produced is wasted – representing the superfluous use of 1.4 billion hectares of cropland.

Food loss and waste carries direct economic and environmental costs and depletes the natural resource base that underpins food production.

Today, diets are becoming more resource-intensive, and the way we buy and consume food is changing due to increasing industrialization, urbanization, the demands of a growing global middle class, and the continued impacts of the economic crisis.

In January last year, UNEP, FAO and partners launched the *Think.Eat.Save: Reduce Your Foodprint* campaign in support of FAO's SAVE FOOD Initiative and the UN Secretary General's Zero Hunger Challenge, in order to raise awareness and encourage action to stop food waste.

This first-of-its-kind food waste prevention Guidance provides the technical expertise and impetus needed for governments, local authorities, businesses and others to take advantage of existing wisdom, catalyse action in their constituencies and get a head start in tackling this critical issue.

As you will see, the Guidance is based on the most successful case studies of measureable food waste reduction initiatives and exemplary practices in policy, awareness-raising, sector-specific voluntary commitments, and process optimizations from around the world.

Using a step-by-step approach, the Guidance provides policymakers and businesses with the tools required to design and deliver on an effective strategy to reduce food waste.

This document supports the development of 'joined-up' policymaking at country level, as well as integrated action across global business supply chains. The objective is to support a concerted, targeted, and well-informed response to this mounting global resource challenge.

At UNEP, we believe that this freely available practical Guidance will provide a clear framework in which public sector stakeholders and businesses can build effective food waste strategies.

I would like to express my gratitude to our colleagues from FAO, WRAP and all partners and stakeholders that have contributed to the development of this pioneering work.

A handwritten signature in black ink, reading "Achim Steiner". The signature is written in a cursive, flowing style.

Achim Steiner

UN Under-Secretary General and Executive Director, UNEP

Executive summary

Background and introduction

Think.Eat.Save: Reduce Your Foodprint was launched in January 2013, by the United Nations Environment Programme (UNEP), the UN Food and Agriculture Organisation (FAO), Messe Düsseldorf GmbH and a number of diverse stakeholders, including the UK-based Waste & Resources Action Programme (WRAP). The purpose of Think.Eat.Save is to raise awareness about the need to reduce food waste, as around **one-third of food produced for human consumption is lost or wasted** globally (FAO, 2011) and this has significant negative financial, environmental and social impact.

- In **financial terms**, food waste is estimated to cost the Chinese economy, for example, \$32 billion (source WRI 2013) and in the United States, it is estimated that US\$48.3 billion is thrown away each year (source Think.Eat.Save).
- The production of food uses many resources, including land, water, and energy, and therefore has significant **environmental impact**. Indeed, if global food loss and waste was a country, then it would be the third-largest CO₂ emitter, after the US and China (FAO, 2013).
- **Food and nutrition security** is affected by food waste. The FAO (2013) identify a need to increase food availability by 60%, by 2050, yet food produced, but not eaten, uses almost 30% of the total available agricultural land.

This Guidance is a key product of the Think.Eat.Save campaign and the FAO/UNEP Sustainable Food Systems Programme, as well as the SAVE FOOD Initiative. It provides **clear and comprehensive steps for governments, businesses and other organisations** to develop strategies, programmes and activities to prevent and reduce food and drink waste, and to achieve the associated financial savings and reductions in environmental impacts. This is **Version 1.0** and the Guidance will be updated in the future, as best practices in food waste prevention continue to be implemented throughout the world.

The objective of this Guidance is to catalyse action around the world by sharing proven methodologies for food waste prevention. We hope you will use this resource, take advantage of our support and share your experiences implementing strategies.

Scope

The **scope of this Guidance is food waste prevention in the retail, hospitality (restaurants, hotels) and food service (schools, hospitals) supply chains, and household food waste**. Waste and loss in the agricultural stages of production are not covered.

The document is organised in **four Modules** which, together, provide extensive guidance on how action can be taken at a country, region, or business level to prevent food waste – measured in tonnes. Food waste has a range of complex causes, and it arises in a dispersed nature – both geographically, across the globe, and at all stages of the supply chain and at consumption level. In order to address this food waste, there are simple actions that every individual or business can take, but there is even greater opportunity to achieve larger reductions if targeted programmes are developed and delivered. It is **scoping, planning, delivering and measuring food waste prevention programmes** and activities that is the focus of this Guidance. This Guidance seeks to address the complex problem of food waste, by providing a framework for action that can be used flexibly, as required by the user.

This Guidance is based on the **proven experiences of developing and delivering food waste programmes that have achieved significant measureable impact**. One of these is the experiences in the UK, where avoidable household food waste has been reduced by 21% overall between 2007 and 2012, and food retailers, restaurants, food service providers and food and drink manufacturers are signed up to voluntary targets to reduce food waste. A wide range of experiences from across the globe have also been used, both in developing the Guidance and to illustrate **examples of food waste prevention in action**.

This Guidance has been developed by using these proven experiences, in order to facilitate knowledge transfer; allowing others to develop and deliver programmes to prevent and reduce food waste more easily and effectively than might otherwise have been the case. There are currently a limited number of examples of such programmes, so it is likely that this **Guidance can be further developed over time**, drawing on new experiences from around the world. In the first instance, elements of this Guidance will be piloted in a range of countries.

The experiences drawn upon are largely from examples in the industrialised world and some emerging economies. In developing countries, it is documented that food loss and waste are more likely to be at the primary production stages and from farm gate to market including storage. However, as food consumption patterns become more similar across the world, the food waste prevention actions included in this Guidance will become increasingly applicable to developing countries. Learning from food waste prevention programmes in a developing country and emerging economy context can be added to this Guidance over time.

There is potential to reduce the amount of food waste that is disposed of to landfill, by recycling more through anaerobic digestion and composting, for example. These opportunities are set in context in this document, using a food material hierarchy, but the Guidance focuses solely on reduction and prevention of food waste, not on different waste management options.

Audience and structure

The audience for this Guidance is **government departments, businesses and other organisations** who have the capacity to influence food waste at a country, regional or business-sector level, by developing and implementing strategies and programmes. This could also be within business operations and supply chains, and tools and information are provided in the Guidance, but the key focus is around developing regional and country-level strategies and implementing these strategies by **developing and delivering food waste prevention programmes targeted at consumers and businesses**.

Because of this strategy and programme focus, the Guidance is extensive and comprehensive - providing a full journey for the reader. Different organisations and countries may be at different stages of developing strategies for food waste and may therefore have different areas of focus, so the **Guidance can be used flexibly**.

The document contains a short introduction, providing background, context and drivers for reducing food waste. Following this, the Guidance document is structured into four Modules. The contents pages give an overview and hyperlinks to each sub-section, and a navigator diagram at the start points to some key sections.

Whilst the Modules are not independent of each other, it is not necessary to cover every step in every Module. Some elements may be more pertinent than others to the reader, given the objectives they wish to deliver.

Each Module has the same overall structure, enabling different elements within them to be used independently of one another as far as possible, as required. The Modules are:

- Module 1** **Mapping and Measuring Food and Drink Waste**
- Module 2** **Options for developing national or regional policies and measures for food and drink waste prevention and reduction**
- Module 3** **Developing and implementing programmes to prevent and reduce household food and drink waste**
- Module 4** **Preventing and reducing food waste in the food and drink business supply chain (retail and manufacturing, and hospitality and food service)**

Within each Module, the structure is presented through step-by-step sections covering:

- Purpose, potential users and outcomes;
- Guidance; and
- Summary.

A summary of the four Modules follows.

Module 1 – Mapping and Measuring Food and Drink Waste is to be used at the beginning of any work on food waste prevention at a country or regional level. There is guidance on how to quantify what is known about the amount of food and drink waste arising, where it arises (in the supply chain or the home) and its impacts. This is the **measurement** part of the Module. The **mapping** part of the Module covers information on how to better understand the opportunities, barriers and potential partners who can help reduce food waste. When the mapping and measurement parts of the module are combined, it provides a powerful basis on which to develop strategies and programmes. As such, the Module is most relevant to a government department or other organisation who can act at a country or regional level.

Module 2 – Options for developing national or regional policies and measures for food and drink waste prevention and reduction provides an overview of the various mechanisms available that can influence food waste. In the first part, this provides context for four mechanisms:

- Policy and legislative measures;
- Fiscal measures;
- Information provision; and
- **Motivational strategies.**

The first three of these mechanisms provide context for the various mechanisms that can influence food waste, and understanding them is useful to combine with the mapping work from Module 1. The Guidance then concentrates on using proven experiences to develop and deliver programmes to reduce food waste, based on **motivational strategies**. Two motivational strategies are therefore described in more detail, and these subsequently form the basis of Module 3 and Module 4, respectively:

- **Consumer engagement programmes**
- **Voluntary collective action programmes with businesses**

Module 3 – Developing and implementing programmes to prevent and reduce household food and drink waste Food waste prevention consumer engagement programmes have been proven to work at a national and regional level. This approach is covered extensively in the Guidance, which covers two interrelated components, critical to success. These two elements are:

- A **household and consumer engagement campaign**. **Objective:** to raise awareness of food waste (and the benefits of its reduction), encourage behaviours which prevent food waste and equip consumers with the information, tools and skills they need; and
- **Changes to products, packaging and labelling**. **Objective:** to make it easier for households and consumers to buy the right amount of food and use what they buy, and therefore helping them to prevent and reduce food and drink waste.

There are five steps where guidance is provided on developing and delivering such programmes:

- Step 1** Plan and develop a strategy for a **consumer engagement programme**
- Step 2** Establish a baseline and set a target
- Step 3** Develop evidence-based guidance
- Step 4** Take action to prevent food waste
- Step 5** Measure, monitor and report progress

Module 4 – Preventing and reducing food waste in the food and drink business supply chain (retail and manufacturing, and hospitality and food service) has **two guidance sections**, each with a different purpose.

The **first section is aimed at individual businesses** and provides guidance on steps that can be taken to reduce food waste in their own operations and supply chains. This has three stages, followed by a continual improvement methodology, called W.A.S.T.E., which is a detailed practical example of an approach that can be used by businesses to prioritise and implement food waste prevention actions in their operations. **The three stages of the section for individual businesses** are therefore as follows:

1. Corporate strategy, baseline and targets;
2. Taking action – guidance with tools and examples; and
3. Measurement and reporting progress towards targets.

These three steps are followed by the W.A.S.T.E methodology, as an example tool that can be used for action.

The **second section is voluntary collective action programmes**. Whilst the first section can be used by businesses to help them take action unilaterally, many causes of waste in the supply chain are influenced by sector-level factors, or other organisations within the supply chain. Therefore, the impact of actions by individual businesses can be magnified, by developing and delivering programmes where businesses commit to working towards common targets. These are voluntary collective action programmes. Within a framework such as this, **businesses can work collaboratively** across sectors and supply chains to unlock greater potential in reducing food waste, in addition to reducing food waste in their own operations, using guidance in the first section of this Module.

There are five steps where guidance is provided on developing and delivering such programmes. The five steps are:

Step 1 Plan and develop a strategy for a **voluntary collective action programme**

Step 2 Establish a baseline and set a target

Step 3 Develop evidence-based guidance

Step 4 Take action to prevent food waste

Step 5 Measure, monitor and report progress

Summary and next steps

This Guidance aims to make a real difference, helping those around the world to reduce food waste, by providing **clear and comprehensive steps for governments, businesses and other organisations** to develop strategies, programmes and activities to prevent and reduce food waste, **based on proven, measurable experiences**.

This document provides the first comprehensive guidance of its kind and provides a robust, compelling and proven basis on which to reduce food waste, by developing, implementing and measuring food waste prevention through:

- **Consumer engagement programmes; and**
- **Voluntary collective action programmes with businesses.**

Examples have been used from around the world to illustrate various elements contained in this Guidance. The basis of the Guidance as a whole draws heavily on recent experiences in the UK, as one of the few countries with comprehensive food waste prevention programmes, where impact is measured. Whilst this Guidance aims to provide a useful framework for action on this basis, it is recognised that there is certainly no single, correct approach or solution. It is not intended therefore that this Guidance be prescriptive or to imply that this approach should prevail. It is recognised that there may be other methods which may work equally well or even better, particularly in different economic or cultural contexts.

To continue to validate existing and new approaches, and to produce more detailed practical guidance to help implement the elements within this document, components of the Guidance can be piloted, in partnership with different countries, and the Guidance will be updated to reflect these new insights.

Call to action

Government departments, businesses and other organisations, that can influence food waste at a country or regional level, are encouraged to use the contents of this Guidance. Businesses are also encouraged to use the Guidance to help take action within their own operations.

At the same time, it is recognised that feedback on other experiences will help improve the Guidance over time, so this is **Version 1.0**, which will be updated and more detailed guidance for the different Modules can be produced. So please do use this Guidance and contact James.Lomax@unep.org if you:

- Would like to understand more about implementing elements of the Guidance or Piloting any part of it;
- Have experiences you would like to share; or
- Have feedback about the content of this Version 1.0 of the Guidance.

MODULE MAP

MODULE 1



Mapping and measuring food and drink waste

Key steps:

- Quantifying waste at national or regional level
- Quantifying waste arising from the supply of food and drink
- Quantifying food and drink waste from households

Example

MODULE 2



Options for developing national or regional policies and measures

Key steps:

- Options for motivational strategies
- Voluntary Collective Action Programmes
- Consumer Engagement Campaign

Example

MODULE 3



Developing and implementing programmes to prevent and reduce household food and drink waste

Key steps:

- Step 1 Plan and develop a strategy for a consumer engagement programme
- Step 2 Establish a baseline and set a target
- Step 3 Develop evidence-based guidance
- Step 4 Take action to prevent food waste
- Step 5 Measure, monitor and report progress

Example

MODULE 4



Guidance for individual business

Key steps:

- Corporate strategy, baseline and targets;
- Taking action – guidance with tools and examples; and
- Measurement and reporting progress towards targets.

Example

Guidance for developing voluntary collective action programmes

Key steps

- Step 1 Plan and develop a strategy for a voluntary collective action programme
- Step 2 Establish a baseline and set a target
- Step 3 Develop evidence-based guidance
- Step 4 Take action to prevent food waste
- Step 5 Measure, monitor and report progress

Example

Contents

MODULE MAP	11
Introduction.....	17
MODULE 1	22
1. Module 1: Mapping and measuring food and drink waste	23
1.1. Purpose, potential users and outcomes	23
1.1.1. Purpose.....	23
1.1.2. Potential users.....	23
1.1.3. Outcomes	23
1.2. Guidance	24
1.2.1. Mapping out the supply of food and drink in your geographic region.....	24
1.2.2. Quantifying waste arising at a national or regional level	26
1.2.3. Quantifying waste arising from supply of food and drink	28
1.2.4. Quantifying food and drink waste: households	32
1.2.5. Approaches to estimating the economic, environmental and social impacts of food waste prevention	33
1.3. Outcomes and next steps.....	34
MODULE 2	35
2. Module 2: Options for developing national or regional policies and measures for food and drink waste prevention and reduction.....	36
2.1. Purpose, potential users and outcomes	36
2.1.1. Purpose.....	36
2.1.2. Potential users.....	36
2.1.3. Outcomes	36
2.2. Guidance	36
2.2.1. Context: policy and legislative measures, fiscal measures, information provision, and motivational strategies.....	37
2.2.2. Context - Policy and legislative measures	37
2.2.3. Context - Fiscal measures.....	41
2.2.4. Context - Information provision	43
2.2.5. Context - Motivational strategies:.....	43
2.2.6. Voluntary collective action by business sector	44
2.2.7. Household and consumer-facing programmes	46
2.3. Outcomes and next steps.....	49
MODULE 3	51
3. Module 3: Developing and implementing programmes to prevent and reduce household and consumer food and drink waste.....	52
3.1. Purpose, potential users and outcomes	52
3.1.1. Purpose.....	52
3.1.2. Potential users.....	53
3.1.3. Outcomes	53
3.2. Guidance to develop and deliver a consumer food and drink waste prevention and reduction programme	53
3.2.1. Step 1 – Plan and develop a strategy	54
3.2.2. Step 2 – Establish a baseline and set a target	69
3.2.3. Step 3 – Develop evidence-based guidance	69
3.2.4. Step 4 – Take action to prevent and reduce food and drink waste.....	73
3.2.5. Step 5 – Measure, monitor and report consumer food and drink waste prevention and reduction	83
3.3. Summary	85
MODULE 4	86
4. Module 4: Preventing and reducing food waste in the food and drink business supply chain (retail and manufacturing, and hospitality and food service).....	87
4.1. Potential users, purpose and outcomes	87

4.1.1.	Purpose.....	87
4.1.2.	Potential users.....	88
4.1.3.	Outcomes	88
4.2.	Guidance for businesses in the retail and manufacturing supply chain and the hospitality and food services sector to prevent food waste.....	89
4.2.1.	Corporate strategy, baseline and target	89
4.2.2.	Prevent and reduce food and drink waste - guidance with tools and examples	95
4.2.3.	Reporting (including W.A.S.T.E. methodology)	101
4.3.	Developing and delivering a voluntary collective action programme to prevent food waste in businesses.....	115
4.3.1.	Step 1 – Plan and develop a strategy for voluntary collective action	115
4.3.2.	Step 2 – Establish a baseline and set a target	119
4.3.3.	Step 3 – Develop evidence-based guidance for businesses	121
4.3.4.	Step 4 – Take action to prevent and reduce food and drink waste.....	123
4.3.5.	Step 5 – Measure, monitor and report.....	128
4.3.6.	Measuring waste arising from a cohort of businesses not part of a collective action programme	128
4.4.	Summary	130

List of Figures

Figure 1 Global food losses and food waste.....	18
Figure 2 An example food and drink material hierarchy, used to scope waste prevention.....	24
Figure 3 Illustration of the mass balance method of quantification.....	31
Figure 4 Five step process.....	52
Figure 5 Influence on the quantity of food waste in the home.....	55
Figure 6 Overview of methodologies used in the UK in WasteDataFlow, for measuring household food and drink waste.....	59
Figure 7 Examples of why UK households waste food and drink.....	62
Figure 8 The disconnect between what people think they throw away and the actual quantity of food and drink waste (UK).....	63
Figure 9 Diagram illustrating household and consumer behaviours and trends in the UK.....	65
Figure 10 Diagram illustrating relationships between causes of household food and drink waste in the UK.....	66
Figure 11 Examples of communication material developed in Think Eat Save.....	72
Figure 12 Examples of communication material developed in Love Food Hate Waste.....	72
Figure 13 Example of infographics used in engagement campaigns.....	80
Figure 14 Five step process.....	87
Figure 15 Example data and reporting form for retailers and manufacturers.....	91
Figure 16 Guidance for hospitality and food service (HaFS) businesses on data collection and reporting – UK example, for which packaging is also in scope.....	93
Figure 17 Potential reasons for food waste from post-farm to purchase.....	95
Figure 18 The W.A.S.T.E. process.....	103
Figure 19 Schematic of W.A.S.T.E process.....	103
Figure 20 Process map in a drink manufacturing plant.....	104
Figure 21 Priorities for action.....	105
Figure 22 Stage 1 project sheet.....	107
Figure 23 An example cause-and-effect diagram.....	108
Figure 24 Stage 2 project sheet (manufacturing).....	109
Figure 25 Stage 2 project sheet (supply chain).....	109
Figure 26 Stage 3 project sheet (manufacturing).....	110
Figure 27 Stage 3 project sheet (supply chain).....	111
Figure 28 Stage 4 project sheet (manufacturing).....	112
Figure 29 Stage 4 project sheet (supply chain).....	112
Figure 30 Stage 5 project sheet (manufacturing).....	113
Figure 31 Stage 5 project sheet (supply chain).....	114
Figure 32 Illustration of the process for businesses as part of voluntary collective action.....	125

List of Tables

Table 1 Template to help clarify data gaps and indicate priorities.....	32
Table 2 Data sources used to estimate household food waste arisings by WRAP.....	59
Table 3 Typical W.A.S.T.E. team structure and responsibilities.....	106

List of Examples

Identification Of Key Players To Target To Maximise Impact	25
Food Loss And Waste Protocol	27
Mapping Food Loss And Waste In South Africa	28
Japan's Regulatory Efforts To Reduce Food Waste	38
Fusions (Food Use For Social Innovation By Optimising Waste Prevention Strategies)	39
Massachusetts Organics Action Plan	40
Payt In The Czech Republic	41
Enshrining In Law Segregated Food Waste Collection Systems In Ireland	42
South Korea Food Waste Policy	42
French Viral Anti-Food Waste Campaign	43
Motivational Strategies In The Uk: Consumer Engagement Programmes And Voluntary Collective Action With Businesses	45
Reducing Household Food Waste	47
Reducing Household Food Waste - Continued	48
Guandon Action And "Operation Empty Plate" In China	49
Trends Affecting Food Waste Arisings	62
Household Food Waste Prevention Engagement Strategy Development In The Uk	68
Raising Awareness Of Food Waste In Norway	71
Multiplying Messages: High Profile Campaigners	74
Consumer Awareness Campaign Development	74
Food Waste Awareness In Switzerland	75
Stop Wasting Food Movement Denmark (Stop Spild Af Mad)	76
Reducing Household Food Waste In An Urban Region – West London Love Food Hate Waste Trial	78
Raising Awareness Of Consumer Food Waste In A Business Context	81
Changes To Product Labelling To Help Consumers Reduce Waste	82
Hospitality And Food Service, Working With Unilever	96
Methodological Guide For Hospitality Sector Food Waste Prevention In Brazil	96
Reducing And Preventing Waste In The Retail Manufacturing Supply Chain	97
Hospitality And Food Service – Waste Reviews	97
Surplus Food Redistribution In Bangladesh: Reclaimed Food System	98
Redistribution Of Surplus Food: Clarifying Legal Frameworks And Working With National Food Security Authorities	99
The Global Foodbanking Network	100
Redistribution Of Food From Retail	101
Allwin Ab: A New Business Model Fighting Food Waste	101
Working With Businesses In Switzerland	117
'Every Crumb Counts' - Joint Food Wastage Declaration	118
Hong Kong's Food Waste Charter And Food Wise Campaign	118
Reducing Food Waste In A Food Service Business – Compass Group	123
Guidance For Commercial Catering	123
Reducing Waste In Businesses In Portugal	125
Reducing Waste In Sandwich Production	126
Uk Retailer Central England Co-Operative Society Limited* And Fruit Company Fyffes Collaborate To Reduce Banana Waste By Over 80 Tonnes Per Year	127

LIST OF ACRONYMS

3Rs	Reduce, reuse, recycle
AD	Anaerobic digestion
CET	Centre for Ecotechnology
CO ₂ e	Carbon dioxide equivalent
Defra	Department for Environment, Food and Rural Affairs
EPR	Extended producer responsibility
EU	European Union
FAO	Food and Agriculture Organisation
FDF	Food and Drink Federation
FUSIONS	Food Use for Social Innovation by Optimising Waste Prevention Strategies
GDP	Gross domestic product
GHG	Greenhouse gas
GLA	Greater London Authority
HaFSA	Hospitality and Food Service Agreement
HWRC	Household waste recycling centre
LA	Local Authority
LEAN	A technology to create more value for customers with fewer resources
LFHW	Love Food Hate Waste
LWARB	London Waste and Recycling Board
MEP	Member of the European Parliament
Mt	Million tonnes
NEA	National Environment Agency
NGO	Non-Governmental Organization
NHO (Norwegian)	Confederation of Norwegian Enterprise
OECD	The Organisation for Economic Co-operation and Development
OFAG (Swiss)	Swiss Federal Office for Agriculture
PAYT	Pay as you throw
PR	Public relations
QSR	Quick service restaurant
R&D	Research and Development
RfL	Recycle for London
SCP	Sustainable Consumption and Production
SKU	Stock keeping unit
SMART	Specific, measurable, actionable, realistic, time-bound
SOP	Standard operating procedure documentation
UK	United Kingdom
UNCSD	United Nations Conference on Sustainable Development
UNEP	United Nations Environment Programme
UNFAO	United Nations Food and Agriculture Organization
USD	United States dollars
W.A.S.T.E.	Problem-solving discipline for business and supply chains
WBCSD	World Business Council on Sustainable Development
WED	World Environment Day
WEEE	Waste electronics and electrical equipment
WLWA	West London Waste Authority
WRAP	Waste & Resources Action Programme
WRI	World Resources Institute

Introduction

Around one third of the food produced for human consumption is lost or wasted globally,¹ putting unnecessary pressure on natural resources as well as rendering a significant proportion of the world's safe and nutritious food production unavailable for human consumption. Prevention and reduction of food losses and waste requires interventions to improve alignment of consumption (in urban, peri-urban and rural areas) and the supply of food, so as to support various types of value chains and to optimise the resource use efficiency of food and agricultural systems. A food systems perspective is furthermore broadening the focus from production, to include food utilisation as a significant driver of food insecurity and natural resources/environmental degradation.

This Guidance aims to provide tools and know-how needed to define the problem of food and drink waste from consumers, retailers, hospitality and processing, find the critical waste points, measure them and identify feasible and sustainable prevention and reduction options. It provides concrete steps for governments, businesses and other organisations to develop strategies and activities to prevent and reduce food and drink waste.

Food security and waste prevention

In 2011–13 842 million people, or around one in eight people worldwide, were suffering from chronic hunger². The 2013 *State of Food and Agriculture report (SOFA)* emphasized that reducing food and nutrient waste within agricultural and food systems could make important contributions to better nutrition and relieve pressure on productive resources, contributing to their sustainable use. Given the need to increase food availability by 60% by 2050 (FAO, 2012)³, there is a clear opportunity to contribute to this by taking concrete steps to prevent and reduce food and drink waste.

Food loss and waste occurs across the supply chain from farm to fork, as illustrated in Figure 1. There is overall a significant difference between the amount of food produced that which reaches consumption. By reducing food loss and waste, the overall availability of safe and nutritious food for human consumption is improved. Furthermore, food loss and waste in developed and emerging economies can contribute directly to global hunger. All countries buy food from the same global market of internationally-traded commodities. Food that is wasted is removed from the market and is therefore not available for other countries to buy. By raising demand for these commodities, the prices paid globally can be impacted, which could make them less affordable for poorer nations⁴.

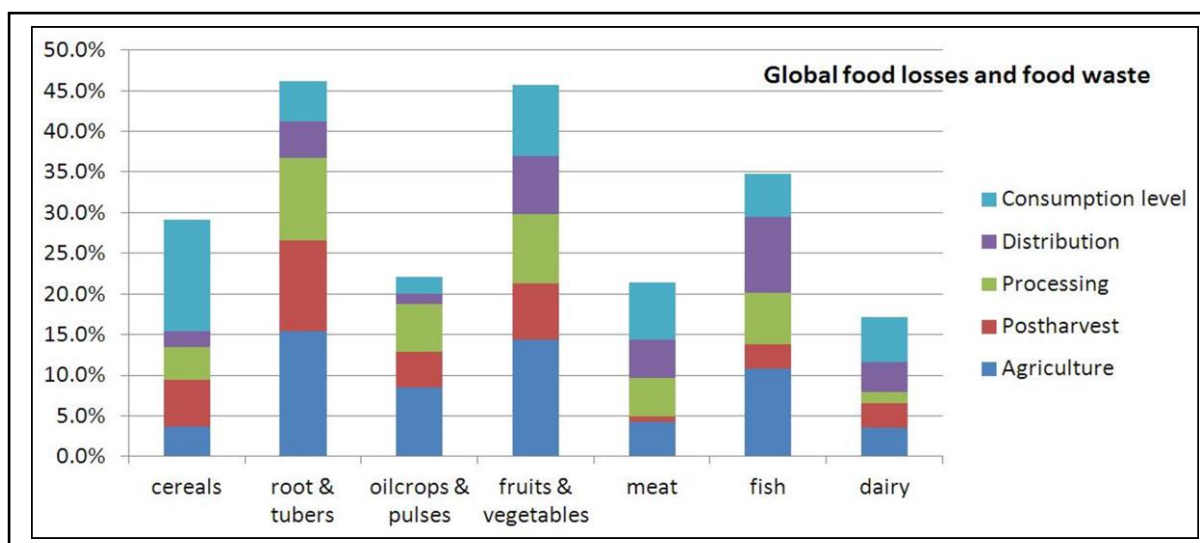
¹ FAO. 2011. *Global food losses and food waste: extent, causes and prevention*, by J. Gustavsson, C. Cederberg, U. Sonesson, R. van Otterdijk and A. Meybeck. Rome. www.fao.org/docrep/014/mb060e/mb060e00.pdf

² FAO, IFAD and WFP. 2013. *The State of Food Insecurity in the World 2013. The multiple dimensions of food security*. Rome, FAO.

³ Alexandratos, N. and J. Bruinsma. 2012. World agriculture towards 2030/2050: the 2012 revision. ESA Working paper No. 12-03. Rome, FAO. Available online at: http://www.fao.org/fileadmin/templates/esa/Global_perspectives/world_ag_2030_50_2012_rev.pdf. Summary available at: http://www.fao.org/fileadmin/user_upload/esag/docs/AT2050_revision_summary.pdf

⁴ <http://www.fao.org/docrep/018/i3342e/i3342e.pdf>

Figure 1 Global food losses and food waste⁵



Natural resources and environmental impact

The global environmental impact of food loss and food waste is enormous. Without accounting for GHG emissions from land use change, the carbon footprint of food produced and not eaten is estimated at 3.3 G tonnes of CO₂ equivalent. Presenting these emissions as a country, food waste would be the third top CO₂ emitter after the USA and China. Globally, the blue water footprint (i.e. the consumption of surface and groundwater resources) of food loss and waste is about 250 km³, which is equivalent to the annual water discharge of the Volga River, or three times the volume of Lake Geneva. Finally, food produced but not eaten occupies almost 1.4 billion hectares of land in vain; this represents close to 30% of the world's total agricultural land area. (FAO 2013)⁶

These environmental impacts accumulate across the food supply chain. Food waste management is particularly greenhouse gas intensive, especially when allowed to decompose at landfill. In addition to natural capital loss, food waste also embodies financial losses, where a high-input model for food production translates into lost inputs such as fertiliser and pesticides, as well as labour and fossil fuels used to extract, process, store and transport the food that is not eaten.

What does this Guidance document aim to do?

Food loss and waste occurs at all stages of the food supply chain and consumption and its social, economic and environmental impacts have global consequences. This complex challenge calls for a dynamic multi-stakeholder approach in order to achieve significant results. This Guidance aims at providing a range of tools for governments, local authorities, businesses and other organisations to guide the development and implementation of a strategy that focuses on working collaboratively to prevent and reduce food waste.

⁵ Source: FAO, 2011. Global food losses and food waste: extent, causes and prevention, by J. Gustavsson et al., Rome.

⁶FAO. 2013. Food wastage footprint: Impacts on natural resources. Available online at: <http://www.fao.org/docrep/018/i3347e/i3347e.pdf>

The Guidance is divided into four modules:

Module 1: Mapping and measuring food and drink waste

The two combined elements covered in this module provide a comprehensive and informed basis upon which to develop and deliver a food and drink waste prevention and reduction strategy:

1. How to gather data on the quantities of food and drink waste arising at a country or regional level across the whole food supply sector and in households, in order to identify where opportunities exist to take action.
2. How to map the food system to understand the organisations, stakeholders and individuals who can influence food and drink waste prevention and reduction.

Module 2: Options for developing a national or regional food and drink waste prevention strategy in a governance context

This Module provides an overview of the various mechanisms available that can influence food waste. In the first part, this provides context for four mechanisms:

- Policy and legislative measures;
- Fiscal measures;
- Information provision; and
- **Motivational strategies.**

The first three of these mechanisms provide context for the various mechanisms that can influence food waste, and understanding them is useful to combine with the mapping work from Module 1. The Guidance then concentrates on using proven experiences to develop and deliver programmes to reduce food waste, based on **motivational strategies**. Two motivational strategies are therefore described in more detail, and these subsequently form the basis of Module 3 and Module 4, respectively:

- **Consumer engagement programmes**
- **Voluntary collective action programmes with businesses**

This module summarises a range of policy options and mechanisms which can be used to tackle food waste at a national or regional level. Within this context, two key areas –consumer engagement and business level action – which can form part of a national or regional strategy are then summarised, the delivery of which form the content of Module 3 and Module 4.

Module 3: Developing and implementing programmes to prevent and reduce household and consumer food and drink waste

The purpose of this module is to present a process for achieving food and drink waste prevention and reduction at the household and consumer level. It discusses how to scope, develop, deliver, measure and report on a consumer engagement programme that enables and facilitates behaviour and attitude changes at household level.

Module 4: Developing and implementing programmes to prevent and reduce food and drink waste in the retail grocery, hospitality and food services supply chains

The purpose of this module is to provide a process to scope, develop, deliver, measure and report on a programme to prevent and reduce food and drink waste:

- In the retail and manufacturing supply chain;
- In the hospitality and food services sector.

It provides guidance on how to work and monitor implementation and impact through voluntary collective action as well as options for individual businesses.

The four Modules are ideally read in sequence. However, a modular approach is used so that the Guidance can be used flexibly. While the modules are not independent of one another, it is not necessary to implement every element of them. The diagram in the Executive Summary can be used to help you navigate rapidly and identify the elements most relevant to you.

The reader may find certain elements and tools more pertinent than others. It is recognised that there is certainly no single correct approach or solution, and this guidance is expected to evolve and improve over time, based on new learning and experience and through piloting different elements of the Guidance.

The Guidance has been designed to potentially be used in any part of the world, providing a framework for allowing the same approach to be emulated while being flexible enough to allow for a variety of approaches to implementation. It is hoped that, in producing this Guidance document, it can help others set up and deliver a programme more quickly, easily and cheaply than would otherwise be the case. The Guidance draws on existing case studies and national experiences, and will be enriched in next versions with new studies and experiences. Some parts of the guidance heavily draw upon the UK's recent experience in tackling food waste, because it is one of the few countries which has adopted a comprehensive approach and programmes and has been able to measure its progress and impacts so far. This Guidance is however in no way implying that this approach should prevail, and is fully recognising the fact that there may be different and more effective ways of preventing and reducing food and drink waste that can be applied in contexts, which are less similar to the UK.

What waste is in the scope of this document?

This guidance aims to help prevent and reduce food and drink ingredients and products from becoming waste in the grocery retail and hospitality supply chains. This includes the physical mass of waste (referred to in tonnes throughout this document) arising from the factory "in gate" onwards – including manufacture, preparation, distribution and retail – through to use by consumers, in and out of the home. Waste associated with primary production (on farm) and food losses are not addressed.

Context of the Guidance

This Guidance is an output of the joint FAO/UNEP Sustainable Food Systems Programme and its Agri-food Task Force on SCP (www.scpclearinghouse.org/sustainable-food-systems), which is a collaboration of governments from developed, emerging and developing countries, the private sector and civil society. The Task Force emphasises the importance of food loss and waste management, recycling and the need to mobilise all stakeholders towards more sustainable food systems (i.e. from consumption to production).

This Guidance contributes to the Think Eat Save: Reduce Your Foodprint initiative, which was launched in January 2013, by UNEP, FAO, Messe Düsseldorf GmbH and a number of diverse stakeholders, including the UK-based Waste & Resources Action Programme (WRAP). It is a global initiative to prevent and reduce food waste (www.thinkeatsave.org), supporting the UN Secretary General's Zero Hunger Challenge (www.un.org/en/zerohunger). The Think Eat Save initiative is evolving and will provide global vision for food loss and waste prevention, support a common framework for measurement via the Food Loss & Waste Protocol, engage targets and commitments for action, and deliver impacts via collective action at consumer, business and national and local government levels.

This Guidance furthermore supports the UN's SAVE FOOD Global Initiative on Reduction and Prevention of Food Loss and Food Waste (<http://www.fao.org/save-food/en/>). Convened by the FAO, the SAVE FOOD initiative's four pillars are: (i) Awareness raising; (ii) Collaboration and coordination of world-wide initiatives; (iii) Evidence-based policy, strategy and programme development, including development of methodology for assessing food loss and field studies¹; (iv) Technical support to investment programmes and projects. In this context, the FAO collaborates with donors, bi- and multi-lateral agencies, financial institutions, public, private sector and civil society to develop and implement feasible and sustainable solutions globally.

This Guidance and the Think Eat Save initiative overall contribute to the UN Secretary's General Zero Hunger Challenge, which seeks to eliminate global hunger in our lifetimes¹. The fifth element of the Zero Hunger Challenge aims aspirationally at zero loss or waste of food, through for example behaviour change, collaborative action and commitments, to which this document specifically responds.

MODULE 1

Mapping and measuring food and drink waste

Section Contents

1.1. Purpose, potential users and outcomes	24
1.2. Guidance	25
1.3. Outcomes and next steps	35



1. Module 1: Mapping and measuring food and drink waste

1.1. Purpose, potential users and outcomes

1.1.1. Purpose

This module provides a starting point from which an effective strategy to prevent and reduce food and drink waste can be developed. Understanding the nature and scale of food and drink waste is the foundation of success, whether beginning a new programme of action or building on existing actions.

There are therefore two main elements to this module:

1. How to gather data on the quantities of food and drink waste arising at a country or regional level across the whole food supply sector and in households, in order to identify where opportunities exist to take action.
2. How to map the food system to understand the organisations, stakeholders and individuals who can influence food and drink waste prevention and reduction.

You can use this waste measurement approach to gain quantified information at the start and again at other stages of your strategy development and implementation to measure changes in waste arising. Over time, the systems and abilities to measure waste are likely to improve in coverage and accuracy, so regular measurement can give ever-improving degrees of accuracy and insight into food waste at all levels, in businesses, regions and countries.

More detailed ways of mapping and quantifying food waste to better understand how waste is generated by consumers and businesses are covered in Module 3 and Module 4. In particular, the mapping and gathering of demographic information to determine how consumers interact with the grocery and hospitality supply chains and any factors to consider such as household type, gender and any roles that these may play are covered in Module 3 in more detail.

1.1.2. Potential users

This module is particularly aimed at providing guidance to:

- National or regional government, for example a sustainable consumption and production department, food department or waste prevention and reduction department in a country or region; or
- An NGO with a remit on food and drink waste prevention and reduction.

1.1.3. Outcomes

The intended outcomes of this module are that you will:

- Better understand the opportunities, barriers, actors and potential partners to prevent and reduce food and drink waste; and
- Be able to quantify what is known about the amount of food and drink waste arising and where it arises and its impacts.

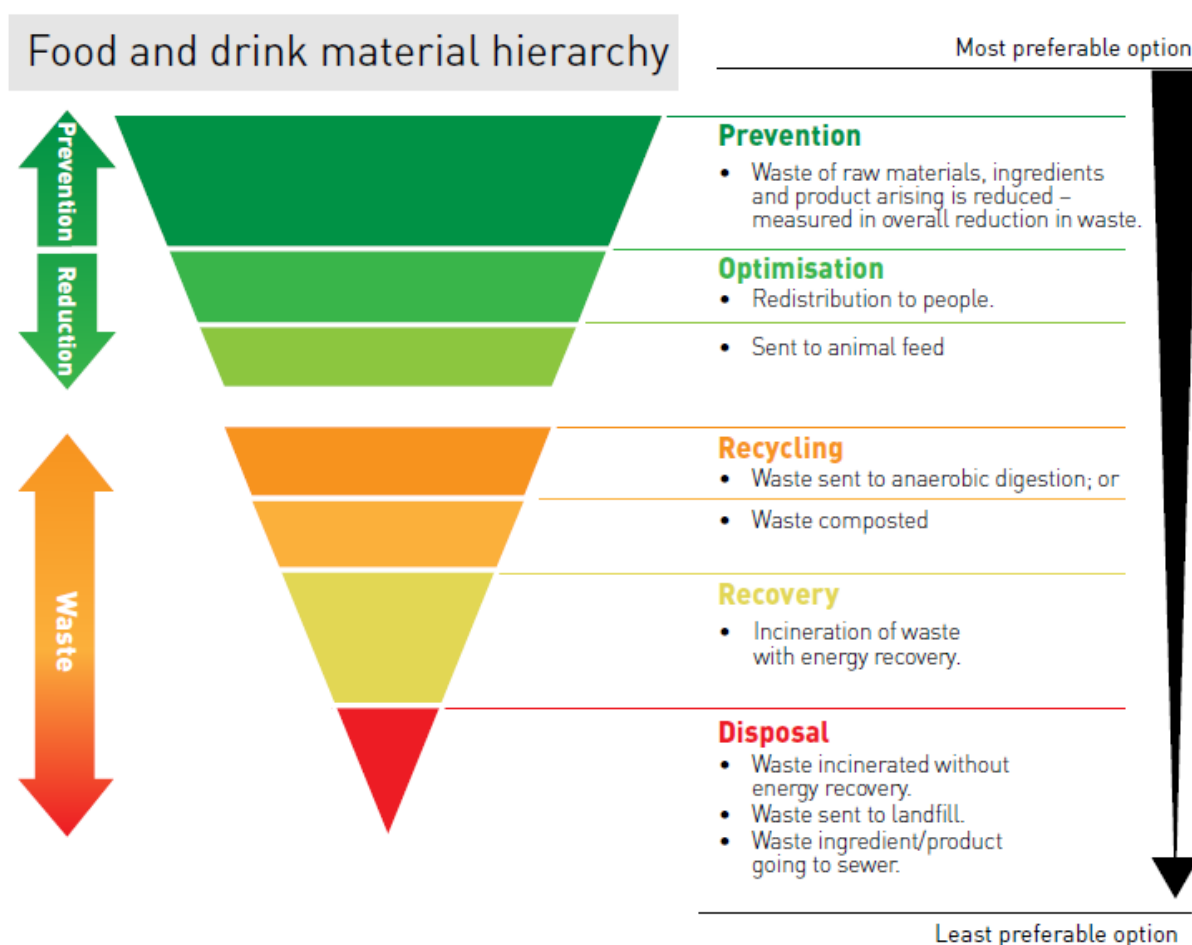
This guidance should help generate information and data to form the basis for Module 2, exploring policy options, and then Module 3 and Module 4, delivering progress towards food and drink waste prevention targets for households and consumers, and businesses.

1.2. Guidance

1.2.1. Mapping out the supply of food and drink in your geographic region

This section is designed to be used at a country or region level. The key outcome here is a better understanding of where food waste comes from, key organisations – their roles and how they could interact, and to identify actions, opportunities and methods to build upon. It is important to understand the food and drink sectors in your country or region, and to develop a food and drink waste prevention strategy or build on an existing strategy. It can be helpful to refer to a food material hierarchy to better understand food and drink, what is considered waste prevention and when food and drink become waste. An example is shown in Figure 2.

Figure 2 An example food and drink material hierarchy, used to scope waste prevention.



Below are some questions which you can use to gather information as part of this mapping exercise. It is recommended that you conduct the exercise as broadly as possible, to best identify where there are opportunities to act and where additional information is needed to respond to gaps identified. It is better to consider all the potential stakeholders involved – consumers, the public sector, manufacturing and retail supply chains, and hospitality and food service businesses (including food service in public sector organisations, e.g. state hospitals).

It is particularly important to include sectors that are responsible for large quantities of waste and the sectors with strong influence in the supply chain as a whole, to maximise the impact of any programme of work. If trade bodies have wide membership and frequently negotiate on behalf of their members, it might be that action could best be achieved through the trade body (or trade bodies) rather than via individual companies. This Mapping process helps to identify this opportunity

Crucial questions to answer include the following:

- What initiatives to prevent food waste already exist? Are significant food waste prevention activities currently being developed? Are these being performed by individual companies or trade bodies, or by whole sectors? Who is leading them (e.g. government, business, individual companies, civil society)?
- Size of the sectors involved: turnover, profit, amount of material sold (tonnes), number of employees, and number of sites/outlets (e.g. hospitality, food service (public and private), retail, manufacturing base, as they are generally sectors where significant amounts of food waste are generated, where programmes can influence waste prevention).
- Market concentration of the sectors: how many companies have a dominant market share of each sector? Or are sectors dominated by smaller businesses?
- What is the relationship between the different sectors? Who has the power and influence when it comes to purchasing and selling food and drink?
- What trade bodies exist? Which companies are members of each and what is the relationship between the trade body and its members?

The results of this sector mapping will help determine the best opportunities for action. For instance, if waste prevention and reduction initiatives already exist, then all that may be required is extending them within or to additional parts of the sector, providing resources to maximise their chance of success, or evolving existing targets and bringing in consistent reporting.

This mapping information should be combined with what is known about the quantities of food and drink waste (more on this below) to support prioritisation of sectors, organisations and individuals you will need to work with to achieve food and drink waste prevention, and how to achieve them.

At this stage, this is not about committing to action in all these areas or ensuring that all possible data is available. It is very likely that this picture will build up over time, so for now, identify what is known and where there are gaps.

You may want to capture this information in a report in order to help develop an overall strategy. You may be in a position to undertake this work yourself or you may need to draw on other organisations to help you, for example researchers, trade associations, or organisations working in the sector.

Example

1

IDENTIFICATION OF KEY PLAYERS TO TARGET TO MAXIMISE IMPACT

Globally the grocery retail sector is becoming heavily consolidated; in the UK for example up to 80% of food sold in the retail sector is accounted for by just five companies. However, the manufacturing sector is more fragmented. Given the nature of buying between retailers and their supply chains, ensuring that big retailers and key trade bodies were identified and partnership approaches developed were crucial to the success of efforts to reduce food waste in the UK. It also allows a large part of the supply chain to be influenced through a small number of companies.

1.2.2. *Quantifying waste arising at a national or regional level*

It is important to understand the food and drink waste arising in your country or region to develop a prevention and reduction strategy or to build on an existing strategy – prioritising areas for action and to measure change. This would include both waste arising in the food and drink supply chain and also from consumers in and out of their homes.

Quantification can be through a range of criteria. For example, tonnes, number of products, financial value and greenhouse gas emissions associated with food and drink waste could all be quantified.

The following sub-sections outline methods you can use to gather and understand waste data and the associated environmental and financial data, as part of this mapping exercise. It is recommended that you conduct the exercise as broadly as possible – gathering as much data as you can and identifying gaps and areas where you have less confidence in the data. Data can be supplemented at a later date from information you gather as part of your delivery activities. Module 3 covers how this links to the measurement of impacts of a programme to reduce and prevent household food and drink waste. Module 4 covers links to the measurement of impacts of a programme of work with a cohort of businesses to reduce and prevent food and drink waste.

Collecting data on food and drink waste is challenging, and establishing and maintaining trust among stakeholders of the food supply chain is essential for this process to be successful. This requires, in particular, the development of relationships and working collaboratively with businesses and organisations in the sector, in order that they agree to provide data that is sufficiently accurate and consistent over time to track trends in food and drink waste.

It is also important to have realistic expectations of what can be measured and what this information can be used for.

Example**2****FOOD LOSS AND WASTE PROTOCOL**

If one does not know how much or where food loss and waste is occurring, then how can one take effective action to reduce it? To address this challenge, the World Resources Institute (WRI), UNEP, FAO and the World Business Council on Sustainable Development (WBCSD) propose to develop, road test, and popularize a global standard for measuring food loss and waste, or a “food loss and waste protocol.” This protocol will be a globally consistent, peer reviewed, and credible approach for individual countries and companies to measure and monitor in a consistent and periodic manner the food loss and waste that occur within their boundaries and supply chains.

This protocol will provide guidance and requirements on multiple aspects of measuring both food loss and food waste, including (but not necessarily limited to):

- Definitions
- What should be measured
- How to set boundaries or “scopes” for what to measure
- What unit(s) of measure to use
- What types of data sources are appropriate
- What quantification methods are appropriate
- How to evaluate trade-offs between accuracy, completeness, relevance, and cost
- What level of accuracy is needed to meet various uses
- How to report results

The protocol will be developed and road tested throughout 2014 and 2015. Parties interested in participating in the development and/or testing of the protocol should contact Craig Hanson (chanson@wri.org) at WRI.* After this testing period, it is hoped that the protocol will provide a globally credible and consistent methodology for food waste quantification, which may be integrated into module 2 of this Guidance.

*Lipinski, B. et al. 2013. “Reducing Food Loss and Waste.” Working Paper, Installment 2 of Creating a Sustainable Food Future. Washington, DC: World Resources Institute. Available online at www.worldresourcesreport.org

Example**3****MAPPING FOOD LOSS AND WASTE IN SOUTH AFRICA**

A quantification of national food waste was undertaken in South Africa in 2012, providing a preliminary average estimate for national food waste in the order of 9.04 million tonnes per annum. This amounts to 31.4% of average annual agricultural production (28.79 million tonnes per annum). When looking at the percentage contribution to total food waste at each step in the food supply chain in South Africa, the split in waste generation between agricultural production, post-harvest handling and storage, and processing and packaging is fairly equal. The majority (8.67 million tonnes per annum or 95.9%) of the food waste generated annually is generated during the pre-consumer stages. Pre-consumer food waste amounts to 30.1% of average annual agricultural production. It is estimated that only 4.1% (0.37 million tonnes) of the total food waste is generated at the consumption (post-consumer) stage; amounting to 1.3% of agricultural production, (Oelofse and Nahman, 2012).

In terms of the contribution of each commodity group to total food waste, fruit and vegetables, combined with roots and tubers, contribute 57% of the overall food waste stream; fish, seafood and meat are found to contribute only 6%. Waste data in South Africa is collected under the South African Waste Information System (SAWIS), developed by the Department of Environmental Affairs (DEA) in 2005. The system is used by government and industry to capture routine data on the tonnages of waste generated, recycled and disposed of in South Africa on a monthly and annual basis. A waste hierarchy that prioritises waste avoidance and reduction is in place in South Africa to guide waste management practices.

A Food Bank network was established in South Africa in 2009, redistributing food past its saleable lifetime to the needy. There is interest in expanding redistribution activities from the retail sector to also include the hospitality sector.

1.2.3. Quantifying waste arising from supply of food and drink

Measurement at a country or large region level for business food and drink waste has sufficient uncertainty to make tracking trends in waste generation difficult. This is likely to be the case for many countries or regions that do not require businesses to report waste levels, and thereby require a sampling approach to estimate waste quantities. The benefit of working to quantify waste arisings is that, when combined with an understanding of the sector, it can support you in prioritising your efforts and provide focus for any evidence, guidance and tool development to support action on food and drink waste prevention.

The main metric for measuring food and drink waste prevention and reduction is the physical quantity of food and drink waste that is generated, measured in tonnes. However, tracking business food and drink waste at a national or regional level may be problematic unless businesses are required to report them publically. This is why working with groups of businesses collectively to measure and report consistently on food waste, as part of a strategy, is so effective. The physical quantities of food and drink waste can then be used to estimate the accompanying economic losses and social and environmental impacts, to articulate the problem in understandable terms.

It is essential to understand as far as possible how much food and drink waste is generated by different sectors, what the waste is and the extent to which it could be prevented and reduced. This information helps to make informed decisions, and also allows you to make a more persuasive case to individual companies, to potential participants and other stakeholders involved in a voluntary collective initiative and/or a consumer engagement campaign. The information need only be approximate at this stage and can be refined as your strategy and activities are developed and implemented.

It is usually more cost and time effective to use existing waste data than commissioning primary research to determine waste levels across the supply chain. Therefore, the first step is to review what information already exists through a literature review or similar exercise. Relevant waste statistics may be collected by:

- Central and local government;
- Government agencies responsible for waste;
- Waste management companies;
- Businesses in the food and drink sectors (for example, in corporate social responsibility reports);
- Trade bodies representing these businesses;
- Academic-based projects;
- Environmental groups; and
- Food redistribution organisations.

You can obtain much more accurate data when collecting data reported directly from businesses and organisations, using consistent measurement and reporting, details of which can be found in Module 3 and Module 4.

It is important to understand the scope and definition of data sources, as well as any significant assumptions or limitations. These should be taken into account when using this information to generate estimates of waste, and it is good practice for it to be performed by a group of people who understand both waste flows and statistics. Once the limitations of the data are understood, it may be possible to generate estimates of:

- The amount of waste in each sector (e.g. by stage in the supply chain);
- What the waste material is; and
- What the potential for reduction is.

Where gaps exist, you may need to specify and undertake primary research to gather data. If resources are insufficient to allow this, information from other countries with similar businesses in the food and drink sector and similar patterns of food and drink consumption could be used to give an idea of the potential scale of opportunity. Comprehensive and extensive projects to quantify food waste can be very complex and expensive.

Baselines and changes in physical quantity of food and drink waste can be estimated by the following techniques, which are explained in further detail below:

1. Direct measurement of waste streams by weight or volume conversion to weight
2. Using a mass-balance approach
3. Calculating the impact of waste prevention and reduction activities covered in 25 and Module 3 and Module 4.

The first method usually gives the most robust and accurate estimates, although mass-balance approaches can be sufficiently accurate if the conversion from ingredients to products is well understood. A mass balance approach involves estimating the amount of product that **could be** produced from ingredients purchased and comparing that with **actual** amount produced.

Once changes in stock levels are taken into account, the difference between the two is a measure of waste within the process (Figure 3). It requires an understanding of the quantity of incoming ingredients required to manufacture a certain amount of product if all the ingredients were successfully made into the final product.

Direct measurement through weighing or volume conversion to weight

Weighing food waste at the business as it is generated, or measuring the volume of the food and drink waste placed in collection containers as it is generated and converting to weight using appropriate bulk density factors.

Potential sources of data

- Waste management companies, and
- Direct measurement by the business.

Applications

To identify areas of food waste generation and therefore potential cost and environmental savings.

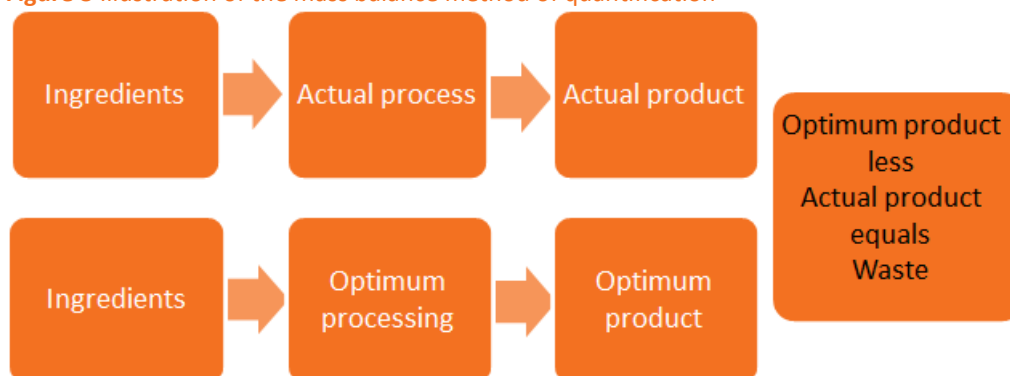
Limitations

- Unless measurement and reporting is mandatory it can be difficult and costly to obtain the data,
- To get sufficient data at a country level will require research and evaluation skills and techniques and will need robust analysis,
- If businesses are implementing measurement of their own waste, it can take a while for a business to see the benefit. Often piloting measurement first can help get buy-in, and
- Consistency is key - if methods or assumptions change this must be noted and trend-tracking over time at a country level is very challenging.

Measurement through mass balance

Mass-balance approaches can be sufficiently accurate if the conversion from ingredients to products is well understood. A mass balance approach involves estimating the amount of product that **could be** produced from ingredients purchased and comparing that with **actual** amount produced. Once changes in stock levels are taken into account, the difference between the two is a measure of waste within the process (Figure 3). It requires an understanding of the quantity of incoming ingredients required to manufacture a certain amount of product if all the ingredients were successfully made into the final product. This method is mainly applicable for individual businesses or sites (e.g. a manufacturing site) and would be very challenging at a region or country level.

Figure 3 Illustration of the mass balance method of quantification



What this diagram illustrates is a comparison of food products purchased (ready-made and ingredients) with food products sold and inferring that the difference is food waste. This requires data on the number of products purchased and sold, as well how much sold product can be produced from purchased product.

Potential sources of data;

- Procurement and buying data (sales and purchases),
- Meals served data, and
- Transaction data.

Applications

Identification of areas for cost savings as well as inefficiencies and waste.

Limitations

Need to have good enough data (number of units as well as weights) and coverage. The 80:20 rule can be applied.

In general, business waste estimates require more information due to the diversity of businesses in the food and drink sector. They often perform very different activities and can be very different in size. For instance, the type and amount of waste generated by a small-scale bakery is likely to be very different from a large soft-drinks factory or from a restaurant.

Data on waste arising in the food and drink supply chain may be available through a national survey of waste levels. If available in your country, such information may be sufficient for quantification at this scoping stage. However, it may need supplementing with information from other sources.

Given the nature of the information, it is recommended that the analysis be performed by people proficient in statistics and waste-related data. It is easy to include large errors in estimates if the data is not well understood. For example, companies within a single sector may greatly differ in size and food and drink waste arisings; the differences can easily be a hundred-fold. Therefore, to scale from the sample to the population, it is often best to use 'waste per unit of production' or 'waste per market-share-percentage', rather than waste per business. Understanding the data fully and having a sufficient number of data points allows for informed decisions on the potential to prevent and reduce waste – to maximise the opportunity. Where food and drink waste cannot or is not prevented or reduced, then the next best options in the waste hierarchy should be explored. In the first instance, identifying how much and where waste arises should be the priority, and then you can decide on whether it can be prevented or better managed.

Combined with any information collected in the mapping exercise, a key output from this stage will be data on waste. Table 1 below can be used as a template to populate with the quantification data you gather. This approach enables you to identify gaps and areas for action, and to get an overall picture of food and drink material, waste and how it is managed in your country or region. You could use this output table to identify hotspots (priority areas for action).

Table 1 Template to help clarify data gaps and indicate priorities

	Food Production	Food Manufacturing	Retail and Wholesale	Food Service	Households
Redistribution	(a)	(f)	(k)	(p)	(u)
Animal feed/by-products	(b)	(g)	(l)	(q)	(v)
Recycling (AD/Composting)	(c)	(h)	(m)	(r)	(w)
Recovery (thermal/landspreading)	(d)	(i)	(n)	(s)	(x)
Disposal (sewer/landfill)	(e)	(j)	(o)	(t)	(y)

1.2.4. Quantifying food and drink waste: households

In endeavouring to quantify household food and drink waste, it is helpful to understand the following, as far as possible:

- The total amount of food waste arising annually, in tonnes;
- The percentage this represents of total food purchased;
- The proportion of household waste that is food;
- What happens to this waste;
- Using compositional analysis, what foods are wasted, how much and what state they are in (e.g. as bought, whole or partially used, or cooked);
- What causes this waste;
- The financial value of this food, and the environmental impact (carbon dioxide equivalent (CO₂e) and water if possible); and
- Differences in demographics or between genders, where possible.

Summarise this information at a national or regional level, but also on an individual per-household or per-consumer basis where possible. This makes the information as relevant as possible to policy-makers, the media and individuals.

The following data collection techniques may be helpful in collecting this data:

- A literature review or the results of work you may have completed following activities set out in Section 1.2.2 above.
- Local authority waste management monitoring. Local authorities may be obliged to report the amount of waste they collect (or is collected on their behalf) to central government. This may include an estimate of the amount of residual (general) waste and the amount of food waste in any separate collections.
- Compositional analysis. Local authorities or other organisations may commission studies to understand the composition of mixed waste streams. These studies may measure the proportion of food waste in the residual stream, which allows the total amount of food waste collected from households to be estimated.
- Standard compositional analysis rarely records the types of food and drink waste or the potential for reduction. This can be estimated using more detailed compositional analysis or diary research.
- It is possible that a substantial minority of food and drink waste is composted at home or poured down the sink. This can best be estimated using food-waste diaries. Information on food waste diaries can be found later in this section.

Quantifying household or consumer food and drink waste is challenging. This section has aimed to help by providing guidance on quantification methods and use of indicators for household food and drink waste.

1.2.5. Approaches to estimating the economic, environmental and social impacts of food waste prevention

Reductions in the waste of food and drink that can be internationally traded are likely to reduce global pressure for land use change, as well as the greenhouse gas emissions, bluewater and biodiversity impacts associated with food waste. It is reasonably expected that food and drink no longer wasted will be redistributed in the global economy to meet growing demand. It is worth considering the economic and environmental impacts of your desired reduction in food waste and how these can be monitored.

The economic impacts of food waste are complex and not yet well-understood. Rutten et al (2013)⁷, for example, model a scenario in which an overall reduction in food waste leads to consumers “trading up” to buy more meat, whereas Britton et al (2014)⁸ suggest that when food waste is reduced, consumers trade up within the same food category. It may therefore be relevant to monitor changes in food purchases in correlation with any significant reductions in food and drink waste generation, to identify any unintended consequences.

As regards the environmental impacts of food waste, these can be tracked using Life Cycle Assessment, for which there are international standards (ISO 14040 and ISO 14044). There is furthermore potential to use life cycle assessment in conjunction with other tools (such as Global Equilibrium Models), to anticipate changes in greenhouse gas emissions, resource depletion and other issues.

Water footprinting can be used to quantify the amount of water association with food production, and can be used in combination with national trade data to understand not only the quantity of water association with food and drink, and food and drink waste, but also the scarcity of that water in the country of origin.

In many cases, existing datasets such as the Ecolnvent database or the Water Footprint Network information on water footprints may be used without the need for primary research. Other relevant environmental indicators include understanding the link between reducing food waste and reducing the pressure for land use change, which has indirect environmental and social impacts (e.g. land acquisitions, deforestation). Attention may also be required to consider impacts on marine environments.

⁷ Rutten, M., P. Nowicki, M.-J. Bogaardt and L. Aramyan (2013), ‘Reducing food waste by households and in retail in the EU; A prioritisation using economic, land use and food security impacts’ LEI-report 2013-035

⁸ Britton, E., Brigdon, A., Parry, A., Le Roux, S., (2014) *Econometric modelling and household food waste*, WRAP, Banbury

There are a range of social issues potentially associated with the production of food, and which may be affected by reductions in food waste. Social issues may be identified and evaluated through a formal framework, or through more qualitative scorecards tailored to your country.

Social Return On Investment (SROI) is a framework based on social generally accepted accounting principles which seeks to comprehensively account for the impacts of an organisation's activities using a combination of narrative, qualitative and financial measures. For example, community initiatives to reduce food waste may provide training and employment opportunities, which could be identified through SROI⁹.

Alternative qualitative assessments are used by a range of organisations such as Oxfam¹⁰, Fairfood International¹¹ covering issues such as land rights, workers and women's rights, and the role of smallholders in a supply chain. Social and environmental issues also interact with food security, thus awareness of social risks in the supply chain is helpful.

Once you have begun to quantify food and drink waste generation in your country or region, you can use the data you have collected to investigate the economic, environmental and social impacts that food waste reductions might provoke. This is most relevant at a national level, and is not critical to implementing a food waste prevention strategy, but is worth considering as it impacts national policy contexts going forward.

It can also be useful to explore behaviour and activity related to food and drink waste. This helps, for instance, understanding behaviours in the population that are associated with food and drink waste prevention and reduction in the home, and how they change over time. It is also possible to track how many companies have adopted specific practices or policies that are associated with waste prevention and reduction, to help understand the impact of engagement with a sector.

A successful waste prevention and reduction programme will also contribute positively towards a range of different indicators, such as business productivity and efficiency, and food and drink availability, access, stability and utilisation, the four elements of food security¹². However, given that many other factors will also influence these variables, using them to track the success of a waste prevention and reduction programme is not recommended.

1.3. Outcomes and next steps

You should now:

- Have a better understanding of the opportunities, barriers, actors and potential partners to prevent and reduce food and drink waste; and
- Be able to quantify what is known about the amount of food and drink waste arising and where it arises.

At a country / regional level, you can use this information as a basis for adopting the guidance in Module 2 – exploring policy options. You can also use the outcomes from this Module further in Module 3 and Module 4, where your work here will help you set food and drink waste prevention targets and deliver, measure and report progress on these targets for businesses and households, at a country/regional level and with individual businesses.

⁹ More information can be found here www.thesroinetwork.org

¹⁰ Oxfam: "Behind the Brands" www.behindthebrands.org/en-gb

¹¹ FairFood International www.fairfood.org/about-us/

¹² http://ec.europa.eu/food/food/sustainability/docs/background_08022013_en.pdf

MODULE 2

Options for developing a national or regional policy measures for food and drink waste prevention



Section Contents

2.1. Purpose, potential users and outcomes	37
2.2. Guidance	37
2.3. Outcome and next steps	50

2. Module 2: Options for developing national or regional policies and measures for food and drink waste prevention and reduction

2.1. Purpose, potential users and outcomes

2.1.1. Purpose

When a country or government identifies food waste prevention goals that they wish to pursue, a range of policy-related mechanisms can be used to achieve these. This guidance cannot be exhaustive in its approach. This Module explores a range of policy mechanisms that could be developed that have an impact on or interact with food waste prevention, building on the mapping of existing activities and opportunities identified in Module 1. It aims to provide an orientative summary of policy options and mechanisms to achieve food and drink waste prevention and reduction. This policy overview is given to provide context to the three strategy areas elaborated in Module 3 and Module 4:

- A summary of policy options and mechanisms to achieve food and drink waste prevention and reduction a household and consumer engagement campaign (Module 3);
- Action by individual businesses (Module 4); and
- Business sector level action – including voluntary collective action (Module 4).

2.1.2. Potential users

This module is aimed at providing guidance to various entities among which:

- National or regional government, for example a sustainable consumption and production department, food department or waste prevention and reduction department including semi-autonomous policy implementation institution; or
- An NGO with a remit on food and drink waste prevention and reduction.

2.1.3. Outcomes

The intended outcomes of this module are that you will be able to:

- Understand that policies are important to create a supportive environment for other stakeholders – business and citizens – to put into place effective strategies and practices to reduce and prevent food waste
- Understand, that there is a range of policy related mechanisms to create a supportive landscape for food and drink waste prevention and reduction;

2.2. Guidance

This section contains two elements:

- Context, regarding policy and legislative measures, fiscal measures, information provision, and motivational strategies;
- Motivational strategies are then explored to give options for programmes targeting households and businesses. These are then covered in Module 3 and Module 4, respectively.

2.2.1. Context: policy and legislative measures, fiscal measures, information provision, and motivational strategies

There are a range of examples of measures you could and may already be employing to prevent food and drink waste.¹³ Rather than concentrating on a single approach, a holistic approach is recommended, to ensure that information for businesses and institutions, public awareness amongst householders, waste collection and disposal infrastructure and other measures to minimise the impacts of legislation are brought together in a coherent national (or regional) food waste prevention strategy. This requires joined up policy making across government, including departments interested in soil quality, waste collection, energy, health, heat and resource self-sufficiency. In broad terms, possible approaches can be divided into four categories:

- Policy and legislative measures;
- Fiscal measures;
- Information provision; and
- Motivational strategies.

These four broad policy areas are outlined below.

2.2.2. Context - Policy and legislative measures

It is important that any strategy, for household or business food and drink waste prevention, links to the wider policy and legislative landscape in the region or country. One area that can be seen from many of the illustrations in this Guidance document is that food waste collection and management is often considered alongside food waste prevention. Reducing biodegradable waste going to landfill is important, but should not hide the fact that food waste prevention and reduction is the best way of achieving the environmental, financial and social benefits, as illustrated in the food material hierarchy example in Figure 2. Where diversion of waste to landfill is part of a strategy in a country or region, then food waste prevention actions and messages could be considered at the same time.

Policies and legislation can be used for example to require or support:

- Mandatory reporting of food waste by local authorities (collected from households) and/or by businesses;
- Investment in recycling and collection infrastructure and developing end-markets for recycled food and drink (e.g. compost used as a growing medium); and
- The setting and delivery of waste prevention and recycling targets.

Although recommendations, guidelines, commitments, targets and cooperation strategies are certainly crucial for a successful food waste prevention strategy, businesses and consumers may be more likely to take an active role if preventive and reduction practices are an economically attractive option or they are required to comply with legally binding requirements. Examples might be compulsory waste data reports for businesses, high landfill levies, payment for waste (sometimes termed “pay-as-you-throw”) systems and, generally, any market-based instrument that reflects the real cost of natural resources use. The framework for such fiscal measures (covered later in this section) is often drawn from legislation and policy, so these two approaches can be linked.

¹³ This section draws on Section 4 of the European Commission’s October 2012 guidance document, ‘Preparing a Waste Prevention Programme’ <http://ec.europa.eu/environment/waste/prevention/pdf/Waste%20prevention%20guidelines.pdf>

For this reason, it is important that policy-makers consider adopting holistic preventive initiatives, undertake actions involving all stakeholders at all levels of the food value chain, and encourage cooperation, exchange of information, awareness campaigns and education. Some governments are already moving in this direction, setting food waste reduction targets and making pledges to enhance the sustainability of the food chain, reducing dependence on natural resources and changing consumption patterns. Several policy documents and recommendations stress the importance of a combined effort by actors involved in the food and drink value chain as a key lever supporting resource efficient production and global food security and nutrition.¹⁴

Legislation on waste movement, management and disposal is another key policy area. Landfill bans on organic waste have been introduced in countries in Europe and certain States in the US with an aim of preventing waste and managing it in an environmentally preferable manner, and in the case of Europe to comply with the EU Landfill Directive. In practice, in many of these countries this has been accompanied by programmes to expand anaerobic digestion. This may be a viable option for some countries to consider as a way of diverting food waste from landfill, while it is recommended that the prevention rather than diversion of food waste remains the key priority.

Examples of the ways that policy and legislation can be used to support food and drink waste prevention are shown in the case studies from Japan, Massachusetts, Ireland, and the FUSIONS project below. The UK example shows how wider waste legislation can have an impact on food waste, in this case, improved measurement and awareness of waste resulted.

In Japan, we can see how legislation can target businesses in measuring and recording information on waste and the impact this can have.

Example

4

JAPAN'S REGULATORY EFFORTS TO REDUCE FOOD WASTE

In Japan, food waste is the central focus of the *Law for the Promotion of Recycling and Related Activities for the Treatment of Cyclical Food Resources* (Food Waste Recycling Law) in 2001. The law aims both at reducing food waste, promoting recycling food waste into animal feed and fertilisers, managing via energy recovery. In order to monitor such policy, data on food waste has been collected in the categories of food manufacturing, wholesale, retail and food services. Businesses that produce food waste of more than 100 tonnes are required to report the amount of food waste regularly, including the amount which was recycled as feed, fertiliser etc. whereas businesses generating less than 100 tonnes of food waste are subject to a sample survey, to complement the national estimate.

The FUSIONS project example shows how pan-European research is seeking to explore how policies might be used to galvanise food and drink waste prevention, and how measurement could be made more consistent.

¹⁴ This section draws heavily on PP43 – 47 of Reducing the Food Wastage Footprint Toolkit, FAO 2013, <http://www.fao.org/docrep/018/i3342e/i3342e.pdf>

**Example
5****FUSIONS (FOOD USE FOR SOCIAL INNOVATION BY OPTIMISING WASTE PREVENTION STRATEGIES)**

FUSIONS is a four year research project that aims to optimise food use and reduce EU food waste by 50% by 2020. The project involves several activities which together support this goal:

- Understanding food waste data and trends by developing standard methodologies for measuring food waste: The team will propose a clear and specific definition of food waste, and will then work on quantifying food waste and assessing its environmental and socio-economic impacts. To help standardise food waste quantification across the EU, the team will develop a Food Waste Quantification Manual for Member States.
- Evaluating how various EU and national policies work to either drive or impede food waste prevention and reduction: The team will map different policies and regulations across the EU and will develop recommendations for a European Common Policy on reducing and preventing food waste, with a focus on social innovation.
- Involving stakeholders across the food system: The team seeks to actively include a variety of stakeholders in the project, and stimulate dialogue between different actors across the food system. By August 2013, over 100 stakeholders had pledged support to the project by becoming Members of the FUSIONS multi-stakeholder Platform. The Project organises regularly regional and EU-level interactive workshops to bring these different actors together and facilitate dialogue.
- Testing how social innovation can help reduce food waste: Social innovation is at the core of the FUSIONS project. The team will look at existing social innovations that help reduce food waste, and will then pilot four new ideas suggested by stakeholders and will evaluate their impact on reducing food waste. Raising awareness on FUSIONS and food waste prevention: The team works continuously to spread the word about food waste, solutions, and the project's activities through its website, social media, the press and numerous live events and presentations across the EU.

www.eu-fusions.org

The Project brings together 21 partners from across the EU and runs from August 2012-2016.

The example from Massachusetts in the United States shows how at a regional level (in this case, a US state) a combination of legislative and policy approaches are being used to reduce food and drink waste to landfill and how this links in to some of the other measures outlined in this Module – namely information provision and motivational strategies.

Example**6****MASSACHUSETTS ORGANICS ACTION PLAN**

The 2010-2020 Massachusetts' Solid Waste Master Plan calls for the Massachusetts Department of Environmental Protection (MassDEP) to aggressively pursue diversion of food and other organic materials from the solid waste stream. Representing more than 25 per cent of solid waste disposal in Massachusetts, food waste, compostable paper, and other organics are the largest fraction of the remaining waste. In order to achieve the Commonwealth of Massachusetts's overall solid waste management goal to reduce total solid waste disposal by 30 per cent by 2020, MassDEP has established a goal to increase diversion of food waste from disposal by 350,000 tons per year annually by 2020. This goal is shared with MassDEP's Clean Energy Results Program, which is focused on fostering renewable energy development in Massachusetts, including anaerobic digestion of food waste. MassDEP has developed an Organics Action Plan that establishes a comprehensive set of strategies to help achieve this goal.

Organics diversion includes methods such as reducing the amount of food waste produced through improved tracking or reduced portion sizes, and donating servable unused food to people through food banks. It also includes, and processing organic waste on- or off-site through composting, use as animal feed, and use to produce renewable energy through anaerobic digestion. The Massachusetts strategy will initially focus on businesses and institutions, such as hotels, convention centres, supermarkets, food waste manufacturers and processors, and institutional food service providers.

MassDEP has proposed a solid waste disposal ban that would apply to businesses and institutions disposing of one ton or more of food waste per week, effective as of July 2014. The proposed disposal ban, along with other market development initiatives, will help building the state's infrastructure to manage separated food waste.

MassDEP will conduct extensive outreach, education, and technical assistance for businesses and institutions subject to the proposed ban. An educational outreach program is initiated called RecyclingWorks in Massachusetts, which provides businesses and institutions with information resources and on-site technical assistance to help implement or improve recycling and organics diversion programs. The RecyclingWorks in Massachusetts program, funded by MassDEP and delivered under contract by the Centre for Ecotechnology (CET), is an example of a successful government-non-profit-industry partnership to increase commercial recycling and organics diversion.*

*Organics Action Plan: <http://www.mass.gov/eea/docs/dep/public/committee-4/orgplan12.pdf>

Proposed Commercial Organics Disposal Ban: <http://www.mass.gov/eea/agencies/massdep/news/comment/proposed-ban-on-disposal-of-commercial-organic-material.html>

RecyclingWorks in Massachusetts: <http://www.recyclingworksma.com/>

2.2.3. Context - Fiscal measures

Fiscal measures, related to the use of economic instruments by governments, may include: taxes, fees, economic incentives, or subsidies (e.g. landfill taxes, price support mechanisms or incineration taxes.). These various fiscal measures can all be used to encourage businesses divert food waste from landfill and reduce food and drink waste. Investment can also be made in waste collection and treatment infrastructure. A landfill tax or charge, furthermore, gives a fiscal incentive for prevention, reduction and recycling activities, as well as providing funds for environmental projects through for example in the UK the Landfill Tax Credit Scheme.¹⁵

Direct or variable charging schemes ('pay-as-you-throw' or PAYT) for waste collection by weight or volume have been implemented in many countries, including several European countries, Canada, the United States, Japan, Taiwan, Korea, Thailand, Vietnam and China. This measure can create incentives for householders and businesses to minimise the amount of food and drink waste they produce. These systems are probably best implemented by municipality, at local authority level or contracted waste management companies. However, before implementation, a full understanding of public opinion and existing waste management infrastructure must be taken into account to develop a context-specific plan. The impact of this measure on waste prevention may be encouraged by providing an accompanying information campaign, to ensure public understanding of the need for the measure, how to prevent waste at home or in a business context, and what the potential economic and environmental benefits of prevention are. Information provision and motivational strategies are outlined in this Module, and the latter form the basis of Module 3 and Module 4

Example

7

PAYT IN THE CZECH REPUBLIC

A study was carried out as a part of an EU-funded PAYT (Pay-As-You-Throw) project. This was implemented across 157 local authority areas in the Czech Republic, covering a total of 2.6 million inhabitants. All authorities were given the option to choose which method of charging for the collection of general waste to be implemented in their area. Of the 157 areas, 92 operated a Pay-As-You-Throw system, and 65 operated a flat fee approach. The level of recycling among the first group was 12.1 per cent. This was almost double that of the second group's recycling rate of 6.9 per cent. The amount of mixed residual waste generated in the Pay-As-You-Throw areas was on average 240 kg per head annually, compared with 260 kg in the areas charging a flat fee.

Source: Šauer, P., Pařízková, L. and Hadrabová, A. (2008). Charging systems for municipal solid waste: Experience from the Czech Republic. *Waste Management*. 28(12): 2772-2777.

¹⁵ <https://www.gov.uk/green-taxes-and-reliefs/overview>

The reduction of waste and the separate collection of food waste has been encouraged in Ireland and volume based fees in South Korea as outlines below.

Example

8

ENSHRINING IN LAW SEGREGATED FOOD WASTE COLLECTION SYSTEMS IN IRELAND

Ireland met its 2010 EU Landfill Directive target with a reduction in solid waste to landfill from 77% in 2001 to 53% in 2010. However the 2013 and 2016 Landfill Directive targets are at risk of not being met without considerable policy effort.

The Landfill Levy was increased to EUR 75 per tonne in 2013 which will be a key element in meeting this challenge as will the new regulations on household food waste. These new regulations are set into two parts with on the one hand obligations for the waste collector and secondly for the householder. The regulations state broadly obligate:

- Waste collectors to have a separate collection service for household food waste; and,
- Householders who produce food waste to segregate such waste and make it available for separate collection. Producers may alternatively compost the waste on the premises where it arises under specified conditions or take it to authorised facilities such as civic amenity sites, composting sites, anaerobic digestion sites or for incineration.

Source: <http://www.environ.ie/en/Legislation/Environment/Waste/WasteManagement/FileDownload,32686,en.pdf> and Ireland - Municipal Waste Management, European Environment Agency, February 2013: see <http://www.eea.europa.eu>

Example

9

SOUTH KOREA FOOD WASTE POLICY

South Korea considers its food waste to be a serious environmental and economic issue, and this is addressed through a number of policies and an overarching campaign, aiming to minimise food waste. The food waste policies are developed as part of a corporation-plan where the Ministry of Environment and eight other ministries have come together. The food waste policies include recycling and, food waste-to-energy and payment for food waste. Through an on-going national campaign, targeted towards restaurants, households and individuals the government reaches out with information through the media and the education system.

A Volume-Based Waste Fee System was implemented in 1995, and applies to residential waste, and business waste that are similar to residential waste. By 2010 the total landfill rate dropped to 17.9% as a result of the Volume Based Fee System and other recycling policies. However, in the history of implementing the Volume Based Fee System, the focus has not been on the reduction of food waste. In fact food waste increased by 3% between 2008 and 2012. To mitigate this development, South Korea is developing a new system, as part of the Volume-Based Waste Fee System, which requires citizens to pay for the weight of food they throw away, not solely the volume. The system works similarly to the original volume-based system: a disposal fee is billed, based upon the weight of the food waste. The waste weight is controlled by advanced high-tech billing measures, such as a personalized tap card combined with a specially designed food waste bin, to be available from 2014 onwards. Where pay-as-you-go strategies are accompanied by awareness-raising on food waste prevention, this can be a promising approach to reducing residential food waste.

2.2.4. Context - Information provision

Provision of information and guidance to target audiences on reducing food waste can also be a powerful part of any broader strategy to prevent food and drink waste. These information provision approaches can be used as standalone mechanisms, but they are more likely to give maximum impact when they form part of a considered and evidence-based strategy and associated motivational strategy (see next section for more on this).

Information provision measures could include:

- Awareness campaigns at national, regional and global levels;
- Provision of information on specific waste prevention techniques;
- Training programmes;
- Labelling schemes; and
- Community development and support to prevent and reduce food waste.

Example

10

FRENCH VIRAL ANTI-FOOD WASTE CAMPAIGN

The French Ministry for Agriculture, Food and Forestry launched a viral anti-food waste campaign (called 'Anti-gaspi') in June 2013 along with a National Pact against Food Waste, with the goal of halving food waste in France by 2025. Activities began with public service announcements on the radio and in December expanded with a poster campaign with the theme "Manger c'est bien, jeter ça craint !" (Eating is good, wasting- that sucks!), creating an engaging visual identity around odd-sized or bruised fruits and vegetables. The goal of both the posters and the radio clips is to raise public awareness of the issue and encourage the development of waste prevention behaviours (through better understanding of expiry dates to name one example).

Within this governance context and the range of measures available at a country or regional level, there are a range of levers and mechanisms not covered in this Guidance. The important thing at this stage is to understand what policy landscape any options developed may operate in and how this can help support action on food and drink waste prevention. Two options are explored in Module 3 and Module 4 of this Guidance and are introduced in the Options section below.

2.2.5. Context - Motivational strategies:

You may wish to explore further the use of policy and legislation, fiscal measures, and information provision – as many of these elements can create a supporting environment for motivational strategies and, indeed, can help to deliver food and drink waste reductions. Motivational strategies can also be used by policy makers to develop and deliver programmes to prevent food and drink waste. Motivational strategies incentivise behavioural change and providing financial and logistical support for beneficial initiatives. These programmes could be developed with any combination of the preceding three approaches outlined here, or in the absence of any of them.

These strategies can aim at stimulating:

- Voluntary collective action with businesses; and
- Consumer engagement programmes.

NGOs, sector bodies and other organisations can provide technical and delivery functions within this landscape, for example establishing and maintaining relationships with multiple stakeholders to overcome barriers to action. They can also perform a coordination, monitoring and evaluation role.

2.2.6. *Voluntary collective action by business sector*

There is evidence that the prevention of food and drink waste by businesses in the retail and manufacturing supply chain and/or in the hospitality and food services sector can be successfully supported through voluntary collective action and engagement. This Guidance gives assistance on establishing and delivering a sector-level strategy, using experiences of voluntary collective action (Module 1, this section (2.2.6) and Module 3 and Module 4). These mechanisms can be designed to complement the existing policy framework in your country or region, or any new framework.

Voluntary collective action is a structure within which to work with businesses. These mechanisms take time and resources to establish and deliver, but there are significant benefits to successfully using them, including the following:

- The need for additional regulation or legislation is avoided. Regulation may be perceived as costly for governments and businesses may prefer a voluntary approach.
- It allows the specific circumstances of companies to be taken into account. Some businesses will be able to reduce and prevent food and drink waste more than others. A common goal unites actions and allows everyone to make their own contribution.
- If key organisations and businesses are involved, it can have a wider reach within the sector as a whole, even if not every organisation or business commits to voluntary collective action.

The processes described in this document are based on practical learning, development and implementation. Other countries or regions, organisations and businesses can benefit from this experience and adapt for their own purposes, and examples follow below.

**Example
11****MOTIVATIONAL STRATEGIES IN THE UK: CONSUMER ENGAGEMENT PROGRAMMES AND VOLUNTARY COLLECTIVE ACTION WITH BUSINESSES**

The UK has adopted three principal mechanisms for implementing and delivering food and drink waste prevention, and the experiences from these have been used as a basis to produce this Guidance. These mechanisms consist of two voluntary agreements and an associated consumer engagement campaign.

1. The Courtauld Commitment is the collective agreement for the food and drink retail and manufacturing sector, and contains targets on reducing waste within the businesses signed up to the agreement and also in households (working alongside the consumer engagement campaign).

The Courtauld Commitment helps businesses, consumers and local authorities to save money, improve performance and reduce their carbon footprint. It specifically helps businesses to:

- Reduce costs;
- Improve the resource efficiency of products and their packaging;
- Better position organisations for a carbon-constrained future;
- Deliver against consumer expectations; and
- Help drive innovation in the sector.

Between 2009 and 2012, signatories to the commitment reduced food, drink and packaging waste in their UK operations by 7.4% (against a 5% target by end of 2012). The cost and efficiency benefits of tackling waste prevention at retail and manufacturing sites across the supply chain are now being realised.

Household food waste has fallen by over 1 million tonnes between 2006/7 and 2010.

2. There is a consumer engagement campaign www.lovefoodhatewaste.com and a delivery programme in support of the campaign, which supports the Courtauld Commitment.
3. The Hospitality and Food Service Agreement was launched in summer 2012 working with the profit sector (hotels, restaurants and other outlets) and the cost sector (food service provision in hospitals, schools, prisons etc.) to reduce food and drink waste and recycle more.

You can now use the mapping from Module 1 to determine the existing policy and legislative landscape affecting food and drink waste in your country or region, and decide to what extent sector-level action, including any voluntary collective action, would work in your circumstances. Determine which organisations might be best placed to lead the development and management of such an approach, which organisations you may want to be involved in voluntary collective action and what you ask of them.

Using these methods can:

- Work best when applied at a country or large-region level alongside localised delivery;
- Also be applied at a more localised scale, working with local partners;
- Work best when combined with a household engagement campaign and delivery, recognising that this may not be possible;
- Help deliver significant prevention and reduction in food and drink waste when planned and delivered over a sufficient timescale; and
- Work best when effective and trusted partnerships are developed between governments, local authorities, businesses and other organisations.

Module 4 can be used to further explore some of these options.

2.2.7. Household and consumer-facing programmes

Due to the scales and complexity of food and drink waste prevention in households, a strategy is likely to have greater impact at a national level or in a large region. However, it can also be used at a more local level and when operating at a national or regional level, working with local partners, including local authorities, is key to success.

At this stage, you should scope out to what extent you want to target households and consumers in a food and drink waste prevention strategy. You can use the output from Module 1 and information in Section 2.2.1 of this document. You may want to raise awareness or you may want to encourage behaviour change. This may take the form of a consumer engagement campaign and associated delivery programme. Relevant outputs from Module 1 will help inform your approach and Module 3 contains guidance around establishing and delivering activity that targets households.

**Example
12****REDUCING HOUSEHOLD FOOD WASTE**

Food is a valuable resource and yet UK households throw away over 7 million tonnes every year, around 20% by weight of that purchased. More than 60% (4.4 million tonnes) of this could have been eaten.

Preventing household food waste could save the average family £680 (or over US\$1000) a year and deliver significant environmental benefits. Food is wasted for a number of inter-related reasons, which vary depending on household characteristics. These include a lack of planning, buying more than is needed, not storing food to keep it at its best, confusion around date labelling and what food can be frozen, incorrect portioning and a lack of confidence around leftovers.

Influencing change

Over the last five years WRAP has built up a comprehensive evidence base, which has raised awareness of the issue.* We have developed a strong case for change and given focus to the areas where consumers need the most help, where business and local authorities can benefit, and where the biggest impacts can be made.

Influencing decisions around food product design, production processes, purchase and use is challenging. WRAP has worked with a wide range of partners to develop a credible, integrated and consistent approach, providing a suite of tools and guidelines to make it easier for consumers.

Taking action

Retailers and brands have spent at least £15m helping their customers reduce food waste. For example:

- Sainsbury's 'Love Your Leftovers' campaign;
- Morrison's 'Great Taste Less Waste' campaigns;
- The Co-operative showing Food Lover messages on till screens, reaching 20 million customers a week;
- The introduction of better labelling (e.g. removing 'display until' dates from products); and
- Pack sizes that are better suited to today's households.

These will help meet the Courtauld Commitment targets – a voluntary agreement with businesses.

WRAP has developed a cascade training programme** which trains communities, employees in businesses, local authority staff etc. in the key behaviours needed in order to reduce food waste in the home. This training is then cascaded by those delegates to their communities, peers, colleagues and working with community groups, housing associations and businesses. Charities and broader civil society are also engaged.

Individuals have also been motivated by Love Food Hate Waste.*** They have started their own activities with friends and neighbours to tackle food leftovers and design new recipes.

REDUCING HOUSEHOLD FOOD WASTE - CONTINUED

The drivers and opportunities

WRAP's work on household food waste prevention has been driven by:

- The need to divert organic waste from landfill to meet EU Landfill Directive targets.
- **The UK generates 15 million tonnes of food waste every year. Around half of this comes from households, and 4 million tonnes of this reaches landfill where it generates methane, a powerful greenhouse gas.**
- The need to mitigate the effects of climate change, water scarcity and concerns around food security.
- **Avoidable food waste is associated with 17 million tonnes of CO₂e emissions, equivalent to one in five cars on UK roads.**
- The potential to make significant savings for consumers and local authorities.
- **Consumers spend £12 billion on food that is not eaten (13% of their spend on food).**
- **Local authorities spend hundreds of millions of pounds collecting and landfilling this waste.**

Progress

Since 2006/7, millions of people have benefitted from this programme, throwing away less food and saving many hundreds of pounds for their household. Key achievements include the following:

- Overall food waste arisings reduced by over **1.3 million tonnes** a year (950,000 tonnes of which could have been eaten; an 21% reduction), preventing over **£2.5 billion worth of food** a year being wasted and heavily influenced by the campaign.
- This means on average **every household in the UK not having to spend £100 a year** on food bought but thrown away, helping to mitigate the impact of rising food prices.
- Preventing **3.6 million tonnes of CO₂** emissions a year, and saving a billion tonnes of water.
- More than **2 million people** have made changes to the way they shop, prepare, store and use food.
- **Every £ spent by WRAP on reducing household food waste has prevented more than £100 of food being wasted.** Additional spending by partners has more than matched the WRAP spending.
- Local authorities will have saved around **£80 million** in avoided gate fees and landfill

*www.wrap.org.uk/node/9993/

**Evaluating the impacts of WRAP's cascade training programme in 2011/12
http://www2.wrap.org.uk/downloads/Evaluation_of_Cascade_Training_in_England_2011-12_-_Final_Report.012f93c3.12053.pdf

***<http://england.lovefoodhatewaste.com/>

Example**13****GUANDON ACTION AND "OPERATION EMPTY PLATE" IN CHINA**

Estimates from China Agricultural University have revealed that leftovers at banquets in China every year can feed 200 million people. The State Administration of Grain has estimated that food wasted every year is worth 200 billion yuan (2.95 trillion yen, or \$32.09 billion) which constitutes one-third of the nation's defence outlays. In response, Xi Jinping, the general secretary of the Communist Party of China, has given a directive to end wasteful spending on food.¹⁶

Food waste in China have strong cultural connotations. It is often believed that in the event of a banquet more food should be bought and displayed by the host than guests can eat in order to show hospitality. The worry is that banquet hosts may be seen as parsimonious and lose face if nothing is left on the table after their guests finish eating. This has prompted a number of citizens groups to react through campaigning.¹⁷

One of these groups is Guangpan Action ("Plates without leftovers"). The group printed campaign posters calling for the prevention of food waste at their own expense and delivered them to restaurants. As a result of newspaper coverage a number of restaurants have started serving smaller portions of food at lower prices.

Another Chinese activist Xu Zhijun started an Internet campaign on Weibo – the Chinese version of Twitter – called 'Operation Empty Plate' which has been officially endorsed by Xi Jinping.¹⁸

2.3. Outcomes and next steps

There is huge variation in the governance context across the world. There are also lots of options for policy levers and drivers to be employed to support food and drink waste prevention and reduction. Even if there are specific actions taken already, understanding the governance framework as it relates to food and drink waste prevention and reduction is key in planning how to take further action.

Use the output from the mapping exercises in Module 1 and this Module to establish:

- The existing policy, fiscal and legislative framework in your country or region;
- The organisations which operate in this framework;
- The areas where there is an opportunity to build on existing, or develop new policies, fiscal or legislative measures to reduce and prevent food and drink waste;
- The opportunity to explore voluntary collective action with businesses; and
- The opportunity for a household or consumer engagement campaign.

You should now have:

- Used guidance in Module 1 to map the food and drink sector in your country or region and quantify food and drink waste at this level, and this Module 2 to determine what mechanisms can best be part of the approach you take to reduce and prevent food and drink waste in your country or region;
- Information on the extent to which you may want to work to prevent and reduce food and drink waste
- At a sector level with businesses through collective action,
- As an individual business, and
- With households and consumers, and at what scale you may want to develop and implement these strategies.

¹⁶ <http://ajw.asahi.com/article/asia/china/AJ201303020009>

¹⁷ <http://ajw.asahi.com/article/asia/china/AJ201303020009>

¹⁸ <http://www.bbc.co.uk/news/world-asia-china-21711928>

You can use this information alongside that in Module 1 as a basis for following Module 3 and Module 4 where these mechanisms are explained in more detail.

The remainder of this Guidance covers consumer engagement and delivery (Module 3), using voluntary collective action to work with businesses (Module 4), and businesses taking action to reduce waste by other businesses and consumers, the latter forming part of both Module 3 and Module 4.

MODULE 3

Developing and implementing programmes to prevent and reduce household and consumer food and drink waste



Section Contents

3.1. Purpose, potential users and outcomes	53
3.2. Guidance	54
3.3. Summary	86

3. Module 3: Developing and implementing programmes to prevent and reduce household and consumer food and drink waste

3.1. Purpose, potential users and outcomes

3.1.1. Purpose

This Module aims to enable you to develop a successful programme to influence consumer behaviour, to prevent and reduce household food and drink waste. By following it, you will be able to scope, develop, deliver, measure and report on your programme. Business users can use this Module to help identify their role in helping customers and households more generally prevent and reduce food and drink waste.

There are five main elements in this process (outlined in Figure 4 below).

Figure 4 Five step process



Whilst these steps are written sequentially, some can and will work best concurrently, and each of the five steps themselves will evolve over time. For example, the strategy may involve a five to 10-year programme of work and as such the evidence, guidance and other actions you take will develop over time, while measurement and reporting could be at regular intervals. In Figure 4 above timescales are shown as an indicative illustrative example only, based on a 10-year strategy.

The two key components throughout these five steps are:

1. A household and consumer engagement campaign. **Objective:** to raise awareness of food and drink waste (and the benefits of its reduction), encourage behaviours which prevent and reduce food and drink waste and equip households and consumers with the information, tools and skills they need; and
2. Changes to products, packaging and labelling. **Objective:** to make it easier for households and consumers to buy the right amount of food and use what they buy, and therefore helping them to prevent and reduce food and drink waste.

Ideally, a household food and drink waste prevention and reduction programme has both these key elements which are aligned and complementary.

The Guidance presented in the following two Modules has been developed from in-depth experience in food waste prevention by WRAP in the UK, with insights from wider global prevention activities.

3.1.2. Potential users

This Module is aimed at providing guidance to:

- National or regional government, for example a sustainable consumption and production department, food department or waste prevention and reduction department in a country or region, focusing on households and consumers;
- An organisation or group of organisations with a remit to prevent and reduce household food and drink waste; or
- A food and drink business in the retail and manufacturing supply chain, or the hospitality and food service supply chain who wants to support household and consumer food and drink waste prevention and reduction, and who wants to understand what part they can play in helping customers prevent and reduce food and drink waste. For businesses wishing to identify what part they can play in helping customers, and households and consumers more broadly, to prevent and reduce food and drink waste, steps 3 and 4 are most relevant. Module 4 focuses on how businesses can prevent and reduce waste in their operations and systems.

You understand the extent to which consumers in your country or region are wasting food and drink. There may also be pressures on waste disposal, food and nutrition security. Addressing this food and drink waste problem can lead to economic, environmental and social benefits both for your country or region and the householders and consumers themselves. It is appreciated that you may already have policies and activities aimed at preventing food and drink waste at household level, and this Module can be used to supplement or improve existing policy.

Ideally, you will have completed activities in Module 1 and/or Module 2 of this document and identified household food waste prevention as a priority for your country or region (or for your business).

3.1.3. Outcomes

The intended outcomes of this Module are that you will have:

- A basis to develop a programme to deliver household food and drink waste prevention and reduction; and
- The methods and techniques to develop and deliver this programme, through changing consumer behaviour.

3.2. Guidance to develop and deliver a consumer food and drink waste prevention and reduction programme

Like any programme aimed at changing consumer and household behaviour, critical to success is:

- Consistent clear and simple messages and actions, which have traction with individuals; and
- Sustained communication through a variety of methods.

Because of this, any programme developed using this Module is more likely to achieve significant food and drink waste prevention and reduction when it is implemented at a country or large region scale, supported by local activities. Cities or other smaller geographies can be a good environment in which to test effective messages and behaviour change actions before sharing them nationally.

For businesses wishing to identify what part they can play in helping customers, and households and consumers more broadly, to prevent and reduce food and drink waste, steps 3 and 4 are most relevant.

3.2.1. Step 1 – Plan and develop a strategy

This step helps you to establish what is known about the amount of food and drink waste, why food and drink is wasted, and the barriers and opportunities to preventing and reducing this waste. It also shows how to use this information to develop your strategy for a household food and drink waste prevention programme. Information from Module 1 will help inform what is known about the overall amount of food and drink waste, in Module 2 you can understand the policy context and where such a strategy as this may sit. In this step, you can draw on the insights from these first two Modules in order to develop your strategy.

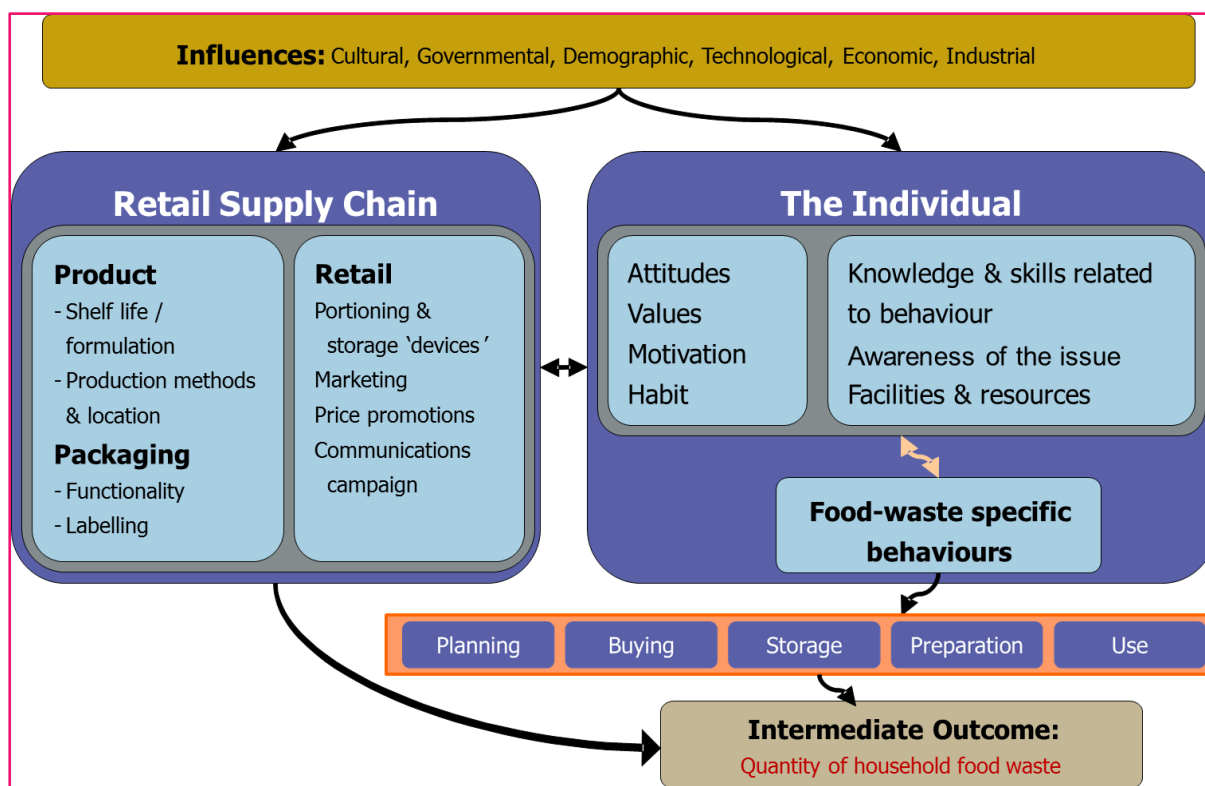
Methodologies for measuring household food and drink waste and evaluating change

This section gives detailed guidance on methods for using indicators to identify changes in household food and drink waste arisings and changes to products and packaging (the retail environment), which can influence this waste. FUSIONS¹⁹ work package 1.3 is developing guidance for measurement of waste in supply chains and from households and this is currently planned to be published in 2015 and this section draws on measurement guidance used in the FUSIONS project. WRI (World Resources Institute) have recently launched work in partnership with UNEP and others to develop a Food Loss and Waste Protocol on harmonised global food waste measurement. As this work develops in the coming years, this methodological guidance may be integrated into this document.

The generation of food waste in the home can be thought of as a complex interplay between food purchased, people's behaviour in the kitchen and whilst shopping, and their lifestyle (Figure 5). Each of these elements is influenced by a large number of factors. The result of this complexity is that measurement is not straightforward – different quantitative techniques are more suitable depending on the objective of the research.

¹⁹ The FUSIONS project (Food Use for Social Innovation by Optimising Waste Prevention Strategies) is working towards a more resource efficient Europe by significantly reducing food waste. It runs for 4 years, until July 2016 and is funded by the European Commission Framework Programme 7. To learn more about the project click [here](#)

Figure 5 Influence on the quantity of food waste in the home



Furthermore, measuring the amount of food waste generated in the home can be difficult to achieve for the following reasons:

- As activities in the home around food are highly habitual, people are often unaware of the quantity of food they throw away.
- Once food has entered a bin, it is often forgotten. This means that asking people how much they throw away is not as reliable as direct measurement of food waste.
- Food is disposed of using several different routes and therefore several strands of work are required to estimate all waste arising.

The following methodological techniques demonstrate the variety of possible approaches to quantification possible. In selecting the approach(es) to use in your country or region, it will be helpful to consider the existing data sources available and the financial means available to undertake this data collection.

Waste composition analysis

Waste composition analysis is the analysis of waste streams, either domestic or industrial and commercial. Waste streams can be characterised by a range of factors to give detailed information, for example on the types of food wasted, what fraction of this was edible²⁰, and its preparation state. The following procedure relates to household waste composition analysis, and is based on waste and recycling collection routes.

Project steps

1. Design a sampling regime – for budgetary reasons this is likely to include clustered sampling to reduce travel and set-up costs of the sorting.²¹
2. Select collection routes and properties.
3. Survey potential participants using a questionnaire to gather contextual information about their household, their attitudes and behaviours around food, and obtain consent for the waste collection phase of the research.
4. Use completed questionnaires to develop a collection record sheet to enter results.
5. The route and approximate timings of the collection are agreed with the local authority or municipality. Households selected for study would usually be drawn from the middle of a route to ensure waste can be collected ahead of the usual local authority collection round.
6. All survey staff collecting waste are to display photographic identification and carry a letter of authority from the appropriate public authority explaining that they are authorised to carry out the work.
7. Collect materials in non-compacting vehicle.
8. Sort, analyse and record materials collected from each household (see below).

Things to consider:

1. The sample needs to include at least a few hundred households – the exact number depends on the level of detail required in the results and the use to which the results will be put. Tracking trends over time will require relatively high numbers of households.
2. Sampling of households (e.g. by location - rural or urban - and social strata), local authorities and waste collection rounds needs to reflect the overall geographic region of study, for example be nationally representative if the aim is to monitor national trends.
3. How properties with shared waste collection will be included in the research¹ or controlled for if excluded (e.g. through analysing differences between flats and houses in diary research or surveys).
4. Where collection of residual or organic material is fortnightly or monthly, all materials should be collected over a complete collection cycle to take account of any variation in behaviour within this period.
5. It is recommended that signed consent is given by the householder from whom waste will be collected for analysis.
6. Any information collected about the householder should be treated as strictly confidential.
7. Any waste collected from households should be disposed of in the usual way, just as if it had been collected as normal by the local authority.
8. You may wish to undertake a pre-survey – conducting a questionnaire of the selected households before their waste is removed for analysis. It may be possible to invite a specific member of the household to participate in the pre-survey (if undertaken), e.g. adults who are either solely or mainly responsible for food shopping or food preparation.
9. It is important to recognise that a pre-survey (if undertaken) could affect actual behaviour to some extent. In order to mitigate any research effect, a period of least two weeks should be left between the end of the survey period and the waste collection data
10. Materials will need to be accurately specified during the sorting and analysis stage to ensure results are not misleading, e.g. cooked pasta will weigh more than dry pasta because it has absorbed water. When compared to purchasing data, adjustment for cooking may need to be made.
11. Assumptions will need to be made on the effect of particular weather conditions or the season²² on

²⁰ As opposed to inedible fractions including bones and some inedible skins

²¹ A random sampling plan in which the population is subdivided into groups called clusters so that there is small variability within clusters and large variability between clusters.

results. For example the types of foods available and eaten or the rate of spoilage may differ according to the weather, and the extent to which people eat at home will differ in holiday periods.

Food waste diary

Food waste diaries enable researchers to determine quantities, disposal routes and reasons for disposal. This includes disposal to waste streams that are hard to measure from compositional analysis (e.g. what is poured down the kitchen sink, home composted or fed to animals).

Diary research is able to obtain approximate estimates for quantities of food waste, but appears to suffer from under-reporting. For instance, analysis of food waste diaries and compositional analysis in 2007 in the UK suggests the diaries were under-reporting by around 40%.²³ The degree of under-reporting appears to be dependent on many factors, including type of food, number of people in the household, length of the research and design of the diary.

It is suggested that each household is surveyed before and after the diary research using a questionnaire on attitudes, stated behaviours, demography etc.

In addition to under-reporting, diaries may also influence people's behaviour. Therefore any estimates obtained need to be treated with caution. The degree of under-reporting, and the extent to which this can be quantified and corrected may be investigated at the analysis stage (for example through post-diary surveys).

Project steps

1. Design a suitable sampling regime.
2. Develop survey and diary materials (see below).
3. Recruit householders to participate in the diary research.
4. Conduct a telephone survey with the diarists three weeks prior to the diary completion to gather contextual information about their household, their attitudes and behaviours around food.
5. Diary fieldwork: between one and two weeks in which households complete the diary.
6. Post-diary questionnaire: a telephone interview with the diarists after diary completion. The main purpose of this will be to identify any shifts in the baselines recorded from the pre-diary questionnaire and to understand how respondents now view different food and drink waste issues.

Things to consider:

1. The sample needs to include at least a few hundred households.
2. Sampling of households (e.g. by location - rural or urban - and social strata), local authorities and waste collection rounds needs to reflect the overall geographic region of study, for example be nationally representative if that is the aim.
3. Any information collected about the householder should be treated as strictly confidential.
4. Which member of the household will be invited to participate in the diary (and both surveys, if undertaken) e.g. adults who are either solely or mainly responsible for food shopping or food preparation.

²² For many studies, it is necessary to link food waste to individual (yet anonymous) households to help establish the link between demographic information and waste. This means that households for which waste cannot be identified (in a shared bin or waste receptacle) may have to be omitted from the research. Omission of flats will be partially counteracted by weighting of the calculations, which takes into account the fact that flats generally have fewer occupants than houses. However, weighting does not take into account any other differences between flats and houses that affect food and drink waste generation.

²² A review of single-phase data from the Defra WR0119 project indicates that, in the UK, there is limited seasonal variation in food waste, though with slightly higher arisings in autumn.

²³ MSc thesis "To what extent are quantifications of the level of household food waste from a seven-day, self-recorded diary method comparable with those from a compositional analysis method?", Høj, S., University of South Australia, available from WRAP on request.

5. It is important to recognise that a survey (questionnaire) of waste disposal behaviour could affect actual behaviour to some extent. In order to mitigate any research effect, a period of at least two weeks should be left between the end of the survey period and the start of the diary period.
6. To help householders complete the diary accurately, a pack could be provided containing a professionally printed diary that includes full instructions, pen, self-addressed envelope to return the diary, fridge/bin magnet (reminding diarists of daily completion), and measuring jugs/spoons.
7. There may be benefits to starting the diary week mid-week, as there may be some level of respondent drop-off as time passes and it will be important to capture weekend vs. weekday data.
8. Throughout the fieldwork, it is suggested the researcher maintains regular contact (telephone, email and text) with each household to resolve any issues, and encourage participation and full, accurate completion of the diary.
9. The act of weighing / recording may in itself also reduce waste.
10. Assumptions will need to be made relating to the effect of particular weather conditions or the season. For example, the types of foods available and eaten or the rate of spoilage may differ according to the weather, and the extent to which people eat at home will differ in holiday periods.
11. Households that take part in the full research programme (diary and surveys) could be offered a financial incentive.
12. It is suggested a small-scale pilot is conducted beforehand. This will inform the development of the final version of the diary and questionnaire.

Local authority or municipality synthesis

A local authority or municipality (LAM) synthesis is a method for collating waste composition analyses performed by local authorities.

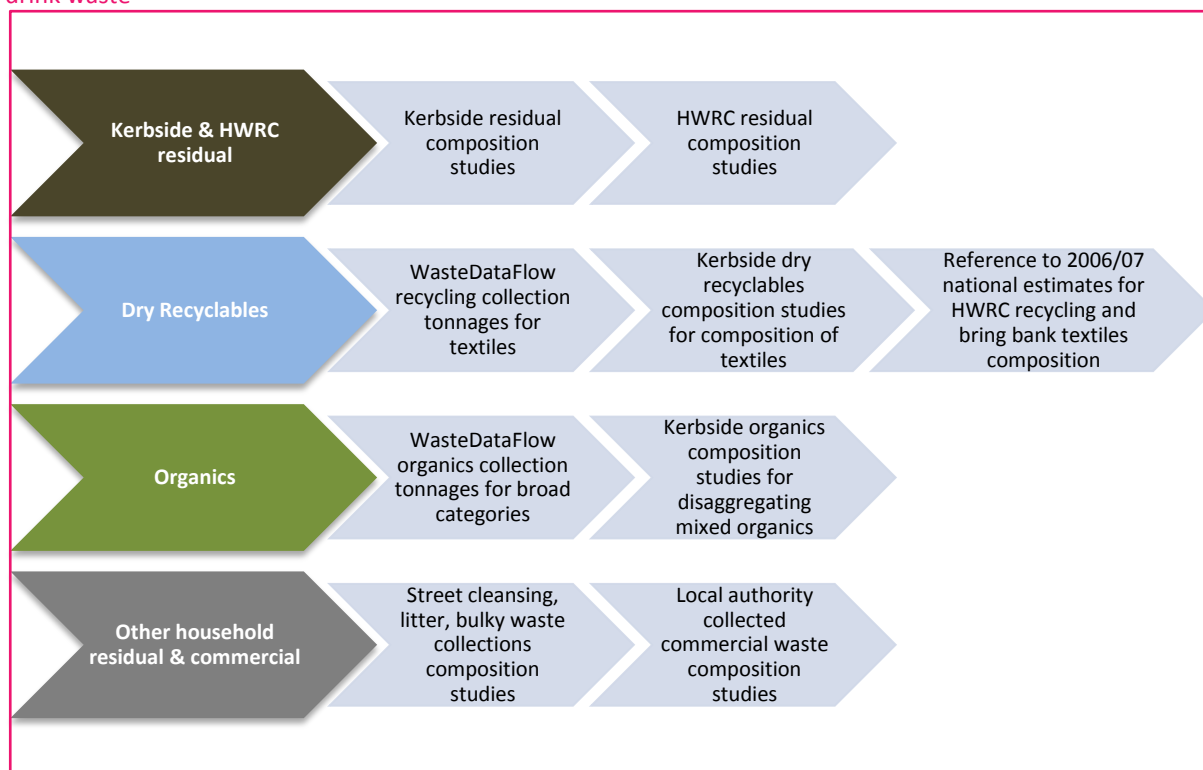
In many countries, local and regional governments will commission studies to examine the waste they collect (or is collected on their behalf by waste contractors). These studies classify the waste into different materials, usually between 15 and 40 depending on the detail required and the amount to be sorted. Food waste is usually one of these categories and sometimes this is further subdivided into, for example, home compostable/non-home-compostable, or packaged/non-packaged.

A LAM synthesis study is a secondary piece of research that collates information from a large number of composition analyses (primary research). These are combined to obtain estimates of food over a greater geographic area (usually a country). They also have the advantage of greatly decreasing the confidence intervals around estimates – effectively by increasing the sample size.

Many LAM synthesis studies combine composition analysis data with waste-monitoring data from local authorities. For instance, in the UK, all local authorities must record the amount of waste collected from households and submit it to the WasteDataFlow system.²⁴ This information includes quantities for individual waste streams and materials. Once checked, the data are published and can be used in these synthesis studies, often negating the need for all waste streams to be sampled. For instance, local authorities which have separate food waste collections will record the amount in Waste Data Flow and therefore do not need further sampling to determine the quantity of waste.

²⁴ www.wastedataflow.org

Figure 6 Overview of methodologies used in the UK in WasteDataFlow, for measuring household food and drink waste²⁵



The generation of food waste in the home can be thought of as a complex interplay between food purchased, people’s behaviour and their lifestyle, each of which is influenced by a large number of factors.

Furthermore, measuring the amount of food waste generated in the home can be difficult to achieve for several reasons, the key being that food is disposed of via several different routes and therefore several workstreams must be followed to estimate all waste arising (Table 2).

Table 2 Data sources used to estimate household food waste arisings by WRAP

Objective of Study Disposal route	Amount of food waste	Type of food waste	Reason for waste
Residual waste Council food waste collection (Inc. mixed with garden waste)	Local authority synthesis	Detailed compositional analysis	Kitchen diary
Kitchen sink Home composted Fed to animals	Kitchen diary	Kitchen diary	Kitchen diary

Source: Dr Tom Quested, WRAP

²⁵ HWRC stands for Household Waste Recycling Centre. Kerbside collections are household waste collected by local authorities from outside residences on the side of streets.

LAM synthesis research will have the largest coverage of composition analyses (and therefore the most accurate estimates), but is unlikely to have sufficient detail on the types of food and drink wasted. This will be supplied by detailed composition analysis, focusing on different types of food waste. However, composition analysis is a poor research method for determining why food is thrown away – it is often not possible to tell why food is in the bin just by examining the waste. The reasons why food is wasted will be supplied by the kitchen diary research. It is not possible or practical to use composition analysis to analyse material poured down the kitchen sink, home composted or fed to animals. Therefore, these estimates will also come from kitchen diary research.

Ethnographic research

Ethnographic studies involve observation and discussion of food- and waste-related practices in the environment in which they occur. This can include in-home interviews or discussion, accompanied shops, and discussions around the contents of a fridge. These provide very detailed understanding of food waste behaviours and some of the underlying reasons why food is thrown away. However, they are rarely suitable to quantify household food waste arisings, as the number of households researched is usually small (usually much less than fifty). It also has the potential to suffer from the research effect (i.e. the researcher influencing behaviour and quantities of waste produced).

Also similar in scope is ‘plate examination’ research. This method involves examining what people are throwing away from their plates (and often what is put on their plates in the first place). It is typically used in hospitality and catering settings, but can also be applied in the home. It enables researchers to understand waste arising at a specific point in time – after serving – but does not give an overview of all waste in the home or dining venue. It also has the potential to suffer from the research effect.

Surveying consumers

The two main ways in which surveys might be used to estimate waste arisings are:

1. Directly asking respondents how much they think they waste; and
2. Estimating the potential trend in household waste arisings by analysing responses to a suite of behavioural questions.

A number of different forms of question can be asked to elicit levels of food waste. Important considerations are:

- The time period over which the estimate is being made;
- Whether the estimate is being made for an actual period of time (e.g. last week) or a typical or average period of time (e.g. ‘in a normal week’);
- The units of estimation (monetary, weight, volumetric or equivalent, such as shopping bags); and
- The level of disaggregation of food waste – whether asking about total quantities, types of food and drink, the preparation state of the waste, the reasons for the waste, etc.

Secondary data analysis

Secondary data analysis is the use of data collected by someone else for some other purpose. In this case, the researcher poses questions that are answered through the analysis of a data set that they were not involved in collecting. In determining food waste in the home, some examples of using secondary data include the following:

- Using national consumption studies to understand how much food is consumed (compared to how much is purchased; the difference is assumed to be the amount of waste). This consumption data is often obtained from diary-keeping research.
- Using purchase data, which may come from governments (trade or tax data, diary research), market research companies, or grocery trade bodies.
- BMI (body mass index) data to help understand consumption levels. This data could come from government/academic research projects and/or organisations like the World Health Organisation²⁶.

When using secondary data, it is important for the researcher to become familiar with the data set, including how the data was collected, what the response categories are for each question, whether or not weights need to be applied during the analysis, whether or not clusters or stratification need to be accounted for, who the population of study was, etc.²⁷

Understanding and tackling household food waste behaviours

a. Identify why households waste food and drink

Conduct research to:

- Determine why food is wasted (according to different types of consumer/demographic and considering gender, identifying different needs within these demographics and genders);
- Establish what is available to consumers where they buy their food and in their homes (e.g. types of food available, tools, white goods (e.g. freezers), guidance etc.);
- Understand social trends which may impact on waste, e.g. retail style (large supermarkets, smaller convenience stores, markets etc.), where people buy food;
- Understand awareness of food waste as an issue among consumers;
- Understand awareness of how much food consumers think they waste;
- Identify what would motivate them to do more, what would hinder them; and
- Identify who would they trust or like to get information and guidance from.

The guidance on mapping and measurement in Module 1 (Section 1.2) also contains extensive social marketing research methods.

b. Identify barriers and opportunities to preventing and reducing household food and drink waste

Analyse the information you have gathered to identify barriers and opportunities, and then to help inform your strategy.

Examples of barriers could be a lack of availability of appropriate pack sizes (e.g. bread, bagged salads etc.), resulting in consumers buying more than they need, householders not making effective use of the fridge and freezer and therefore throwing edible food away, or the different access people have to food retail e.g. time and transport available to shop.

Figure 7 below highlights the wide range of reasons that households in the UK waste food and drink. For example, research found that many UK consumers did not know how to keep food at its best until needed, with only 26% of households storing fruit in the fridge even though that will help it last up to two weeks longer.

²⁶ <http://apps.who.int/bmi/>

²⁷ This section draws heavily on a report written by Sophie Eastal and Tom Quested at WRAP as part of the FUSIONS project www.eu-fusions.org

Figure 7 Examples of why UK households waste food and drink

Planning	Buying	Storage	Preparation	Use
<u>Lack of planning</u> Meal planning Pre-shop checking Making a list	<u>Buying more than is needed</u> Sticking to a list Pack sizes/ amounts Buying on offer	<u>Sub-optimal storage</u> Location Fridge temperature Use of packaging Use of the freezer	<u>Cooking too much</u> Portioning	<u>Not using what is bought/made</u> Use of leftovers Use of date labels Not liking what is made (children)

- Lack of awareness of how much food is being wasted (habit)
- Lack of awareness of the benefits of tackling food waste (personal)
- Use of separate food waste collections / home composting

These trends can inform strategy and can also provide insights into the likelihood of food being wasted. Some trend information is illustrated in the example box below.

Example 14

TRENDS AFFECTING FOOD WASTE ARISING

WRAP research in the UK showed that those in single households waste almost twice as much per capita as others, but larger households waste more than smaller ones, while those that shop more frequently may waste less. Key influencing trends found in the UK are shown below.



Demographic trends

- More people and more households
- Smaller households - less space per household
- Ageing population
- Increased affluence



Lifestyle trends

- Convenience, convenience...
- 24/7 shopping
- More unplanned shopping trips
- Routine shop still key for the majority

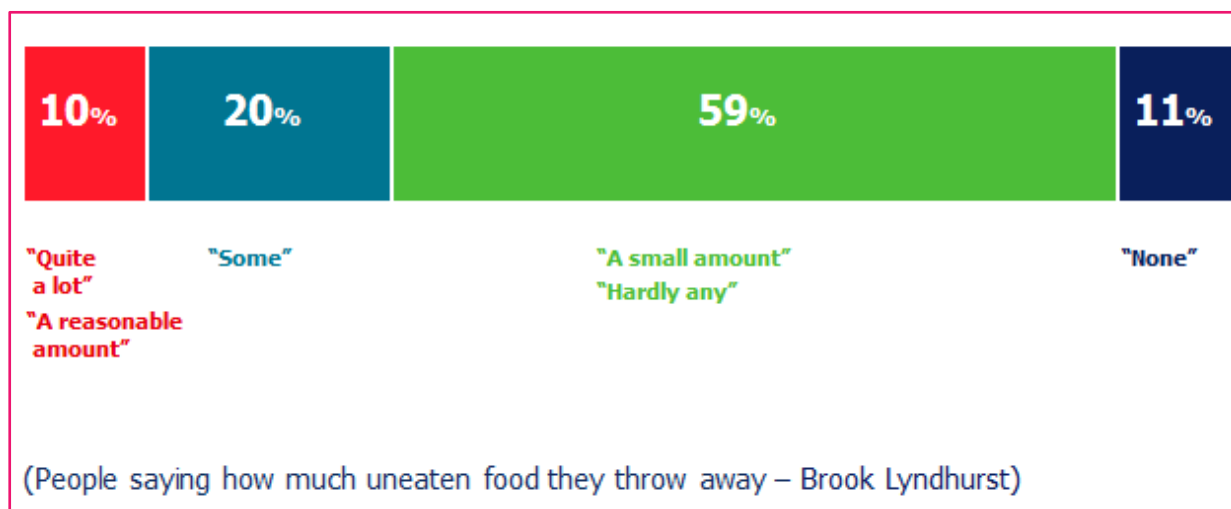


Food trends

- Spending on food falling as a proportion of total income
- More fresh and chilled food– shorter shelf life
- More choice
- More healthy options

Establishing levels of awareness of food waste as an issue and awareness of how much food consumers think they waste allows decisions to be made on how to prevent and reduce household food and drink waste. It may be that household and consumer awareness and acceptance of food waste as an issue is limited and these are issues that any engagement strategy should seek to address. For example, research in some countries showed that this knowledge and acceptance can be very low, as illustrated in Figure 8 below.

Figure 8 The disconnect between what people think they throw away and the actual quantity of food and drink waste (UK)



Social marketing research will help you to identify not only what would motivate households and consumers to do more but also the barriers. Some findings could be as follows:

- Reducing food waste is not one behaviour but many.
- Reducing food and drink waste involves the behaviour and responsibility of all individuals regardless of demographic or gender.
- Behaviour in this area cannot be predicted from our environmental attitudes.
- It cannot be assumed that prevention is the next "natural step" from recycling.
- A sense of powerlessness – "what difference can just I make on my own?"
- Apathy – lack of interest – "why should I bother?"
- Someone else's responsibility – "it's the supermarkets' fault!"
- Inconvenience – planning/making lists – "I don't have time!"
- Lack of visibility of action – "why should I if no one else does?!"
- There is an inherent dislike of wasting good food.

Once awareness is raised, different benefits motivate different groups of consumers (e.g. financial, environmental).

c. Use the information you have gathered to develop a strategy for household food and drink waste prevention

Using the information you have gathered and analysed, you can now start to develop your strategy. Tools you can use to do this include brainstorming, identifying links and relationships and identifying key organisations.

You should consider two key components in your initial strategy:

- A household / consumer engagement campaign; and
- Changes to products, packaging and labelling.

The strategy will be informed by a number of issues, and could consider prioritising activity based on the proportion of specific foods and drinks wasted, efficacy of action, the financial value of specific food and drink waste, environmental impacts (e.g. water footprint) or social impacts (e.g. food security, nutrients and diets).

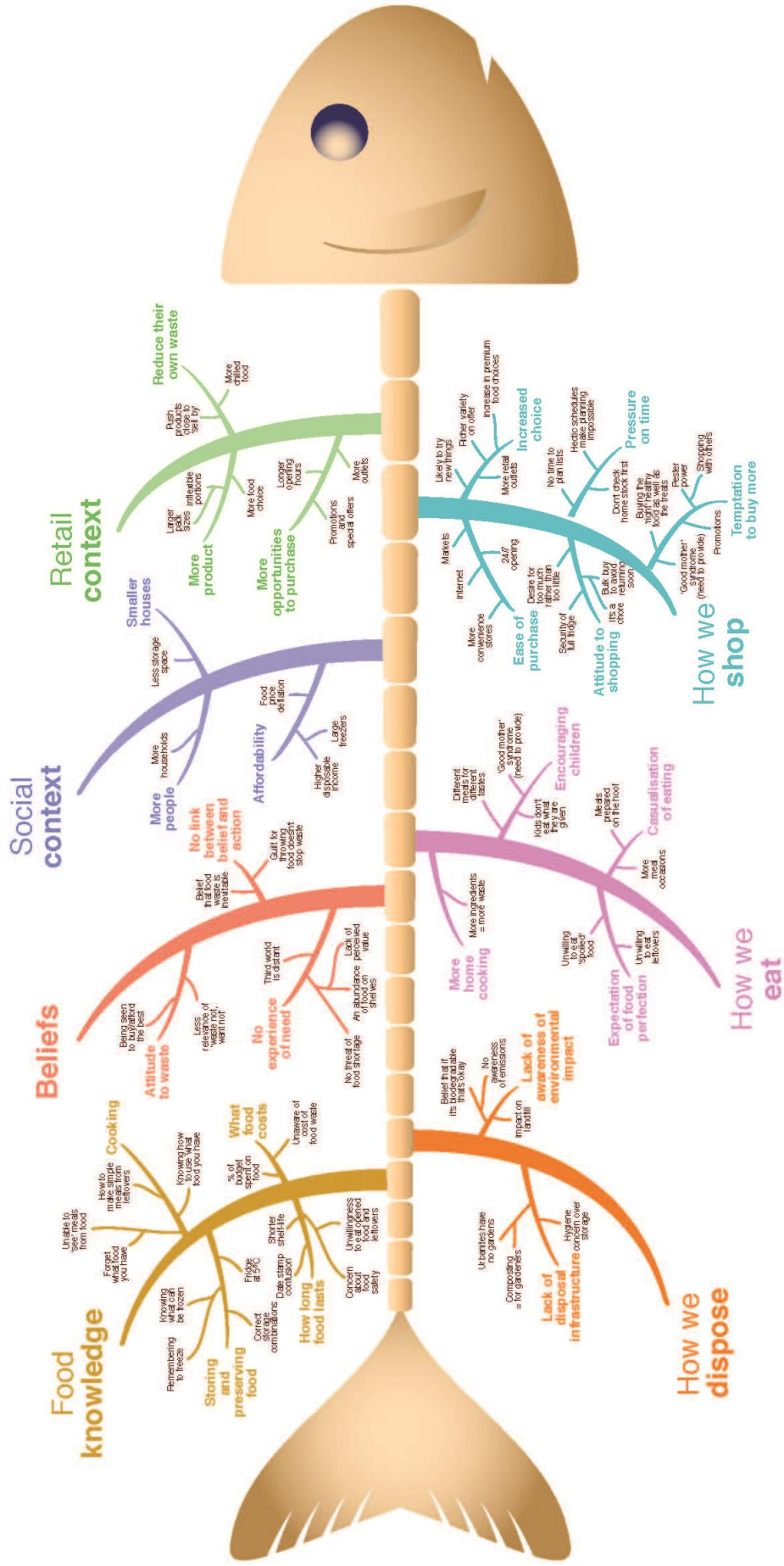
Early wins to raise profile and awareness are key, so you can use your initial findings as follows:

- Media and stakeholder work on the amounts and value of food waste.
- Inform discussions with potential funders and partners.
- Inform discussions with communications experts and agencies.

To help structure your discussions and strategy development, you can collate the information you have gathered into helpful graphics.

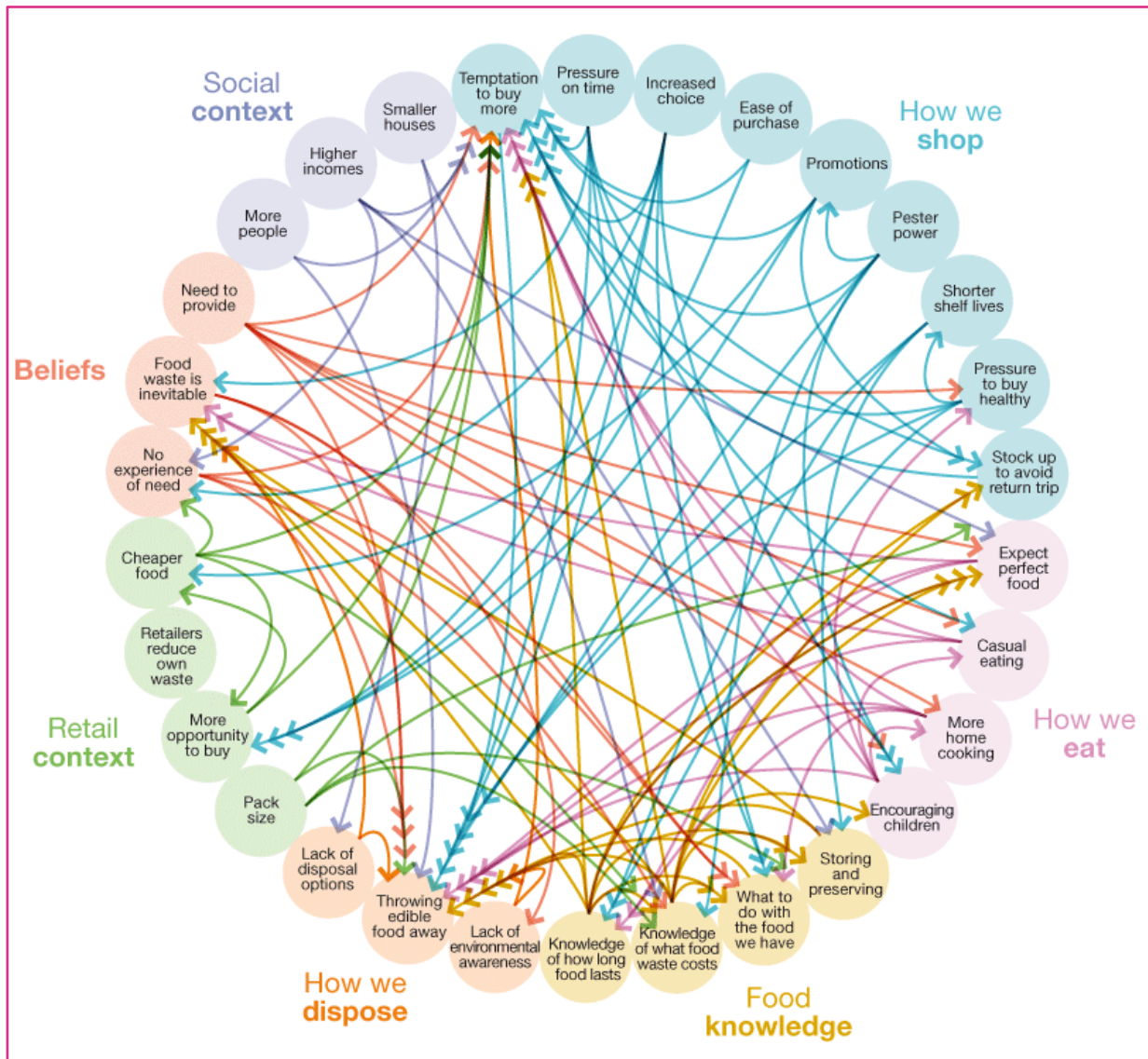
The graphic in Figure 9 shows an example from research identifying the breadth of reasons why households and consumers waste food and drink in the UK

Figure 9 Diagram illustrating household and consumer behaviours and trends in the UK



You can use relationship diagrams, such as the one shown in Figure 10 - an example from research conducted to identify the breadth of reasons and complex interactions between factors relating to why households waste food and drink.

Figure 10 Diagram illustrating relationships between causes of household food and drink waste in the UK



You should also analyse how consumers feel about food and drink waste, so you can determine what actions will resonate with people.

You can summarise your findings in a diagram that shows the results of your investigations into what influences the quantity of food and drink waste arising from households.

Using this process:

- Decide whether a new “central” awareness-raising or communications campaign is needed, or whether there are existing routes that can be used (for example, around healthy eating or food safety);
- Decide what communication channels are available and will be used, and when;
- Decide what barriers may exist to changes to products, packaging and labelling; and
- Decide how your strategy fits with related messaging around health, waste collection and treatment, climate change – i.e. where consumers may already be receiving messages about food or other key behaviours.

At this stage you should then:

- Agree a communications strategy based on raising awareness (initially) and then key messages to support waste prevention behaviour change (once awareness has started to rise);
- Identify what support and guidance is needed to provide to households and consumers to adopt behaviours which value food and drink and reduce waste;
- Identify what changes to products, packaging and labelling will support these behaviours and how businesses can make these changes; and
- Identify which organisations can influence consumer behaviour via products and the retail environment, and via the availability of information.

Example 15

HOUSEHOLD FOOD WASTE PREVENTION ENGAGEMENT STRATEGY DEVELOPMENT IN THE UK

This process was developed in the UK to identify key findings from the quantitative and social marketing research and inform the development of a household and consumer food and drink waste prevention strategy. The key findings, which may be relevant to other countries or regions, were as follows:

- Awareness of food waste is low. People feel that food waste is just “something that happens to them” and, even when they recognise that food waste is a problem, they do not think that they themselves are actually wasting very much.
- Reducing food waste is not the message that will gain traction and influence behaviours that reduce food waste. People need positive encouragement if they are to take action. So:
 - Use simple messages;
 - Make it easy for them;
 - Promote valuing your food, not reducing your waste (in the UK the messages were buy the right amount, store food to keep it at its best, use up what you buy); and
 - Show them the benefit (in the UK the focus was financial – the average family could be £680 better off every year).
- Understand that awareness of food waste must be established and maintained – it is a message that will need repeating time and time again and in a variety of ways to establish, grow and maintain awareness and then action.
- Food waste requires collective action and everyone playing their part – consumers will not change if they feel they are acting alone, do not feel they are being helped or that the retailers are not doing their “fair share”.

The strategy was based around common messages, tools and guidance to be developed and delivered in four key ways:

- Through a consumer awareness and engagement campaign – working with partners and the media – Love Food Hate Waste (LFHW);
- By encouraging retailers to use LFHW to communicate to their customers;
- By working with retailers and brands to make changes to their products, packaging and labelling systems to help households and consumers waste less food and drink; and
- By working with a network of partners to advise households and consumers on relevant aspects of food behaviours, e.g. dates, storage and freezing, to ensure consistency and credibility.

The strategy envisaged a campaign lasting between 5 and 10 years, evolving over time. Some evidence is needed ahead of initial engagement work, but then evidence gathering and engagement proceed in parallel, e.g. early evidence helps identify the scale of problems and key motivations, but then other evidence helps target subsequent engagement and changes to products, packaging and labelling work over the course of many years.

3.2.2. Step 2 – Establish a baseline and set a target

At this stage, with the data and strategy you have developed through Step 1, you should set a time-bound and quantified baseline for household food waste, from which to measure, and determine a challenging but achievable target. It is helpful to have a baseline measured in tonnes, from which you can measure change.

Target-setting needs to take into account a number of factors, which you can scope, using information from Modules 1 and Module 2:

- How much waste is generated and what is the potential for reduction;
- Are there different social patterns within demographics and between men and women that you have to consider and target?
- What your strategy is and who it targets;
- How easy it is to engage households and consumers;
- Whether there is an alternative course of action being proposed (e.g. legislation or regulation);
- What might happen to levels household food and drink waste due to social, economic and demographic changes (e.g. might it increase as society becomes more affluent, or are food costs going up and thus waste may decrease?);
- How much money are you trying to save (e.g. what is the benefit to your country or region of reducing household food and drink waste? Will it cut collection and waste management costs?); and
- What funds you have to deliver the strategy.
- Use this information to set a SMART (Specific, Measurable, Actionable, Realistic and Time-bound) target. For example a target may take the form of, 'to reduce household food and drink waste in country X by 5% by 2020, from a 2014 baseline'. This need not be a legally binding target, simply an objective to try and achieve.

3.2.3. Step 3 – Develop evidence-based guidance

This step helps you to develop guidance i) to develop a household and consumer engagement campaign and ii) to change products and labelling.

a. Developing a household and consumer engagement campaign

In developing your engagement campaign, you should develop simple key messages to promote and communicate, and also identify what tools and guidance you wish to make available to support these messages. For example, your messages may be around how much money households can save, and a tool could be recipes for using up leftovers/forgotten foods, or measuring guides to help people cook the right amount of food. It is unlikely that you will be able to develop all the material and collateral you need at once, which may in any case change and develop over a number of years as more evidence becomes available and as your engagement strategy progresses.

Decide who you want to target – evaluate your audience and ensure your messages and approach are fit-for-purpose and appeal to a range of people, of both genders. Your approach may include:

- A national campaign;
- Local and national partners (public, e.g. local authorities, and private, e.g. retailers);
- Tools and guidance; and
- Peer-to-peer engagement (developing 'train the trainer' materials).

Example 16

SAVE FOOD CUT WASTE IN SINGAPORE

Singapore imports about 90 per cent of its food, consequently having limited control over the food that is wasted during production and transportation. There is also risk of food insecurity if supply chains are vulnerable. In this context, raising awareness of the real value of food, providing knowledge on handling food properly as well as preventing waste of edible food is extremely important.

Save Food Cut Waste is a movement launched in 2012, with the main objective to increase public awareness and action, as well as help nudge businesses and the government towards implementing new technologies and policies. Through the Save Food Cut Waste website, information is provided about the environmental and social impacts of food waste, and local solutions are given on how to reduce, redistribute and recycle food waste. Save Food Cut Waste is co-organised by Green Future Solutions, a sustainability consulting company, and ECO Singapore, which is an environmental body advocating sustainable lifestyle for youth.

The National Environment Agency (NEA) are also working on reducing and minimising food waste in the commercial and industrial sectors by raising awareness and educate the management on the 3Rs (Reduce, Reuse and Recycle). Furthermore, NEA has developed various guidebooks to help businesses reduce waste, including food waste and has currently formed a workgroup, comprising representatives from various agencies and relevant stakeholders to look into food wastage reduction as one of the measures to enhance food security (including raising public awareness on food wastage reduction) NB this is example is also useful in relation to Module 4.

Tips are provided under different categories covering a broad range of solutions aiming at reaching out to individuals and households on how to deal with waste on a daily basis.

For example, “Cook and Eat” gives tips on how to store and handle food, as well as how to cook and order just enough, to minimize any potential waste. “Plan What to Buy” encourages people to make a shopping-list and plan a weekly menu. It also deals with handling and storing food in the right way, otherwise a big contributor to food waste in households.. Since the launch, there have been a total of 2500 visitors per month on their website. One of the biggest challenges of the movement is to find volunteers and companies that use good practices in managing food waste to use as good examples on the website.

In 2014 the movement will enter its second phase, focusing on businesses who wish to cut their food waste through better practices. Businesses will be able to gather information on how to implement proper food management policies and to improve distribution and storage, similarly through the website.

Looking into the future, the Save Food Cut Waste movement aims at launching a third phase that will focus on outreach to schools and closely working with various partners and food companies. As the “Expert Working Group Meeting on Food Wastage in Southeast Asia” mentioned in its report 2013, ecotrophology, which is an interdisciplinary approach towards including physiological, economic and technological principles of healthy nutrition and practical implications, can become a valuable part of school curriculums.*

*<http://www.savefoodcutwaste.com>

Eugene Tay (Founder and Director at Green Future Solutions - <http://www.greenfuture.sg/>)

<http://www.rsis.edu.sg/nts/html-newsletter/report/pdf/Food%20wastage%20meeting.pdf>

<http://app.mnd.gov.sg/Newsroom/NewsPage.aspx?ID=3710&category=Speech&year=2012&RA1&RA2&RA3>

Jun Gang Tein (Waste and Resource Management Department, [National Environment Agency](http://app2.nea.gov.sg/)): <http://app2.nea.gov.sg/>

Map your needs against any existing guidance, information and media material, and determine what can be used or adopted. There is now an increased level of awareness of food waste across the globe, with the launch of Think Eat Save in January 2013. The messages in Think Eat Save can be used to build on in any country. The messages and tools developed in Love Food Hate Waste (LFHW) are complementary to Think Eat Save and can be licensed for use in your country if needed. When developing your national consumer awareness campaign, LFHW can be used to map your results against to see to what extent the messages and tools available can be directly applied or modified to work in your country avoiding the need for costly development. Materials developed by other organisations in your country or region can also be used.

Example

17

RAISING AWARENESS OF FOOD WASTE IN NORWAY

ForMat (meaning ForFood in Norwegian), was initiated by the Confederation of Norwegian Enterprise (NHO), grocery stores and the food industry in Norway, aiming at preventing usable food waste with 25 per cent before the end of 2015. It is a four year collaboration project that started in 2009. ForMat tries to profile themselves at different public events such as the Snowboard World Championship that was held in Oslo, and food festivals, showing what food is wasted (10 kg of bread, 12 kg of fruit and vegetables and so on). Food is served that has gone beyond its "best before" date, like waffles, soup or yoghurt, and brochures are handed out about how to take better care of food.

ForMat lectures in seminars for companies that work with food or packaging, and also at a lot of schools - trying to make food waste as a priority in food related courses in both elementary- and high school.

Almost all food products in Norway are today labelled with an expiration date, thanks to the outreach and engagement of ForMat.

Examples of communication and engagement materials and collateral that have been used successfully around the world, by businesses and other organisations, are illustrated below.

Figure 11 Examples of communication material developed in Think Eat Save



Figure 12 Examples of communication material developed in Love Food Hate Waste



Examples of guidance and tools successfully used around the world, with businesses and other organisations, include:

- Shopping list and meal-planning guidance;
- Information on how to store different foods in the home, to keep them at their best;
- Recipes that help use up leftovers of frequently-wasted food and drink;
- Information on measuring portion sizes;
- Information on what might be frozen to eat at a later date; and
- Smartphone 'apps'.

b. Develop guidance for changes to products, packaging and labelling

Using the evidence and information you gathered already, conduct complementary research projects to identify what changes to products, packaging and labelling will help households and consumers prevent and reduce food and drink waste. The objective is to determine simple, evidence-based changes that align with messages and material developed for your household and consumer food and drink waste prevention engagement strategy. Key to success is for consumers to receive consistent, simple messages, and for them to experience and see that the food and drink businesses are ‘playing their part’ and helping them, for example, through products, packaging and labelling. If this is not addressed, it can be a barrier to the success of the engagement campaign. It is unlikely that you will be able to develop all the evidence and guidance you need at once. It may in any case change and develop over a number of years as more evidence becomes available and the more work you do in the sector.

The guidance you produce could be around:

- Type and details of dates displayed on packaging;
- Storage guidance (both presence of, and detail);
- Freezing instructions (both presence of, and detail);
- Defrosting instructions (both presence of, and detail);
- Pack size, features and format;
- Recipes, tips and information;
- Portion guidance;
- Price and promotions;
- Presence of symbols;
- Presence of on-pack ‘flash’ labelling; and
- Presence of on-pack tips on waste avoidance or use of leftovers.

3.2.4. Step 4 – Take action to prevent and reduce food and drink waste

This step helps you to use the information from Steps 1 and 2 and the guidance you develop in Step 3 to deliver actions, which will support the prevention and reduction of household food and drink waste. In practice, this step should be undertaken in parallel with Step 3.

a. Delivering a household and consumer engagement campaign

At this stage, you should scope and plan a large-scale consumer communication campaign, to encourage behaviours that prevent food waste. This works best at national level, but can begin at regional level for extension nationally if convenient.

Establish and develop working partnerships with organisations and individuals who can reflect messages in the national media. These partners should be those that consumers trust and who can influence consumers. These can include local authorities, other public-sector organisations and businesses such as retailers.

Example**18****MULTIPLYING MESSAGES: HIGH PROFILE CAMPAIGNERS**

Celebrities have been used to act as spokespeople in a number of countries to share messages on food waste prevention that resonate with target audiences. In Denmark for example, Bo Jacobsen spoke out about situating food waste prevention behaviours within a good food culture, at the 2014 United Against Food Waste awareness-raising event. Supermodel Gisele Bündchen has shared food prevention tips in various US media as part of the Think Eat Save campaign. A related campaign in the UK on preventing fish discards, led by Hugh Fearnley-Whittingstall, has been particularly successful, joined by high profile supporters such as chef Pierre Sang Boyer in France, making use of strong cultural interest in cooking television at the present time.

It is nevertheless important to note that peer-to-peer messages are particularly powerful, working via 'people like me': active partners who have bought into the messages at a local level.

Messages need to be positive and enabling, rather than shocking, negative, playing on guilt or reprimanding in nature, as it is human behaviour to respond better to positive messages. There are three core elements needed:

- Facts – to raise awareness and to get buy-in to act;
- Guidance – to enable people to have the tools and information they need to act; and
- Motivations – to make people want to use guidance to act.

Example**19****CONSUMER AWARENESS CAMPAIGN DEVELOPMENT**

An engagement strategy might start with:

- Raising awareness of the amount of food thrown away – since most consumers do not consider that they waste food, while in actual fact all consumers do; and
- Focusing on low-hanging fruit, for example 'committed green middle-class shoppers' as in the UK, to try to encourage them to waste less food. Starting this way to get some 'real life examples', leading to peer-to-peer adoption of Love Food Hate Waste guidance, has proved to be one of the most effective ways to get action from consumers.

This was developed to:

- Focus on solutions to food waste; and
- Prioritise high food-wasters and a financial saving message.

The principle and name of the Love Food Hate Waste campaign in the UK was established to embody this tone of loving and valuing food, rather than wanting to focus on reducing food waste. Reducing food waste is the goal, but not necessarily the message which will work.

Example**20****FOOD WASTE AWARENESS IN SWITZERLAND**

As in most developed countries, in Switzerland, most food, up to 40%, is wasted at the consumer level. Therefore the Swiss Government considers awareness-raising among the population as key towards a minimization of food waste.

An exhibition on food waste and loss was developed and presented for the first time on the occasion of World Food Day 2012 in Berne. In 2013 the exhibition was presented in different cities all over Switzerland.

The exhibition offers a global perspective on the issue of food waste by explaining the global food situation and the environmental impacts of food waste. The most important features of the exhibition are specific advice and tips to consumers on how to prevent food waste and to show them how much money they can save. Advice is given concerning the storage of food, the expiry dates and their meaning, recipes for leftovers and how to plan one's purchases. Banana cakes as a give-away made with brown bananas demonstrated that fruit and vegetables don't need perfect looks in order to taste delicious.

In addition school classes were invited to guided tours in order to reach out to future consumers. Booklets which were handed out during the exhibition are also distributed to companies and teachers to achieve a multiplier effect.

The exhibition succeeded in attracting considerable public and media attention. Food waste is today a well-known and much debated topic in Switzerland.

For more information see (only in French/German/Italian):

<http://www.blw.admin.ch/dienstleistungen/00020/01495/index.html?lang=fr>

Example 21

STOP WASTING FOOD MOVEMENT DENMARK (STOP SPILD AF MAD)

Since its launch in 2008, Stop Wasting Food movement Denmark (Stop Spild Af Mad) has grown to be Denmark's largest consumer movement NGO, constructively shaping public opinion in its drive to prevent food waste.

Objectives: Increase public awareness by organizing campaigns, mobilizing the media, and encouraging discussion and debate.

Outreach: Danish consumers, Members of the Danish Parliament, the European Parliament, Denmark's former Prime Minister Poul Nyrup Rasmussen and European Commissioner Connie Hedegaard, as well as leading Danish food personalities and the private sector.

Achieved food waste reduction results to date:

Consumers: In 2012, 50% of Denmark's population has reduced their food waste.

Private sector collaborations:

- The retail chain Rema 1000 was inspired to eliminate quantity discounts in the chain's more than 200 Danish stores
- Coop Denmark and Arla Foods were mobilized to take concrete actions.
- Danish Unilever Food Solutions introduced 'doggy bags' in restaurants.
- Multi-stakeholder "United Against Food Waste" events were organised

Education:

- Launched the educational campaign "Stop Food Waste" (Stop Madspild) for Danish schools in collaboration with The Danish Union of Teachers.
- Initiated "What is Food Waste" campaign for educating consumers about food waste with advice from Danish top food experts.

Food donations:

- Initiated "From Food Waste to Food Help" project - a bridge between donors of surplus food and local charities for homeless people.
- Publications and articles:
- Selina Juul published an award winning Leftovers Cookbook "Stop spild af mad - en koge bog med mere" with recipes from top celebrity chefs.

Partnerships:

- Stop Wasting Food movement is an official Partner of the SAVE FOOD: Global Initiative on food loss and food waste reduction, its FAO-UNEP campaign Think Eat Save, and of the EU project FUSIONS.

Main online reference: <http://www.stopspildafmad.dk/inenglish.html>

This stage should last (at least) three years. These timescales are required in order to:

- Launch and sustain a national awareness campaign;
- Establish, build up and maintain relationships with partners to support delivery (both public sector and businesses); and
- Develop and promote tools and guidance to help consumers reduce waste in the long-term.

The guidance developed and communicated should encourage key behaviours that will reduce food waste.

A high-profile launch and sustained promotion of a nationwide food waste awareness campaign is essential. Common branding and messages supported across the country are key to success, as consumers need exposure to consistent brand, message and communication.

Not all this communication and engagement needs to be done centrally. Partnership working is central to maximising impact of an awareness campaign and leveraging the biggest change. From the previous stage you will have identified who these partners should be, and you should work to support them with materials and guidance for them to use.

The most effective changes to behaviour through communication of LFHW have come from local, peer-to-peer action. The network of local authority and community group partners has been critical to achieving change. An example from the UK is shown below.

Example 22

REDUCING HOUSEHOLD FOOD WASTE IN AN URBAN REGION – WEST LONDON LOVE FOOD HATE WASTE TRIAL

Target area: West London Waste Authority 601,000 households. Four local partner organisations working with WRAP, October 2012 to March 2013

- The amount of avoidable food waste (food which could once have been eaten) decreased by 14%. Total food waste decreased from 2.6kg per household per week pre-campaign to 2.2kg post-campaign
- For every £1 invested West London Boroughs saved up to £8
- Those households who had seen something about food waste and claimed to be doing something different reduced their avoidable food waste by 43% (a 35% reduction in total food waste)
- Reduction in the amount of avoidable food waste is equivalent to 5,250 tonnes per year for all households in West London.
- West Londoners would have saved £14 million by not wasting this good food and drink and 20,000 tonnes of greenhouse gases would have been prevented

Following a Love Food Hate Waste campaign in West London, avoidable food waste decreased by 14% in just six months.

The reduction in food waste overall could save the Boroughs of West London around £1.3 million pa in disposal costs (including gate fees and landfill tax).

Between October 2012 and March 2013 Recycle for London (RfL) delivered a pan-London Love Food Hate Waste campaign supported by local Borough activity. The Greater London Authority (GLA) and WRAP worked in partnership to deliver the RfL programme, funded by the London Waste and Recycling Board (LWARB).

One of the local campaigns was carried out in the six Boroughs of the West London Waste Authority (WLWA) area.

The full research report can be found at <http://www.wrap.org.uk/content/west-london-food-waste-campaign>

In London alone, an estimated 890,000 tonnes of food is thrown away per year, of which 540,000 tonnes is avoidable. The cost to London Boroughs of reprocessing/disposing of this food waste is estimated at over £50 million per annum. It costs consumers £1.4 billion per year to purchase the food and drink thrown away in London, and generates the equivalent of 2.1 million tonnes of CO₂e.

LFHW and RfL worked alongside Greater London Volunteering to recruit and train volunteer Food Waste Champions in local communities across the city. Volunteers were fully trained in LFHW messaging through WRAP's cascade training programme and supported to cascade messages into their local communities. This enabled the campaign to reach a wider audience and to encourage behaviour change at a local level. Food Waste Champions generated a total of 11,839 volunteer hours across the whole of London, which had an economic value of £185,5142. There are now plans to roll this out with up to a further 10 UK cities.

The campaign

Activity in West London focused on raising awareness of the issue of food waste locally, offering simple everyday solutions and community engagement to influence relevant behaviours. Activities were planned to amplify the impact of the national and London wide activities. Activities during the campaign period included:

Local radio adverts – radio adverts placed on LBC Radio in January 2013, followed by adverts on Radio Jackie, Hayes FM and Sunrise Radio in March 2013. The minimum reach of these adverts is estimated to be 1.1million people.

Let's Get Cooking Clubs – 28 Let's Get Cooking Clubs were set up across West London, engaging 800 people. The purpose of the Clubs is to provide practical cookery skills and information to enable people to make the most of the food that they buy.

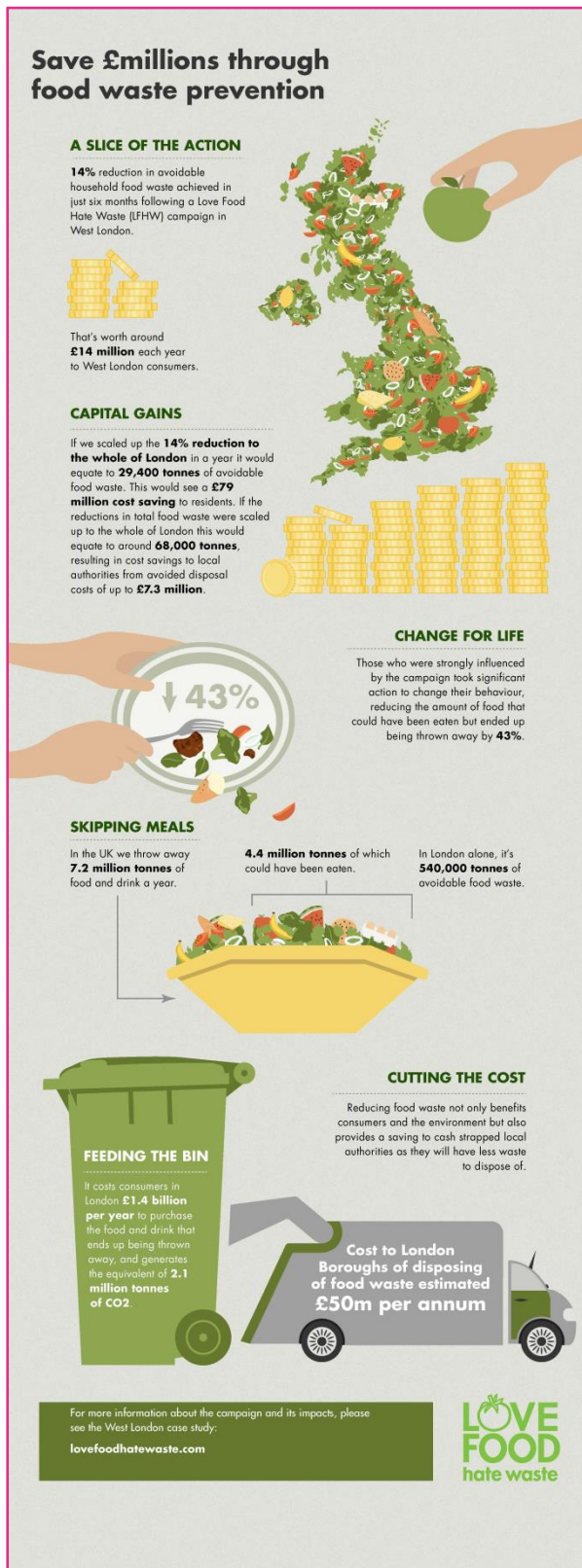
Internal communications – targeting staff within the Boroughs of West London through internal magazines and the intranet at key points throughout the year. This activity took place in Ealing, Hounslow and Harrow, and targeted 9,000 staff members.

Social media – WLWA delivered an on-going programme of social media, communicating directly with residents about LFHW (99 LFHW related tweets were put out by WLWA with 61,859 opportunities to see for WLWA followers and 138,519 retweets).

Local online advertising – LFHW digital adverts included on the websites for local news, linked to the LFHW website to direct people to the national campaign (113,634 page impressions with 609 people clicking on the link and following through to LFHW.com)

Website – the WLWA website included local and targeted information about LFHW including 9 comprehensive articles and a direct link to the national website.

Figure 13 Example of infographics used in engagement campaigns



As discussed in Module 1 and Module 2, it is very important that any strategy, for household or business food and drink waste prevention, links to the wider policy and legislative landscape in the region or country. Awareness campaigns can work well in parallel with food waste management policy, for example. The separate collection of food waste for recycling and recovery is already environmentally preferable to landfilling, but where separate collection is coupled with awareness-raising on food waste prevention, this can be particularly effective. A key challenge in changing behaviour is that most consumers do not think they waste food: confronting them with the food they waste as they separate their food for collection is helpful in overcoming this barrier. This provides a conducive backdrop for both environmental but especially economic messages about the costs of wasting food.

Example 23

RAISING AWARENESS OF CONSUMER FOOD WASTE IN A BUSINESS CONTEXT

In 2013, Bank of America partnered with the United Nations Environment Programme (UNEP) and the Think Eat Save initiative to educate employees about global food waste. The bank chose to focus on this topic because it is something that most people are not aware of and a great opportunity to have a positive impact on the environment, through their internal engagement programme: My Environment.

As part of this partnership, the bank created a global food waste initiative for Earth Day and provided actionable steps employees could take to reduce their food and food packaging waste. This included: buying the right amount of food and storing it properly, planning shopping trips and meals, using what you bought, taking leftovers home from restaurants and eating them, better understanding expiry dates and many tips for reducing packaging waste associated with work lunches. This initiative kicked off with online educational webinars featuring the Think Eat Save team and employees were asked to pledge to eat a “waste less” lunch on Earth Day. In total, the challenge engaged more than 2,500 employees who took the “waste less” lunch pledge and supported ambassadors who hosted more than 60 Waste Less Lunch events across 17 countries.

The momentum from these efforts has continued this year, for example through employees hosting monthly “waste less” lunches at work, and “waste less” meals at home for friends and family.

<http://about.bankofamerica.com/en-us/global-impact/employee-programs.html>

Working with those businesses who can convey messages to consumers and households can also have a significant impact. For example, retailers can include articles, recipes and information in their in-house magazines, websites, recipe cards and in-store advertising. They can often have massive reach, with millions of individuals seeing the information. This also demonstrates to consumers that businesses are supporting them and playing their part – making action in the household more likely. More detail on the role of businesses is given in the following section.

b. Delivering changes to products, packaging and labelling

At this stage, you should plan a programme of technical changes. This stage may last five years. This timescale is required to:

- Develop credible evidence and simple guidance on the specific changes you want to influence; and
- Establish build-up and maintain relationships with partners to support delivery, develop and promote tools and guidance, and work with key influencers to make and embed changes.

When engaging with businesses, it is important to present evidence to key sector bodies who can influence their peers and members. Work with them to develop consistent messages and act to promote the evidence and guidance you develop.

This can be supplemented by work with individual businesses to present the evidence for action, together with simple, credible changes they can make to support consumer food waste prevention.

The role of retailers in consumer food waste prevention

Leading food retailers can dominate markets (five of which command over 80% of grocery sales in the UK for example). Achieving key technical changes on products, packaging and labelling in this case had three main elements:

- As the customer is the single biggest influence on the retailers, showing the retailers evidence from the research proving that consumers are confused about date labels, storage and freezing instructions, that consumers care about food waste a great deal, and that consumers have an expectation that everyone plays their part and expect the retailers to play a significant role.
- Demonstrating that the solutions being proposed can work (you must develop evidence), are simple, and help is available to them.
- Getting buy-in from authoritative organisations, which could otherwise have prevented action. For example in the UK, the Food Standards Agency (a government-funded body) is in charge of food safety and standards. Food safety must not be compromised in any way and, therefore, any strategy must be developed in partnership with whichever body is responsible for food safety.

Only a small number of major businesses (in the UK two to three of the big five retailers) are needed for a critical mass – other competitors will make the changes too, as will businesses across the supply chain.

Example

24

CHANGES TO PRODUCT LABELLING TO HELP CONSUMERS REDUCE WASTE

In 2011, only 3% of pre-packed cheeses carried a 'use by' date in the UK, compared to 25% in 2009. The move towards a 'best before' date enables consumers to eat the product after the date, removes the risk of prosecution, and provides more opportunity for donation of un-sold product to charity.

1. WRAP's Retailer Survey found that the use of 'display until' dates has declined between 2009 and 2011, with 39% of products carrying a 'display until' date in the 2009 sample, falling to less than one third in 2011. Further reductions are on-going and several retailers now have whole categories where no products carry a 'display until' date
2. Using a 'freeze before date mark, defrost and use within 24 hours' label is recommended rather than 'freeze on day of purchase'. A WRAP/Food Standards Agency freezer guidance labelling decision tree has been produced to guide manufacturers. Marks & Spencer, Sainsbury's and Waitrose are all rolling out the new 'freeze before date mark' label.
3. Using a 'freeze before date mark, defrost and use within 24 hours' label is recommended rather than 'freeze on day of purchase'. A WRAP/Food Standards Agency freezer guidance labelling decision tree has been produced to guide manufacturers. Marks & Spencer, Sainsbury's and Waitrose are all rolling out the new 'freeze before data mark' label

NB. THESE CAN BE USED IN STEP 5 AS INDICATORS

3.2.5. Step 5 – Measure, monitor and report consumer food and drink waste prevention and reduction

Due to the complexities around food waste, it is currently not possible to estimate the reduction in food waste from a change in behaviour(s). Several techniques have been developed to help to deal with this complexity of measurement and action and these are covered in this Module.

You should conduct work to measure changes to household food and drink waste arisings. To do this, you can repeat the measurement process used in step 2 and the guidance contained in this section You should use this information to inform your on-going strategy and delivery – feeding back into Steps 1 to 4 and to enable you to report progress.

You can measure and report in three main ways:

- Changes to the quantity (in tonnes) of food and drink waste, and the associated financial and environmental benefits – repeating the methodology in Step 2;
- Changes to products, packaging and labelling as indicators of changes that help support consumer behaviour to prevent and reduce food and drink waste; and
- Changes in household and consumer behaviours as indicators of change.
- Guidance on ways of measuring changes to products, packaging and labelling and changes in consumer and household behaviours is given in this Step.

These three ways can be used together or separately²⁸.

Indicators of behavioural changes

The behavioural scorecard is a tool for tracking behaviour change relating to food waste in the home. It draws together a large amount of information on a number of behaviours, allowing an ‘at-a-glance’ assessment of current behaviours. The scorecard also provides a clear link to more detailed information on individual behaviours. Such an approach was taken in the UK in 2010, where the scorecard was designed through a series of workshops with stakeholders and experts.

A scorecard can be developed via workshops involving key stakeholders. These workshops can clarify the need for a method for monitoring behaviours, in addition to understanding awareness of the issue, attitudes towards it and the quantities of food waste generated from households. They can also demonstrate the wide range of behaviours that can have a positive impact on food waste reduction. The workshops can be used to identify important behaviours that are likely to be applicable to large parts of the population, are legitimate for you and your partners to try to influence, and are likely to have a large impact on food waste quantities.

Questions for each of the identified behaviours can be drafted and then cognitively tested to ensure that they are obtaining information on the behaviours of interest from the vast majority of the respondents. The behavioural questions can also be tested to see if there are differences between responses when administered a) on-line and b) as part of a face-to-face survey.

²⁸ This section draws heavily on a report written by Sophie Eastal and Tom Quedest at WRAP as part of the FUSIONS project www.eu-fusions.org

Possible behaviours to assess in the scorecard are:

1. Meal planning;
2. Cupboard checking;
3. List making;
4. Use of freezer;
5. Storage of opened cheese and meats;
6. Use of fridge to store fruit and vegetables;
7. Use of left-overs;
8. Cooking the right amount; and
9. Use of date labels.

Indicators of technical changes

This work involves collecting a range of data on key product types thought to be representative of their food or drink category. Categories were chosen to reflect those where food wastage is highest. The products used in UK research are shown below.

Food and drink categories used in UK research are:

Product Category

- 1 Sliced white bread
- 2 Plain white rolls
- 3 World breads (plain white pittas, plain tortilla wraps, garlic or garlic and herb naans)
- 4 Standard tomato/original or tomato and herb pasta sauce
- 5 Sliced ham
- 6 Unsmoked back bacon
- 7 Whole, skinless chicken breast fillets (chilled and frozen)
- 8 Fresh potatoes
- 9 Braeburn apples
- 10 Fresh carrots
- 11 Bagged salad; iceberg/mixed salad
- 12 Standard long-grain rice; dry and microwaveable variants
- 13 Dry fusilli pasta
- 14 Chilled and frozen cottage pie ready meals
- 15 Standard yoghurts
- 16 Hen eggs
- 17 Mature cheddar cheese
- 18 Standard mayonnaise

The key data collected on each product surveyed were as follows:

1. Type and details of dates displayed on packaging;
2. Storage guidance (both presence of, and detail);
3. Freezing instructions (both presence of, and detail);
4. Defrosting instructions (both presence of, and detail);
5. Pack size, features and format;
6. Recipes, tips and information;
7. Portion guidance;
8. Price and promotions;
9. Presence of symbols;
10. Presence of on-pack 'flash' labelling; and
11. Presence of on pack tips on waste avoidance or use of leftovers.

Alongside data about products, data were collected about the availability of tools that might help consumers better store or manage the food they purchased. Data on the following types of tools were collected:

- Re-closable food or freezer bags;
- Airtight storage containers;
- Cool bags;
- Plastic clips;
- Spaghetti measures; and
- Fridge thermometers.

You should report against your SMART target.

3.3. Summary

Reducing and preventing household food and drink waste requires clear, consistent and compelling communication along with evidence-based guidance for both householders and businesses and Local Authority and Municipality Synthesis. This is to enable households and businesses to make changes, which support food and drink waste prevention and reduction. The examples in this section illustrate the range of elements and results that can be achieved through developing and delivering a consumer waste prevention programme. A sustained and evolving strategy, at a national or large region level supported by local partnerships and delivery, is more likely to yield significant results. Significant investment of resource will be needed to establish and deliver this work, but costs and effort can be reduced by using learning from the guidance presented in this document and by using modified existing resources where suitable. Costs can be significantly outweighed by the benefits achieved from food and drink waste prevention, in terms of reduced municipal waste management costs and savings on grocery bills to households. Many informational resources are available free of charge.²⁹

²⁹ www.thinkeatsave.org, www.lovefoodhatewaste.com and www.wrap.org.uk/food.

MODULE 4

Preventing and reducing food waste in the food and drink business supply chain



Section Contents

4.1. Potential users, purpose and outcomes	88
4.2. Guidance for businesses in the retail and manufacturing supply chain and the hospitality and food services section	90
4.3. Guidance for voluntary collective action	116
4.4. Summary	131



4. Module 4: Preventing and reducing food waste in the food and drink business supply chain (retail and manufacturing, and hospitality and food service)

4.1. Potential users, purpose and outcomes

4.1.1. Purpose

The purpose of this Module is to provide a process for you to scope, develop, deliver, measure and report on a programme to prevent and reduce food and drink waste,

- In the retail and manufacturing supply chain; and/or
- In the hospitality and food services sector.

Module

For individual businesses (acting unilaterally or as part of voluntary collective action)

There are three stages summarised:

1. Corporate strategy, baseline and target
2. Taking action to prevent and reduce food and drink waste – guidance with tools and examples
3. Measurement and reporting

For delivering results through voluntary collective action

There are five main elements in the process for establishing and delivering (indicative timescales shown, based on a 10-year programme, in brackets) a voluntary collective action as shown in Figure 14, below.

The five steps are (indicative timescales shown, based on a 10-year programme, in brackets) shown in Figure 14 below.

Figure 14 Five step process



Whilst these steps are written sequentially, some can and will work best concurrently, and each of the five steps themselves will evolve over time.

For example, your strategy may be a 5 to 10-year programme of work, and the evidence and guidance and the actions you take will develop over time, while measurement and reporting could be at regular intervals. In the diagram above, timescales are shown as an indicative illustrative example.

Due to the scale and complex nature of food and drink waste prevention in national and international supply chains, this process can deliver more when it is used at a national level or in a large region. While it can also be used at a more local level, any programme you develop using this Module is more likely to achieve significant results when it is implemented at a national or large region scale.

4.1.2. *Potential users*

This Module is aimed at providing guidance to:

- A food and drink business in the retail and manufacturing supply chain, or the hospitality and food service supply chain, that wants to prevent food and drink waste in their operations and/or the supply chain in which they operate;
- National or regional government, for example a sustainable consumption and production department, food department or waste prevention department in a country or region; or
- An organisation or group of organisations with a remit to prevent food and drink waste in either or both of –
 - The retail and manufacturing supply chain, and
 - The hospitality and food services sector.

You understand that your business or businesses operating in your country or area are wasting food and drink. There may also be pressures on waste disposal, and/or food and nutrition security. Addressing this food waste problem can lead to economic, environmental and social benefits for your country or region, businesses and supply chains. It is appreciated that you may already have policies and activities aimed at preventing and reducing food waste by businesses or within your own business or supply chain – this Module can be used to supplement existing policy, as well as developing new policy.

It will be helpful if you have completed activities in Module 1 and/or Module 2 of this document and identified food and drink waste prevention and reduction as a priority for your country or region, business or supply chain, as appropriate.

4.1.3. *Outcomes*

The intended outcomes of this Module are that:

- As a business (e.g. in the retail and manufacturing sectors or the hospitality and food services sector), you will have tools and guidance to help you prevent food waste in operations and supply chains, as part of voluntary collective action or unilaterally;
- As a government department or other organisation, you will have the basis of a programme to deliver a food and drink waste prevention and reduction programme, based on voluntary collective action in:
 - The retail and manufacturing sector; and/or
 - The hospitality and food services sector; and
 - You will have the methods and techniques to develop and deliver this programme.

4.2. Guidance for businesses in the retail and manufacturing supply chain and the hospitality and food services sector to prevent food waste.

4.2.1. Corporate strategy, baseline and target

As a business, you may already be planning or taking steps to prevent food waste. You may also have recycling targets that you wish to build on by reducing waste at source. This may be a unilateral goal and/or through voluntary collective action. Businesses are advised to read this section (4.3) to better understand the part they can play in, and the benefits of, being part of voluntary collective action.

You will begin by seeking to understand more about how much waste you produce in your operations. This can then be used to develop your strategy, set a target and to start monitoring progress against it.

Measuring waste within a business in the retail supply chain or the hospitality and food service sector

This section contains guidance for businesses operating in the manufacturing and retail supply chain and the hospitality and food service sector on measuring, monitoring and reporting waste. This reporting can be unilateral (e.g. through CSR reports) or as part of voluntary collective action.

One of the first questions that companies who wish to work towards a voluntary collective action target and/or a unilateral target to prevent food waste ask is, 'How do I measure and monitor waste?'

Where this information can be obtained depends on what exactly is being measured and any other reporting obligations the company has. As a first step, the business should take time to understand what waste they generate and where this material goes. This should include:

- Material collected by waste management companies;
- Material going down the sewer (e.g. macerators or sink disposal units) or to a controlled water course (e.g. a river);
- Material processed on-site (e.g. going to an on-site incinerator or anaerobic digester); and
- Other waste routes (e.g. material spread on land, given away or sold).

Direct measurement of this waste is the most accurate method, i.e. actually recording the amount of material as it enters the above waste streams. The business should check what already gets recorded for other purposes. For instance:

- Waste management companies often record the amount of material they collect from businesses, and may also record where that material goes. This is likely to cover many waste streams, including material going to landfill, incineration and recycling. This is often a good way to obtain the required data. However, the methods used for obtaining such data should be checked, because they may contain a number of assumptions, especially if direct weighing is not used (for example, how full waste collection containers are and the bulk density of waste).
- Businesses may be obliged to provide information to government agencies on certain waste materials, e.g. what they send down the sewer or to controlled water courses.
- Data from electronic information systems – some retailers scan and record products even where they are not sold.

If, however, this information is not recorded in the ways mentioned above, businesses may need to start recording it on a systematic basis.

Another method for estimating waste in manufacturing, retail, and hospitality and food service is by mass balance. This involves understanding how much product can be made from the ingredients or material brought onto the sites and comparing this to the amount of product that is actually produced. The difference between the two will be closely related to the waste level. Although not always as accurate as direct measurement, this method may provide a reasonable estimate for many companies. See Module 1 for further information on this.

Whether using direct measurement or mass balance, this information can form the basis of regular reporting within voluntary collective action. However, it may need to be modified or supplemented to meet any common reporting requirements. For example, information recorded about sewer waste may form the basis of a calculation to determine how much food and drink is going down the sewer.

It is also helpful to identify and record why food and drink is wasted, as well as recording how much. Businesses can use this information to inform their own strategy, unilaterally or as part of voluntary collective action.

This information may be available from IT systems, at item level or financial value. As already mentioned, waste management companies may have volume data you could access. You may have to modify some of your business and reporting systems to gather this data in a way that is accurate and does not create excessive additional work. To make the data useable and comparable, they will need to be in a consistent format - tonnes being the preferred metric and widely used for reporting.

The methodology to convert data into tonnes will probably follow one of the following paths:

- System units e.g. packs produced, will be calculated by weight and calculated back to tonnes.
- Value of waste in relation to the tonnage recorded by waste contractors. This will give a rough estimate of the value of waste and how it correlates to tonnes.

When gathering your waste data, the following may be useful:


- Determining whether a material is a waste or not is a complex legal issue. You should determine what approach you wish to take to maximise the impact you want to achieve and keep within any legal requirements in the area you operate in.
- Given the above, waste includes material that has been sent for the following: disposal, recycling or recovery. As such, waste includes material going to landfill, thermal treatment (with or without energy recovery), anaerobic digestion, advanced thermal treatment, rendering and composting. The hierarchy (see Figure 2) may also be a good guide to what waste should be reported as such and what other waste management routes for material should be recorded.
- Examples of non-wastes in the UK include material that is surplus food redistributed for human consumption or food diverted to animal feed where legally permissible.
- For some businesses, the amount of waste will be closely linked to production or sales volumes. By normalising the waste data, this allows for the impact of sales change to be understood.

Where possible, split waste by:

- Waste management route; and
- Type of material, for example –
 - Food/product: food or products sent for waste treatment or disposal as a result of being damaged, end of life, off-cuts or deformed (outgraded); and
 - Mixed or unknown other: any other waste, not classified as food or product. Includes mixed product and packaging waste arisings.

On the following pages the examples of collection reporting tables you could use as a manufacturer or a retailer to report and analyse your waste.

Figure 15 Example data and reporting form for retailers and manufacturers



Material change for a better environment

Reporting Form for Courtauld Commitment 2 2009-2012

Retailers - Supply chain waste, by-products and surpluses

For definitions of scope please refer to guidance document
Are you able to supply distribution and store waste separately?
Are you able to supply a breakdown of any packaging waste by material?
 Is distribution managed by signatory, by third party or both?

7a. i. Returns

	Number of units	Total weight (tonnes)
Returns to manufacturers (i.e. not disposed of by retailer)		
Returns disposed of or redistributed on behalf of manufacturer / other company		
Redistributed for human consumption		
Used for animal feed		
Anaerobic digestion		
Landfill		
Other		
Total	0	0

7a. ii. By products and surpluses generated from store and distribution (not including returns redistributed on behalf of manufacturers)

	Number of units	Total weight (tonnes)	Store (tonnes)	Distribution (tonnes)
Management route				
Redistribution / alternative markets				
Redistributed for human consumption				
Used for animal feed				
Other - please specify....				
Total	0	0	0	0

7a. iii. Distribution and Store Waste

	Number of units	Total weight (tonnes)	Mixed, unknown, other	Food / product	Packaging
Recovery and recycling					
Anaerobic digestion					
Composting					
Recycling					
Landspreading					
Thermal treatment with energy recovery					
Rendering					
Other - please specify....					
Total		0	0	0	0
Disposal					
Thermal treatment without energy recovery					
Landfill					
Other - please specify....					
Total		0	0	0	0
Grand total		0	0	0	0

Key to colour coding of cells:

- Essential information
- Desirable information
- Calculation cell - do not enter data
- Click here
- Click here

Figure 16 Guidance for hospitality and food service (HaFS) businesses on data collection and reporting – UK example, for which packaging is also in scope

HaFSA Annual Data Requirements				
	Contextual	Waste	Dry Materials	Packaging
Essential to report	Number of employees and outlets Turnover (£)	Redistributed food and food waste (tonnes) split by destination	Total dry materials (tonnes) split by destination	Obligated packaging (tonnes) – the packaging the next user discards
Optional to report Collecting and reporting this data will further aid your understanding of waste produced and packaging used and how to take steps to reduce it.	Number of: meals served, beverages served, transactions, food and drink products sold and purchased Occupancy rate (%) (hotels) Value of catering contracts (£) (contract caterers) Case studies	Mixed waste(tonnes) split by destination Cooking oil waste (litres) split by destination	Dry materials split by material type (paper and cardboard, glass, aluminium, steel, plastics and polymers, wood and other) and destination (tonnes)	Non-obligated packaging (tonnes) – the packaging the signatory discards Information on packaging re-use

Businesses can report:

- **Contextual** data about the business, such as turnover, number of outlets and number of employees;
- All **food and drink waste** arising, including during supply chain distribution (if the business is a wholesaler or distributor), including waste disposed of to sewer;
- **Mixed waste** and **waste cooking oil**, if the signatory is able to collect data on them that are applicable to their business.

All data should be reported within the geographical boundaries agreed, e.g. within a specified country only.

Tip: Document data collection process

It is recommended that businesses document their data collection process, including the approach, methodologies, assumptions and key data sources and contacts. This way, it will be easier to compile data for the next year of reporting. It may be that different people are responsible for different areas of data. However, one representative from the company should check and approve data before it is submitted.

If the business spans more than one sub-sector, report data on each sub-sector of the business separately. Reporting by sub-sector will create a more detailed understanding of waste, recycling and packaging arising within a business, and could enable participants in any voluntary collective action to benchmark their own performance against sub-sector averages. This is important, as benchmarking at a sub-sector level is more meaningful than at a sector level. WRAP uses the following sub-sector classifications, based on industry standards defined by Horizons (2012):³⁰

- Restaurants;
- Quick service restaurants (QSRs);
- Bars (or drinking places);
- Hotels;
- Leisure;
- Staff catering;
- Healthcare;
- Education; and
- Services.³¹

Contract caterers should report by the sub-sectors in which their clients operate (e.g. healthcare, leisure, education, services and staff catering).

It is important to use this information to identify a suitable target, based on what sort of opportunity you think you have to prevent waste. You can also use this to decide whether to reduce waste in your own operations and/or if you want to focus on key supply chains to reduce waste. There are systemic changes that your businesses can make that will drive action to reduce and prevent food waste. These are elements such as setting a target, embedding it in your organisation and measuring and reporting. You can look at your business systems as well to support this action.

You should use information this to help identify where the greatest opportunities are and where these fit with your business strategies. It is essential to prioritise action in the areas where you can make the greatest impact and to embed this strategy within your business. Things to consider when developing your strategy could be:

1. The extent to which you can influence waste arising in your own operations and supply chains;
2. Where the greatest gains can be achieved;
3. The policy and legal framework in the countries in which you and your supply chains operate;
4. Your strategy on environment and sustainability;
5. Materials security for your products and operations;
6. Supply chain management strategies and transparency;
7. Any agreements and targets you are committed to;
8. Existing business targets; and
9. Your ability to influence your supply chain and your customers.

Waste is likely to arise in all parts of your operation and in your supply chains, and the causes will be numerous (See Figure 17 Potential reasons for food waste from post-farm gate, through to purchase). A Venn diagram has been used to illustrate that there are reasons for waste that different parts of the supply chain have in common.

³⁰ <http://www.hrzn.com/resources/definitions-methodology>.

³¹ Outlets that provide a publicly funded service and that are not health care or educational establishments.

Figure 17 Potential reasons for food waste from post-farm to purchase



Some of the waste arising at different stages may also be due to interactions within the supply chain itself – these are often not immediately evident – since the supply chains are so complex. Therefore, prioritising where you can make the greatest progress will be key to success. In order to do this, you should review the data you have available to identify the biggest waste streams with the greatest opportunities to act on. It is likely that many of these opportunities can be realised through system and behavioural changes, with very little or no capital investment needed. Methods to help you act on these priority opportunities are covered in the next section.

Use this information to set a SMART (Specific, Measurable, Actionable, Realistic and Time-bound) target. For example, a target may take the form of, ‘to reduce ingredient and product food and drink waste in our operations in country X and supply chains Y and Z, by 10% by 2016, from a 2014 baseline’.

4.2.2. Prevent and reduce food and drink waste - guidance with tools and examples

Having decided where you can make the greatest progress, you should instigate actions to reduce waste. Examples are provided below for businesses operating in the retail and manufacturing supply chain and the hospitality and food service sector, with signposting to further resources and guidance.

**Example
25****HOSPITALITY AND FOOD SERVICE, WORKING WITH UNILEVER**

Unilever in partnership with WRAP worked to adapt guidance for businesses and supply chains in the food service sector.

In September 2011 in the UK, Unilever Food Solutions, in partnership with the Sustainable Restaurant Association, launched the 'United Against Waste' Framework to help the food service industry reduce its food waste.

The Framework provides essential information to help food service organisations greatly reduce the waste they generate and reduce the costs for bought-in goods and waste disposal, including:

- How to carry out a review to identify the type of food that is wasted and measure how much is produced;
- Staff training – the Framework provides a wide range of materials to equip staff with the appropriate skills;
- Improving purchasing practices to reduce costs;
- Food preparation and the way it is presented on the plate – reviewing portion sizes and what is used to decorate the plates (e.g. garnish) can have a noticeable impact on cost as well as the waste generated; and
- Monitoring what consumers leave on their plate – this enables businesses to identify a particular dish or ingredient that may not be liked by customers.

With the support of Unilever Food Solutions, WRAP has adapted the United Against Waste Framework into an online resource centre, an interactive guide with quick and easy ways to cut down on food waste costs. The resource centre can be found on the WRAP website.*

*www.wrap.org.uk/resource-centre

**Example
26****METHODOLOGICAL GUIDE FOR HOSPITALITY SECTOR FOOD WASTE PREVENTION IN BRAZIL**

The United National Environment Programme (UNEP) Tourism and Environment Programme has developed a short methodological guide to provide a process which a sample of small and medium sized restaurants and hotels in Brazil can apply to scope, develop, deliver, measure and report on a programme to prevent and reduce the amount of edible food waste. Module 4 of this Guidance document was used as the main reference to develop this methodological guide.

The guideline will be pilot tested in Brazil by (10) Hotels of Roteiros do Charme and (10) local restaurants over a period of 6 months. The overall objective is to set a baseline for edible food waste in Brazil and to provide a recommendation on a common food waste collection and measurement methodology.

The guideline highlights the steps and procedures to prevent and reduce waste in your hotel and/or restaurant. During the pilot phase of the guideline's implementation, the process will be adapted to reflect Brazil's local circumstances and each hotel and/or restaurant's unique situation.

**Example
27****REDUCING AND PREVENTING WASTE IN THE RETAIL MANUFACTURING SUPPLY CHAIN**

Kerry Noon, a UK-based chilled food supplier, provides Morrisons Supermarkets in the UK with ready to eat meals. The two companies worked on this project collaboratively, and with some simple changes in working practices, reduced waste product at the point of manufacture by 33%, and forecast accuracy was increased by 6%. Making things simple for the consumer, retailer and supplier was critical.

Overall, the programme prevented about 1,400 tonnes of waste arising annually. The waste reductions were achieved using simple methods throughout the programme, for example by changing processes or behaviours, thereby not incurring capital or other costs. New ways of working were developed that are transferable to other supply chains, and the reduction was delivered in a sustainable and profitable way. As a result, as a per cent of sales, waste has fallen by up to 1%.

All teams involved have made changes to their working practices as a result of the programme, and the project has given rise to what generically might be termed 'better supplier relations'. A full report on the partnership approach and seven further case studies is available.*

This process can be replicated in other supply chains, and the WASTE methodology can be used by businesses who may wish to use methods similar to those summarised in this report.

*www.wrap.org.uk/content/reducing-food-waste-through-retail-supply-chain-collaboration-0

Some of the largest opportunities for waste prevention in businesses come from identifying what waste is arising and where and then taking action to prevent the waste in the first place. The following case studies illustrate this.

**Example
28****HOSPITALITY AND FOOD SERVICE – WASTE REVIEWS**

A Resource Optimisation Review in the UK, by contract caterer Elior, highlighted potential savings of over £2,000 on a single site. Monitoring food waste generation quickly led to a more cost effective, less wasteful method of working. This process can be replicated on other sites. The WASTE methodology used here (please see following section) can be implemented by other businesses who may wish to use similar methods.

Key facts

- Recycling rate at the TDK-Lambda Elior site was already high – 97% across the site.
- WRAP's Resource Optimisation Review highlighted potential cost savings of £2,441.
- The staff restaurant serves 315 employees. Monitoring food waste by weight rather than cost has had a significant impact.

The full case study can be found on the [WRAP website](#).*

Using clear bags and weighing food and drink waste helped Elior identify waste prevention and reduction opportunities.

The amount of food redistributed through charities and food banks represents a relatively small proportion of total food waste arising. For example it is estimated that around 6,000 tonnes of food and drink were redistributed to charity in the UK in 2011 from manufacturing and retail operations, out of a total estimate of 4.3 million tonnes of food and drink waste in manufacture and retail. However, the redistribution of food can have a significant positive impact on society and can capture the imagination and commitment of businesses and consumers. Because of this, redistribution often forms a part of actions that businesses can take to reduce food waste. Numerous examples follow that demonstrate models for redistribution around the world.

Example 29

SURPLUS FOOD REDISTRIBUTION IN BANGLADESH: RECLAIMED FOOD SYSTEM

Bangladesh is one of the poorest countries in the world and food waste at the consumer and household level is still quite low. For most middle class or lower middle class families, throwing food in the dustbin is unthinkable. Instead, surplus food is either divided among extended family or given to poor people nearby, what has recently been called the reclaimed food system in the media.

Generally, reclaimed food is a collection of food waste/leftovers from weddings, public functions or from highly rated restaurants. This can be caused by portion size overestimation or given the difficulty in estimating the number of guests who will attend events such as weddings. Reclaimed food is sold at inexpensive prices (2-5 percent of the normal price) and at places they easily can access (public areas or streets).

In the last decade, a large network of informal food markets has grown. A great number of people are involved in this food system, from chefs, caterers, managers of hotels, community centres and public festival centres, collectors, suppliers and sellers. This enterprise is informal and not yet well documented. Dhaka, the first megacity in the developing world, has more than 500 community centres which have reclaimed food a major source, including from 50 upscale restaurants. In Dhaka, the amount of wasted food is approximately three tonnes (rough estimation by visual census by research of the Bangladesh Youth Environmental Initiative, 2013) every day from the community centres and restaurants. This remaining food could be redistributed among the very needy. . Collection, hygiene maintenance, preservation and distribution channels would need to be upgraded under a fully sustainable business model.*

* There are yet no formal studies of reclaimed food systems in Bangladesh, it occurs in Bangladeshi newspaper articles, but these are in the local language.

Additional contact and source, the Bangladesh Youth Environmental Initiative: <http://www.byei.org/>

**Example
30****REDISTRIBUTION OF SURPLUS FOOD: CLARIFYING LEGAL FRAMEWORKS AND WORKING WITH NATIONAL FOOD SECURITY AUTHORITIES**

Dariacordar is a nonprofit Portuguese association that promotes the Zero Waste Movement and it is a partner of the SAVE FOOD Initiative. It is a facilitator that enables stakeholders and interested parties to collect surplus prepared and cooked food that could otherwise be wasted and give it to people requiring this food. The Zero Waste Movement would like to expand this model in other Portuguese-speaking countries.

Data registered since the launch in January 2011:

Phase and Locations: Pilot phase in the poorest parishes of 4 municipalities (20% municipality coverage)

- Number of retrieved meals: ~560,000
- Number of meals/day: ~1300
- Recovery rate of food waste from catering in Portugal: ~2,5% (estimated total of recoverable meals/day ~50 000)
- Value of retrieved meals: 840,000 € (~1,5€ / meal)
- Tonnes of food prevented from becoming waste: ~280 (~0.5kg / meal)
- Tonnes of avoided CO₂: 1,176 (1 tonne of food waste / ~4,2 TON CO₂)

Key to the success of this initiative was clarifying the legal framework around donation in Portugal, as EU law and food safety procedures had previously been misinterpreted, presenting a barrier to donation. In this case, and as a ground-breaking point, it was the national food security agency itself (ASAE) that helped formulate new procedures and project standards and was responsible for training interested donors. Contributing to its success is the development of the project brand to disseminate results and low cost process, as it is carried out by a team of part-time volunteers, taking advantage of all partners' existing resources, enabling synergies and optimising operations for effectiveness and efficiency.

There is no excessive paperwork or potential blockage in a growth phase of the project and of its network. A set of indicators for each activity was defined and has to be reported. Monitoring and evaluation are guaranteed by the Zero Waste team from Dariacordar. www.dariacordar.org

**Example
31****THE GLOBAL FOODBANKING NETWORK**

The Global FoodBanking Network (GFN) is dedicated to creating a sustainable approach to supporting food and nutrition security by building efficient public and private partnerships, providing environmentally friendly alternatives to surplus food and grocery product recovery for human consumption and promoting best practices in charitable food distribution. GFN is a partner of the SAVE FOOD initiative.

Basic Metrics to date:

- 920 million pounds distributed by the network – they measure pounds of food distributed through our system and thus saved from being wasted.
- Nearly 250 food banks operating in the network.
- Food distributed to more than 19,000 institutions that feed people directly.

The concept of food banking is simple: collect surplus and unsellable food that would otherwise be wasted and distribute it to those who are hungry and malnourished through an infrastructure of charitable feeding and service programs.

All relevant safeguards such as food safety management, traceability, inventory controls, etc. are retained and exercised by the food banking system at the same level as required in the commercial side of the chain. Food is then distributed to vetted, qualified institutions that deliver relevant services to the low/no-income community and frees those beneficiary institutions from the need to pursue food donations.

The biggest costs for food banks relate to personnel and volunteer management, hard assets (warehouse, rolling stock, equipment, etc.), and logistics management (collection and distribution of food and grocery products).

Success and impact are defined differently in different cultures, but overall the GFN network enjoys very positive reviews. Two of these examples are:

- **Argentina** – successfully engaging the domestic operating units of global companies to conduct significant projects aimed at enhancing the operational capacity of the food banks and strengthening their IT capabilities. The completion of these projects will elevate the operating sophistication of the member food banks in such ways as will have significant impact on their ability to generate the resources needed to serve the food insecure population.
- **Egypt** –the Egyptian Food Bank , a GFN partner, collects more than 15 million meals per month from more than 425 hotels and resorts across Egypt. These meals are from the food and beverage operations of the hotels and are distributed through across the country.

Global FoodBanking Network: www.foodbanking.org

An Obvious Choice: How Food Banking Fights Hunger, Reduces Waste, and Helps the Environment - <http://youtu.be/j-uwB9A652I>

**Example
32****REDISTRIBUTION OF FOOD FROM RETAIL**

Carrefour has decided to play a key role in food donation. For example, in Belgium, Spain and France, fresh products are taken off the shelves and given to associations such as “Banques Alimentaires” (food banks). In 2012, 350 tonnes of products were collected and given to associations in Belgium, and 1,200 tonnes in Spain. In France, food donation from stores, together with collected products from consumers, allowed the equivalent of 83,44 million meals to be distributed through the association network. These results were achieved through close collaboration between stores and association.*

* www.c-solidaire.fr/#/carrefour-agit/le-don

**Example
33****ALLWIN AB: A NEW BUSINESS MODEL FIGHTING FOOD WASTE**

Allwin AB (Ltd) is a Swedish based company, that believes that high quality food is being thrown away before the ‘best-before’ date has passed due to sales returns, freight damage, mislabelling and poor market forecasts along the production chain. By providing a service of collection of this food from some of Sweden’s largest actors within the food industry, and redistributing this to the most vulnerable people in society, Allwin AB has grown into a profitable company that creates environmental and societal value through corporate engagement. Allwin is still able to make a small profit each year.

Since its beginning, the company has redistributed over 1 million meals to help vulnerable people in Sweden. Allwin has also grown to become a service company, with safe storage of goods, cooling facilities, traceability and delivery as main priorities. This assures the food industry of proper handling of the food and good hygiene for delivery to the non-profit sector for redistribution. Allwin has also managed to address one of the current environmental issues through innovative food waste management software that has, in a long-term perspective, environmental, social, societal and corporate benefits. Specifically it will measure:

- volumes of food handled on a daily basis;
- CO2 impact down to food categories;
- nutritional value of the redistributed food; and will facilitate Sustainability reports for Allwin’s corporate clients.

Today, Allwin AB has the ambition to expand with new partners, to build a functioning international logistics infrastructure between the surplus of the food industry and the lack of resources in the non-profit sector.*

*<http://allwin.nu/om-allwin/>
www.oecd.org/site/agrfcn/

4.2.3. Reporting (including W.A.S.T.E. methodology)

As a business, you should measure and where possible report the impacts of your work against the target you set in Section 4.3.1. You can measure your overall progress towards your target, plus you can measure the impact of individual initiatives and actions you have instigated in your operations or in your supply chains, in order to understand what has worked effectively. The guidance above on measuring waste can be used to report at regular intervals – internally within your business and externally, to stakeholders.

EXAMPLE METHODOLOGY: WASTE problem-solving discipline for businesses and supply chains**Introduction**

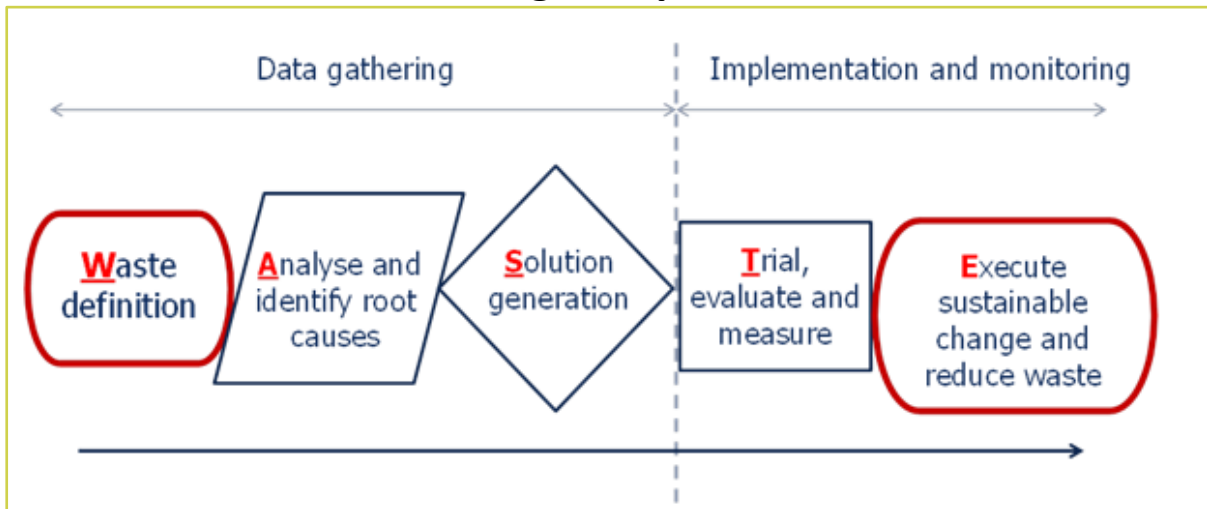
There are opportunities to prevent waste within an individual site or business and across supply chains. Working collaboratively across a supply chain can lead to higher levels of waste prevention. WRAP has developed the W.A.S.T.E. process to help businesses identify waste and reduce it within their operations and across supply chains (Figure 18). It is based on a problem-solving discipline. Problem-solving disciplines are rooted in continuous improvement and lean manufacturing strategies and build on established techniques.³²

The process as described below can be used by businesses as a systematic way to reduce and prevent food and drink waste in operations and supply chains. It is suitable for use in retail and manufacturing businesses and supply chains and those in the hospitality and food services sector.

³² Continuous improvement is an on-going effort to improve products, services, or processes.

Figure 18 The W.A.S.T.E. process

The WRAP Problem-Solving Discipline: W.A.S.T.E.



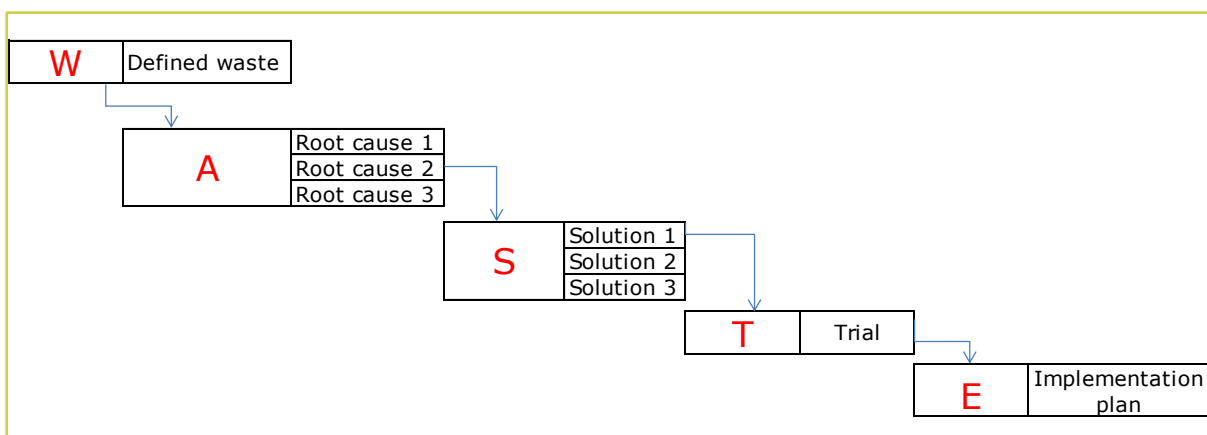
Problem-solving disciplines are team-based processes, containing steps to find the problem that are in the way to achieving a goal. In the context of waste prevention, the ‘problem’ is the waste generated at source, either in a manufacturing, retail or hospitality environment, in a total end-to-end supply chain environment, or across part of a supply chain. The ‘goal’ is waste prevention – to avoid generating the waste in the first place.

The steps within the W.A.S.T.E. process enable:

- Recognition of the waste;
- Definition of the waste;
- Understanding of root causes of the waste;
- Development of solutions to the waste; and
- Development of a strategy to prevent and reduce waste, by implementation of a defined and feasible solution.

A simple schematic of the process steps is shown in Figure 19.

Figure 19 Schematic of W.A.S.T.E process



The following sections explain how you can go about implementing a W.A.S.T.E project.

Scope the project

W.A.S.T.E. projects should be driven by a business need. Define the scope of activity at a top level - examples of scopes include:

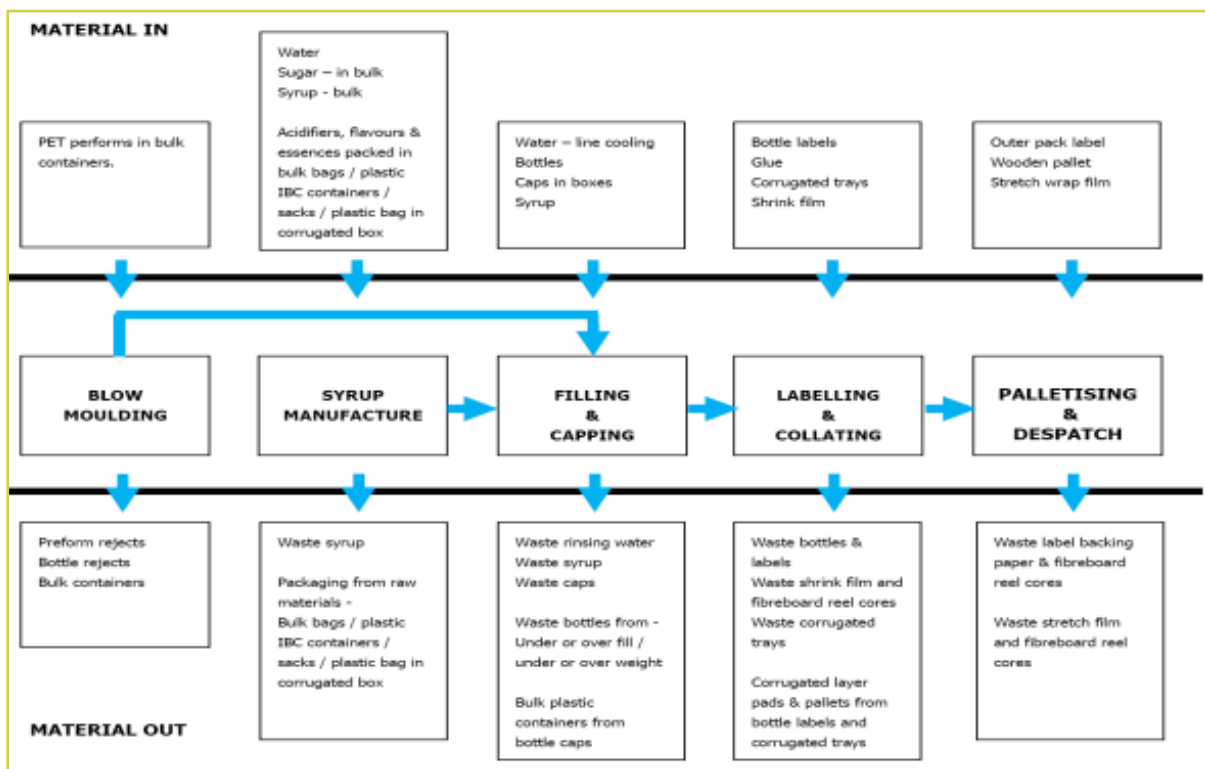
- Known waste streams;
- Waste in production areas; and
- Waste in total supply chains.

Quantify the scope with a level of data; for example, define the tonnage and financial cost of the tonnage of waste to the business, in order to prioritise high waste and financial value opportunities. The intention of this process is that the low/no-cost, high-return opportunities to prevent waste are prioritised. A business may choose to implement waste prevention measures which have a financial cost or longer payback period, if there are sufficient non-financial drivers for doing so.

Make time to physically observe what is happening within the process or supply chain. Value stream or process mapping is an essential activity that should be undertaken to understand the process, identify waste ‘hotspots’, tonnage values and financial implications. Financial impacts include the value of the materials being wasted, the labour and energy costs associated with these materials (the value that the intermediate or final product would have if it wasn’t wasted) and the disposal cost of any waste that arises.

The example in Figure 20 is a very basic process map, showing inputs and outputs in a drink manufacturing process. The next step would be to put quantification to each identified input/output to then identify process or waste ‘hotspots’.

Figure 20 Process map in a drink manufacturing plant



In this example, from the post-its shown in the photo below (Figure 21), around six hotspots (pink post-it notes) have been identified for two main production lines as being a priority for action.

Figure 21 Priorities for action



Obtain data

Data is key to the whole W.A.S.T.E. process. Comprehensive and robust data are an essential prerequisite for the process to be successful. They can be gathered from a number of sources and all data sources should be exhausted, e.g. business systems, off-line spread sheets, supplier data, service provider data. How to use the data is explained at each stage of the W.A.S.T.E. process outlined below.

Form a team

Form a team that will investigate the scope, define the waste (the 'problem') and determine an objective (the 'goal').

Typically, W.A.S.T.E. project teams will consist of individuals working in or impacting on the area of scope. They can be complemented by external expertise, suppliers, or service providers. It is also useful to include a team member who does not work in the area of scope who can challenge 'accepted expertise'. Above all, the team must make decisions and act on facts, and must not be driven by preconceptions or personal perceptions of what the problem is and how it should be resolved.

A typical team structure and responsibilities are shown in Table 3.

Table 3 Typical W.A.S.T.E. team structure and responsibilities

Team member	Level	Responsibilities within the team
Sponsor	Senior management	<ul style="list-style-type: none"> Champions resolution of the problem
Project Manager (optional)*	Area management	<ul style="list-style-type: none"> *Only required if there are multiple W.A.S.T.E. projects happening at the same time. Ensure that activities across the teams do not create negative impact and are not duplicated
Team Leader	Area management	<ul style="list-style-type: none"> Needs to have sufficient leverage to champion and effect change identified by the team Motivates and focuses the team to achieve the goal Defines team structure and manages process timescale Reports team progress to Project Manager or to Sponsor (depending on governance structure) Signs off each process stage
Team member (max 6)	Of influence to, involved in or being impacted on by the area of defined scope	<ul style="list-style-type: none"> Need to be balanced, mix of skills and expertise Root causes (i.e. what is causing the waste), solution generation (i.e. how can the causes of waste be overcome or mitigated), trials (i.e. implement these solutions and review effectiveness) and execution planning and implementation (i.e. undertake these changes to reduce waste).
Facilitator	Ideally from outside of scope	<ul style="list-style-type: none"> Facilitates the team through the W.A.S.T.E. process Supports the Team Leader in management of the team Responsible for completing the process project sheets as a record of team decisions, actions and project planning

Team leadership needs to be strong and linked to structured governance. The key role is to provide guidance to the entire team in order for them to meet the objectives of the project. The Team Leader must unlock and build on ideas the team come up with to resolve problems, overcome institutional barriers on the team's behalf, if encountered, and assist the team in solution implementation.

The initials W.A.S.T.E represent the following steps.

W – Waste definition

The W.A.S.T.E. team needs to take ownership of the problem and define and agree the objectives they are trying to meet (the goal). The team uses the scope to define the problem. The output from this stage is a defined problem statement stating an objective, how it will be achieved and how it will be measured. An example problem statement is shown in Figure 22.

Figure 22 Stage 1 project sheet

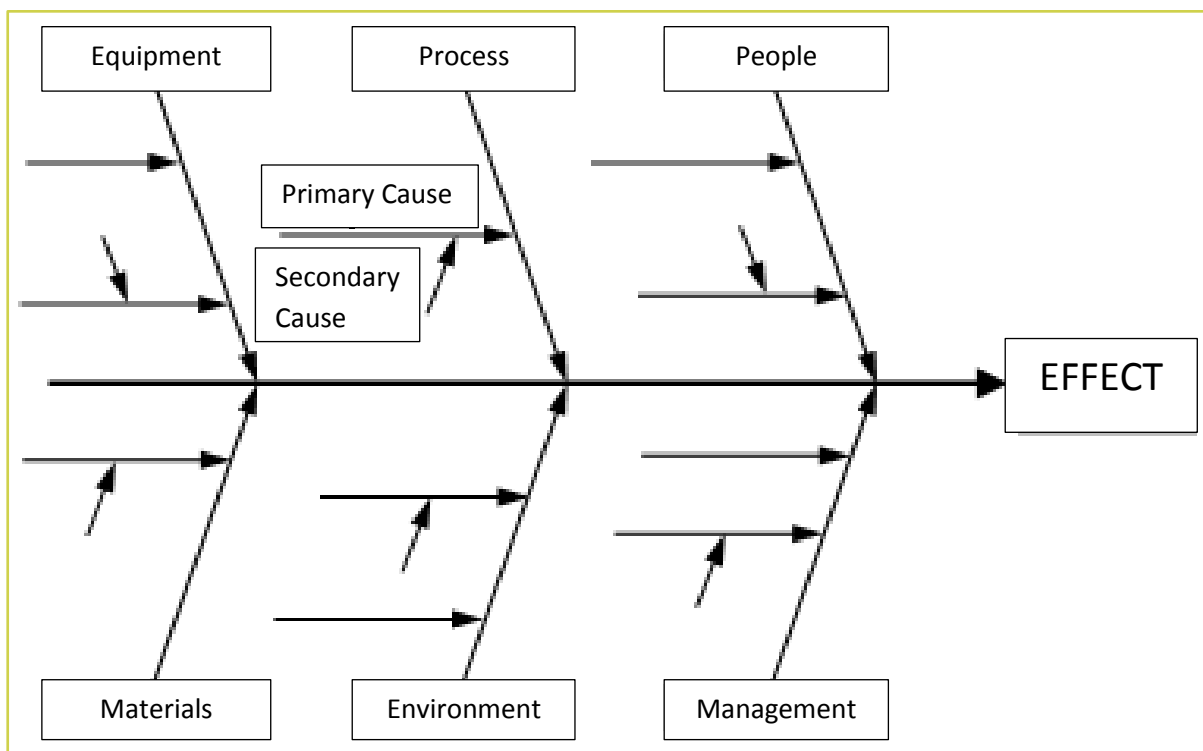
Stage 1: Waste definition – Project sheet		
Question:	Current situation	Desired situation
What is the waste ("the problem")?	1,000 tonnes of soup is wasted	No wasted soup
Who is affected by the waste ("the problem")?	Manufacturing, waste management	No one
When does the waste ("the problem") occur?	Every year	Never
Quantification of the waste ("the problem") e.g. how much?, how many?, frequency, since when?	1,000 tonnes of soup waste/annum costs: Manufacturing costs: £x,000/annum Disposal costs: £x,000/annum Lost revenue: £x,000/annum Total costs to business: £x,000/annum	No waste and no adverse costs
Potential benefits	X	£x,000/annum
Team sponsor: [Name]	Team members: [Names and roles]	
Team leader: [Name]		
Stage approved by: [Team leader]	Date:	

A – Analyse for root causes

The W.A.S.T.E. team now identifies and defines possible root causes. A number of root causes may be causing the waste(s) (the problem). Definition of root causes should not be restricted or eliminated at this stage. Typical tools and techniques employed at this stage are brainstorming and cause-and-effect diagrams.

An example cause-and-effect diagram is shown in Figure 23.

Figure 23 An example cause-and-effect diagram



Using data, each root cause is quantified and its influence on the problem is ranked in order of impact – tonnage and financial.

An example root cause analysis ranking for a manufacturing site is shown in Figure 24.

Figure 24 Stage 2 project sheet (manufacturing)

Stage 2: Analyse for root causes – Project sheet				
Problem statement		1,000 tonnes of soup is wasted each year which costs the business £x,000/annum		
Root cause	Where does it occur?	When does it occur?	Tonnes of waste (T)	Cost of waste
Clean downs	Line 5	Product changeovers – 5 per shift	200	£40,000
IBC residue	All lines	At batch delivery to lines	100	£20,000
Spillage	Lines 5 and 6	When cans are overfilled	50	£10,000
Stage approved by:	Date:			

An example root cause analysis ranking for a supply chain area is shown in Figure 25.

Figure 25 Stage 2 project sheet (supply chain)

Stage 2: Analyse for root causes – Project sheet				
Problem statement		The supply of chicken to store wastes x,000 tonnes per annum costing £x,000/annum		
Root cause	Where does it occur?	When does it occur?	Tonnes of waste (T)	Cost of waste
Forecasting	Supplier, RDC and store	All the time	200	£40,000
Case size	Waste at store	On all deliveries	100	£20,000
Promotional activity	Waste at store	On all promotions	40	£10,000
Stage approved by:	Date:			

The output from this stage is:

- An agreed list of POSSIBLE root causes of the problem, substantiated by data – this may involve some degree of real time measurement of the possible root cause, as well as data available from business systems, off-line spread sheets etc. – the objective is to establish facts and avoid preconceptions;
- A prioritised list of root causes showing a hierarchy of influence to the problem – using the 80:20³³ rule here is a quick way of identifying priorities;
- An agreed list of root causes to be initially targeted; and
- A statement as to why other root causes are not to be explored at this stage, e.g. those with least influence to the problem.

S – Solution generation

For each of the prioritised root cause(s) taken forward from Stage 2, the W.A.S.T.E. team now brainstorms possible solutions. There will be a number of possible solutions to each root cause. All the solutions will be ranked by impact to a root cause.

An example solution ranking for a manufacturing site is shown in Figure 26.

Figure 26 Stage 3 project sheet (manufacturing)

Stage 3: Solution generation – Project sheet							
Root cause		Waste of soup due to clean downs on Line 5 – value: 200t costing £40,000/annum					
Solution	Expected improvement	Expected cost to implement	Expected waste reduction (T)	Feasibility score*	Impact score*	Total score	Trial?
Improve filtering from pipes	Will capture more product from clean downs for use in process	£5,000 for new filters	30	5	5	25	Y
Refine clean down procedures	Reduce product waste by defining best times for cleaning	£0	15	5	4	20	Y
Reduce changeovers by better planning	Reduce product waste by reducing changeovers	£0	15	3	5	15	Y
Stage approved by:		Date:					
* 1 = Low, 5 = High							

An example solution ranking for a supply chain area is shown in Figure 27.

³³ The Pareto Principle was first suggested by management thinker Joseph Juran in the 1940s, The principle is that the majority results of any situation can be determined by a small number of causes. Statements of 80/20 principles can be tested using the Pareto chart and are useful to support decision making.

Figure 27 Stage 3 project sheet (supply chain)

Stage 3: Solution generation – Project sheet							
Root cause		Case sizes (quantity per) are causing waste of x,000 tonnes at back of store which costs £x,000/annum					
Solution	Expected improvement	Expected cost to implement	Expected waste reduction (T)	Feasibility score*	Impact score*	Total score	Trial?
Increase store sell rate	Low waste due to increase in sales	£0	X00	3	5	15	Y
Increase store shelf space	Greater customer visibility, fewer shelf replenishments	£5,000	X00	2	4	8	N
Reduce quantity per case	Quantity per case will be in line with store sell rate	£1,000	X00	5	5	25	Y
Stage approved by:		Date:					
* 1 = Low, 5 = High							

The output from this stage is:

- A list of solutions that address each of the root causes identified;
- A prioritised list of solutions for each root cause showing a hierarchy of influence to the problem –using the 80:20³⁴ rule here is a quick way of identifying priorities;
- The environmental impact (including energy usage where possible) of the reduction;
- Any impact that the solution has on quality and if the solution requires a change in SOP or HACCP;
- Up to 3 solutions which will be taken forward to prevent and reduce waste;
- Quantification of the impact that the prioritised solutions will have – in tonnes and financial cost; and
- A statement as to why other solutions are not to be explored at this stage, e.g. those with least influence to root causes and the problem.

T – Trial, evaluate and measure

From the list of solutions defined for each root cause of the problem, a trial and methodologies plan is designed. This will test a single solution or a combination of solutions. The aim is to determine if the root cause has been addressed.

An example trial report for a manufacturing site is shown in Figure 28.

³⁴ The Pareto Principle was first suggested by management thinker Joseph Juran in the 1940s, The principle is that the majority results of any situation can be determined by a small number of causes. Statements of 80/20 principles can be tested using the Pareto chart and are useful to support decision making.

Figure 28 Stage 4 project sheet (manufacturing)

Stage 4: Trial, evaluate, measure – Project sheet				
Solution to trial		Improve filtering from feed pipes		
Trial location	Timing	Expected outcome	Conducted by	Trial completed
Line 5	New filters expected April '13, trial booked 2 nd week in April '13	Should see reduced product waste on clean down from improved capture by filters	[Team member name(s)]	[Date of trial completion]
Trial conditions/setup			Baseline measurement	
Line 5 feed pipes fitted with new filters			500 kg waste/hour	
Trial outcome			Trial measurements	
New filters performed better than old specification and captured more product			200 kg waste/hour	
Conclusions	New filters better than old, captured 60% more product			
Recommendations	Purchase new filters and fit to all lines			
Stage approved by:			Date:	

An example trial report for a supply chain is shown in Figure 29.

Figure 29 Stage 4 project sheet (supply chain)

Stage 4: Trial, evaluate, measure – Project sheet				
Solution to trial		Chicken case quantity to be reduced from 12 to 6 units/case in line with store sales rate		
Trial location	Timing	Expected outcome	Conducted by	Trial completed
Sheffield store	Supplier will trial in new case size from May '13	Should see sales per case with no waste	[Team member name(s)]	[Date of trial completion]
Trial conditions/setup			Baseline measurement	
Supplier has produced new case size for chickens in 6s. These will be tracked under controlled conditions from supplier to Sheffield store. Sales and waste will be tracked over a three month period.			X tonnes/month sales	
Trial outcome			Trial measurements	
No waste was measured when new case size was introduced – store sales have been in line with case quantity with no supply outage. No waste occurred over period of measurement.			X tonnes/month sales	
Conclusions	Reducing case size has eliminated waste from supply of chicken.			
Recommendations	Implement new case size and adjust store ordering profile i.e. 6 chickens per case			
Stage approved by:			Date:	

The output from this stage is:

- A trial statement – what the trial is, what are the objectives, who, where etc.;
- A trial methodology – how was the trial conducted, what were the results, what are the measurements from the trial etc.;
- Conclusions from the trial – what has changed and what is the impact on waste;
- Recommendations from the trial – what will be continued and what can be scaled up; and
- A business sign-off for the project that has checked that the problem has been resolved without unintended negative consequences.

E – Execute sustainable change and reduce waste

The successful solution is embedded into standard operating procedures. This may be a number of successful solutions. The solution(s) must address the waste (the problem).

An example implementation plan for a manufacturing site is shown in Figure 30.

Figure 30 Stage 5 project sheet (manufacturing)

Stage 5: Execute change – Project sheet				
Solution to implement		New filters for feed pipes on all filling lines		
Location	Timing	Change to SOP manuals?	New BOM	Equipment upgrade
All lines	New filters expected may '13	Not required	No	Yes
State intended implementation planning			How has the solution impacted "the problem"?	
All filters will be replaced in May maintenance schedule. Performance will be measured over a 3 month period to gauge life expectancy and ensure no degradation of product capturing performance.			Trials have proven that the new filters will reduce product loss by 15%	
How will improvements be measured?			How has the change been communicated?	
Product saved will be reworked back into the production lines. This will be reflected in materials variance reporting.			In monthly engineering meetings	
Stage approved by:		Date:		
Project sponsor comments	The team has successfully identified that by using a new specification of filters on our filling lines, product loss on clean downs will be reduced.			

An example implementation plan for a supply chain is shown in Figure 31.

Figure 31 Stage 5 project sheet (supply chain)

Stage 5: Execute change – Project sheet				
Solution to implement		Change case size for chicken supply from supplier to store from 12 units to 6 units per case		
Location	Timing	Change to SOP manuals?	New BOM	Equipment upgrade
All stores	New case quantities can be delivered by the supplier from May '13	Not required	Yes	No
State intended implementation planning			How has the solution impacted "the problem"?	
Supplier will order new case size for packing in April '13. Supply in new case quantity to store will commence May '13. Ordering systems for stores will be amended April '13 placing first orders for new case count on May '13. Sales rate at store is not affected.			Trials have proven that the case quantity of 6 units prevents waste at store from over supply due to case count being greater than sales rate.	
How will improvements be measured?			How has the change been communicated?	
Waste losses linked to sales will be tracked by month from store activity reporting.			Store replenishment communications and adjustment of supplier contract.	
Stage approved by:		Date:		
Project sponsor comments	The team has successfully identified that by changing the unit case size to reflect store sales rate, waste at store is eliminated.			

The output from this stage is:

- An effective implementation plan including how the impact will be sustained, where additional opportunities lie and the implementation plans for them;
- Change to SOPs (standard operating procedure documentation) that will embed the new practice that prevents waste;
- Measurement protocol to be carried out over an agreed period of time that will measure the new procedure against the old way that created waste and that will confirm that the new way is working;
- Communication of success of the project to the immediate and wider business, telling what was achieved (stating tonnes and financial saving, including other metrics if applicable, e.g. CO₂, hours worked, etc.), why the project was started, how the project was conducted and showing how the project could be applied in other areas; and
- Celebration of the team effort to acknowledge their success and encourage others to be involved.

4.3. Developing and delivering a voluntary collective action programme to prevent food waste in businesses

Measureable reductions in food and drink waste have been achieved by businesses working towards a common goal, through voluntary collective action. Examples of the mechanisms used and their impacts can be found in the Introduction and Module 2. This section outlines how you can plan and deliver food waste reductions with a cohort of businesses, using this proven method. You may be undertaking this alongside action to reduce and prevent food and drink waste arising in households – which, when combined can give large-scale results in a country or large region.

If you are an organisation or group of organisations who wish to develop, establish and deliver a food waste prevention programme targeted at multiple businesses, within a country or region, then you will need to have:

- A better understanding of the opportunities, barriers, actors and potential partners to prevent food waste (methods to do this are covered in Module 1);
- Quantified what is known about the amount of food waste arising and where (methods to do this are covered in Module 1); and
- Decided that exploring a voluntary collective action mechanism to work with businesses to prevent and reduce food waste is an objective you would like to pursue and understood the governance context surrounding this.

4.3.1. Step 1 – Plan and develop a strategy for voluntary collective action

This section is about how to deliver a food and drink waste prevention and reduction programme through a voluntary collective action mechanism targeted at multiple businesses, within a country or region. As a business that may want to commit to being part of voluntary collective action within a country or region, you have a role to work with the organisation(s) planning the programme. Context can be found in Module 2.

Voluntary collective action can be defined as:

Those commitments undertaken by firms and sectors that are the result of agreement with public authorities or delivery bodies and/or are explicitly recognised by the authorities, or a delivery body. Usually, they have been launched by (central and local) government or by industry.

Based on the outcomes from Module 1 and Module 2, you should decide:

- Which sectors to target (e.g., processors & manufacturers, retailers, hospitality and catering); and
- Which companies within those sectors to target.

You should then determine which organisation(s) will administer and support the delivery of the voluntary collective action programme. The role of this body (either an existing, or new organisation or a government department) can be summarised as being to:

- Provide an independent and neutral link between the government and businesses;
- Demonstrate credibility within the food and drink sector;
- Focus on and deliver evidence-based guidance which meets business needs;
- Bring industry together and convey what steps are needed to businesses in a clear, concise and compelling way; and
- Establish, develop and maintain effective relationships with businesses, sector bodies and government.

The process of developing a voluntary collective action programme may include a range of tasks. Negotiating with business to determine the scope of any agreement may be quite different to developing measures within government. Obtaining and retaining buy-in during negotiations is essential. The process will require different skills and approaches to other policy tools, and careful consideration of the various interests and agendas involved. This may be particularly true where a 'discovery phase' is necessary to identify the exact problems to be addressed. Sector-specific knowledge may also be highly beneficial.

The inclusion of businesses that are considered to be sustainability leaders in their field is seen as important both by those responsible for setting up a voluntary collective action programmes and by other participants. Those responsible for a voluntary collective action programme need to strike a balance between being inclusive and not setting standards too high and making involvement attractive and worthwhile to front-runners.

Trade associations can also play an important role in establishing or managing a voluntary collective action programme. Trade associations are less likely to play an important role in those voluntary collective action programmes where the target group is a relatively small number of companies.

There is unlikely to be a unique blueprint for a successful voluntary collective action programme as, in practice, the vast array of issues involved, the differing levels of initial understanding and the sheer diversity of sectors and participants, makes it clear that there is no 'one-size-fits-all' solution.

Provided below is a list of prompts for those involved in developing voluntary collective action programmes. Keeping these points in mind should help to clarify for government, the delivery body/partnership, and participants, what the voluntary collective action programme can achieve and how they could be assessed.

Planning and developing voluntary collective action mechanism can be helped by using the following:

Gather and use information to:

- Develop a clear and credible case for action and communicate this to the target organisations and businesses you identified,
- Inform your delivery strategy – who will you need to work with and how,
- Inform and develop your support strategy (the guidance you will develop and how you will operate to encourage and support businesses to take action), and
- Use events and meetings with key influencers to get their views and gain buy-in – with the objective of them committing to work with you to take action and meeting a collective target.

Using the outcomes from this process:

- Decide what the objectives of voluntary collective action programme should be and clearly define this,
- Decide how the voluntary collective action will be administered and how delivery support will be provided,
- Decide how businesses will formally commit the voluntary collective action programme. Key elements are:
 - Businesses will sign up to a collective target (set in Step 2 – Section 3.2.2),
 - They will take actions towards it and that they will report their progress to the administrative body, in a consistent way, and
 - Decide what communication channels are available and will be used, when, the target audience and messages.

Factors that might lead to more successful outcomes are:

- Some kind of formal contract, which each business or partner signs on behalf of their organisation, to give weight to the voluntary collective action,
- Support and guidance that will be developed collaboratively for use by the businesses to prevent and reduce food and drink waste are identified,
- Clearly communicating what the body responsible for the voluntary collective action programme will do, and
- Making clear the expectation on businesses who commit to the voluntary collective action programme.

It is likely that this Step 1 will take between one and two years, depending on the basis from which the process starts.

**Example
34****WORKING WITH BUSINESSES IN SWITZERLAND**

The Swiss Government has adopted an action plan on Green Economy in March 2013, reduction of food waste is one of the measures of the action plan.

The main pillar of the campaign against Food Waste in Switzerland is a stakeholder dialogue and from December 2012 until March 2013 representatives of several Swiss federal offices held talks with key players of the food supply chain and non-government organizations. The dialogue partners were asked to assess the food waste situation in Switzerland and especially in their own spheres of influence, to estimate the potential for reduction and to express their view on the role the state has to play.

The analysis of these talks has allowed to identify areas of action, such as quality standards, cooperation along the supply chain, expiry dates, awareness raising, innovation and marketing of by-products.

Businesses have since started taking action, for example, the quality standards of fruits and vegetables are being revised by the private organization in charge.

In a meeting with all stakeholders and representatives of the federal administration it was decided to establish working groups on expiry dates, education, information and awareness-raising and cooperation with food banks. In these areas, collective action is the key for success. First results are expected in spring 2014.

The stakeholder dialogue shows that the actors of the food sectors as well as civil society are willing to contribute actively to the debate and to step up collective efforts with a view to reducing food waste.

For more information see (in French/German/Italian):

<http://www.blw.admin.ch/themen/00010/01570/01668/index.html?lang=fr>

The industry association FoodDrinkEurope example below shows how cross national boarder work is being encouraged through targeting different parts of the supply chain to work towards a common goal. This framework could help form the basis of further work with businesses in the supply chain, for example through voluntary collective action – a key mechanism covered by this Guidance

Example 35

'EVERY CRUMB COUNTS' - JOINT FOOD WASTAGE DECLARATION

In the area of food wastage, FoodDrinkEurope has committed to: “(working) with food chain and other stakeholders, policymakers, retailers and consumer organisations, to reduce and, where possible, avoid food waste along the chain”. Putting this commitment into practice, FoodDrinkEurope spearheaded a joint initiative involving representatives from across the entire food supply chain, known as the Joint Food Wastage Declaration, ‘Every Crumb Counts’. The Joint Declaration was launched in June 2013 with the support of a number of key decision makers at both EU and international level including: the Chair of the European Parliament’s ENVI committee Matthias Groote MEP, Swedish MEP Anna Maria Corazza Bildt and James Lomax of the United Nations Environment Programme (UNEP). The signatories (seventeen to date) , have pledged to work towards preventing edible food waste, to promote a life-cycle approach to reducing wastage and to actively feed into European, national and global initiatives and solutions in this area. Some of the commitments outlined in the Joint Declaration include:

- Contributing to the development of a common EU definition and methodology for assessing food wastage in the EU;
- Contributing to the development and dissemination of best practices for identifying and preventing food wastage;
- Raising awareness of food redistribution channels;
- Encouraging food operators to explore, together with stakeholders, alternative markets for would-be food loss arising from products, ingredients and intermediate products.

The initiative is supported by UNEP/FAO THINKEATSAVE Campaign, Wageningen University & WRAP.

<http://everycrumbcounts.eu/>

http://everycrumbcounts.eu/uploads/static_pages_documents/JD_PDF_%28FINAL_VERSION%291.pdf

<https://www.youtube.com/watch?v=e6psbhUCPyo>

Example 36

HONG KONG'S FOOD WASTE CHARTER AND FOOD WISE CAMPAIGN

Hong Kong faces an enormous food waste problem. In 2011, over 3,500 tonnes of food waste, accounting for about 40 per cent of municipal solid waste, were disposed of at landfills every day. .

In response, the Hong Kong Government has adopted a multi-pronged approach to tackle the problem. The Food Wise Hong Kong Campaign, implemented by the Environment Bureau has the following objectives:

1. Promote awareness of the community on the waste management problems in Hong Kong;
2. Coordinate efforts within the Government and public institutions to lead by example in food waste reduction;
3. Instil behavioural changes in the community at individual and household levels that will help reduce food waste generation;
4. Draw up and promote good practices on food waste reduction of commercial and industrial establishments;
5. Encourage leadership in the commercial, industrial and community sectors to take action and share best practices; and
6. Facilitate food donation between the establishments with surplus food with charitable organizations in the community.

CONTINUED

To mobilise active participation from the Hong Kong community, the Food Wise Charter has been set up asking signatories to firstly agree to a problem statement and then to a series of steps for implementation.

We understand and agree that -

1. Hong Kong has a worrisome waste problem. We dump about 1.27 kg municipal solid waste per person per day.
2. Food waste is the largest source of municipal solid waste. In 2011, we dumped about 3,600 tonnes of food waste in landfills every day – about 40 per cent of municipal solid waste.
3. When food is wasted, apart from the cost implications, all the land, water, fertilizer and labour needed to grow that food are also wasted. In addition, greenhouse gas emissions are produced by the decomposing food in landfills and by the transport of food that is ultimately thrown away.
4. To realise the vision of a truly sustainable world, we need to transform the way we produce and consume our natural resources. We can all play a useful part to reduce food waste for the benefit of our community.

In order to contribute to reducing food waste from the community, we are committed to:

1. Promoting best practices and behavioural changes to reduce food waste.
2. Drawing up plans to promote the awareness and acceptance of food waste reduction best practices by stakeholders within our organisations Implementing plans with measurable targets to reduce food waste in our organisations and business settings.
3. Encouraging and supporting the management of organisations to conduct in-house waste audits and to use the results of those audits to improve waste management performance.
4. Supporting the Food Wise Hong Kong Campaign and similar initiatives to encourage behavioural and cultural changes that engender respects for our precious food and natural resources.
5. Promoting and adopting recipes that make use of food trimmings.
6. Supporting food donation activities whenever possible.

Since being launched in May 2013, over 200 organisations had signed the charter by August 16th 2013. They represent government institutions, education establishments and hospitals, businesses and NGO's

<http://www.scmp.com/lifestyle/family-education/article/1218410/dealing-hong-kongs-food-waste>
<http://www.foodwisehk.gov.hk/en/news.html>

4.3.2. Step 2 – Establish a baseline and set a target

Use this section to quantify waste within a voluntary collective action programme. This can form your baseline for measurement against.

As described in Section 1.2.2, it is very challenging to obtain accurate figures at a national or regional level. They are nevertheless extremely useful in developing an understanding of the sector and then prioritising effort. If you want to use data to show trends and changes within the food and drink sector in a particular geographic region, it is likely that you will best be able to do this by working with a cohort of businesses. This approach benefits from relative ease and accuracy of data measurement, and consequent generation of evidence of reducing waste. – If you agree common measurement and reporting methods it provides a robust way to measure progress. A baseline can be established against which progress is monitored. A baseline is the measurement against a target before the start of any programme of activity. You may also be able to secure business commitment to voluntary collective action to establish the baselines and measurement. It should be measured in the same way as monitoring in future years of the voluntary collective action, to allow fair comparisons to be made. The methods to deliver a programme of voluntary collective action with businesses are described in Module 2 and Module 4.

It may be that a number of key performance indicators are required within a voluntary collective action programme. These could include:

- Outcome, e.g. how much waste arises and how it is managed (e.g. linked to targets to increase recycling);
- Impact, e.g. estimates of environmental or economic benefits arising from the reduced waste; and
- Enabling changes, e.g. tracking the proportion of companies who report waste arisings to their executive board quarterly.

For waste measurement, agreement around the following is required:

- Which materials to include in the agreement and which to exclude. This should include decisions around:
 - Different materials (e.g. does it include material that cannot be eaten such as preparation wastes);
 - Different waste streams (e.g. in the UK, very little waste from retailers was going down the sewer, so this waste was excluded from reporting to focus on more important waste streams); and
 - Whether certain by-products should be included for optimised resource efficiency (e.g. if the primary aim of the agreement is to encourage food manufacturers to reduce material leaving the human supply chain, then you may consider including material sent to animal feed that could have stayed in the human supply chain if better managed).
- What measurement methods are acceptable for reporting.
- Reporting:
 - Frequency (e.g. annual, quarterly, monthly) and period of reporting;
 - Timescales (it is best to avoid busy times of year such as just prior to major festivals or the start of a financial year to reduce the burden and increase the quality of reporting);
 - Confidentiality of the data and security procedures, in particular whether information will be reported for individual companies or if only a total for all signatories is reported.
 - Whether the data can be used for other purposes, including providing analysis such as benchmarking between companies within the agreement.

The baseline is likely to need minor amendment over time due to the following:

- Companies introduce better measurement methods, so their estimates of the baseline year may improve and change;
- New companies join the agreement; and
- Companies are sold, merge, acquired or go out of business.

Target setting

Target setting needs to take account of a number of factors:

- How much waste is generated and what the potential is for reduction;
- Which sectors are included within the voluntary collective action programme;
- How easy it is to engage the appropriate companies and how ready they will be to sign up to a target of a specific level. They could be motivated by an ambitious target; they could also be put off by what they consider as an unachievably high target;
- Whether there is an alternative course of action being proposed to companies that do not sign (e.g. legislation or regulation);
- What funds you and the businesses have to deliver against the target; and
- The perception of the target by stakeholders: the business sectors involved, relevant government departments, the public and relevant commentators. Will there be any consequences of delivering the target that could be perceived as negative and how can this be mitigated?

Use this information to set a SMART (Specific, Measurable, Actionable, Realistic and Time-bound) target. For example: reduce ingredient and product food and drink waste in manufacture and retail, in country X by 10% by 2020, from a 2014 baseline.

4.3.3. *Step 3 – Develop evidence-based guidance for businesses*

This step is more relevant to an organisation or group of organisations who are responsible for delivering a food and drink waste prevention programme which is targeted at multiple businesses, within a country or region, and/or through a voluntary collective action mechanism.

This step helps you to use the information from Steps 1 (Section 4.2.1) and 2 (Section 4.2.2) and Module 1, to develop guidance, which will support the prevention and reduction of food and drink waste and support actions you and businesses will take in Step 4.

Developing this evidence base and working with industry to develop credible and practical tools and guidance can take many years and significant technical expertise - often finding new solutions and working in new areas.

This section provides an overview of how this evidence-based implementation and guidance work can be developed. The organisation(s) responsible for delivering the voluntary agreement should implement a strategy of between four and eight years, to design and commission (or undertake directly) a programme of work to develop evidence, guidance and tools for industry to use to reduce and prevent waste. These should be made available to businesses, and form the basis of engagement work with them to support the adoption of the guidance (Step 4). Without supporting businesses with evidence and guidance to take action and successfully prevent and reduce food and drink waste, either unilaterally or as part of voluntary collective action, it is unlikely that sufficient reductions in waste will be achieved.

If an existing organisation is made responsible for these activities, the focus should be on them establishing credibility and evidence to influence the sector – and it is likely to be that working in partnership with other key organisations will be essential to success.

There are two areas of opportunity to all businesses to prevent and reduce food and drink waste:

- In their own operations; and
- Across their supply chains.

Food and drink waste in manufacture take the form of:

- Ingredients;
- Produce;
- Partially-formulated products;
- Part or whole batches of product;
- Whole, packaged products; and
- Waste in bins and to sewer (e.g. liquids).

Food and drink waste at retail can be:

- Whole packaged product (e.g. damaged packaging or close to or out of expiry date – i.e. ‘best before’ or ‘use by’);
- Produce;
- In-store preparation waste (e.g. bakery); and
- Whole or partial unpackaged product (e.g. meat, fish and delicatessen counters).

Food and drink waste in hospitality and food service can be:

- Ingredients;
- Produce;
- Leftover food on or in customers’ plates or glasses;
- Unused partially-prepared food;
- Unused fully-prepared food;
- Peelings and preparation wastes; and
- Waste in bins and waste to sewer (e.g. liquids).

Evidence and guidance you produce should help tackle the reasons for the food and drink waste. It is unlikely that there are just a few reasons why waste arises. The evidence, tools, guidance and work with industry that you conduct should support the behaviours required by businesses to enable them to reduce and prevent waste. You should:

- Give clear evidence of the drivers for action – this may be financial, consumer pressure (the public) and customer pressure (in the supply chain). Often, businesses operate at profit margins of just a few percentage points. Reducing waste can therefore have a big impact on their profit margin. Developing a business case for action is key; and
- Demonstrate that waste prevention measures are often behavioural and therefore are no or low-cost actions to a business. There may be a perception that capital investment is needed. So, the objective is to determine simple, evidence-based changes that can help businesses optimise their operations and behaviours to reduce and prevent waste.

Example**37****REDUCING FOOD WASTE IN A FOOD SERVICE BUSINESS – COMPASS GROUP**

Trim Trax is a simple initiative from Compass Group UK & Ireland to target food waste. It allows their catering teams to measure how much waste is produced in their kitchens and to then take steps to reduce it. The initiative can minimise both the environmental and operational cost of food waste within a catering facility. It targets not only food waste, but also wastage in the production process itself, through overproduction, or out-of-date stock.

Trim Trax, works by giving each kitchen section their own Trim Trax food waste bin. Everything thrown away is recorded by volume, categorised and assigned a value each day. Results are then entered online. These are tracked and at the end of the week a report is generated, allowing them to easily monitor the waste reduction.

The reports are accessible through an online portal and help the catering team identify actions and set targets to reduce wastage, to save money and to protect the environment. The best performers can be recognised and rewarded appropriately.

Entering the information online enables the Corporate Responsibility team to measure wastage across the whole company. It is a simple, high-impact tool to raise awareness of the issue of wastage with our teams and embed the disciplines necessary to reduce it.

“As a leading foodservice and support services provider, Compass is continually looking at ways to further reduce its environmental impact and we fully support WRAP’s Hospitality and Foodservice Agreement. We have already made significant achievements across our business to increase recycling rates and reduce waste and we are committed to taking this further, working with our suppliers, clients and customers to meet the Agreement’s targets.”

Ian Sarson, Group Managing Director, Compass Group UK & Ireland

Example**38****GUIDANCE FOR COMMERCIAL CATERING**

In France, the Permanent Centre for Environmental Initiatives (CPIE) has produced a Framework with practical examples to help commercial catering providers reduce food waste. Entitled “How to reduce food waste in commercial catering”, the Framework provides a range of advice on how to conduct a food waste reduction programme, including identifying priority actions, stock management, how to motivate staff and how to raise awareness of the issue among customers.*

*http://alimentation.gouv.fr/IMG/pdf/GuideGaspillage-8_pages_cle8759e5.pdf

4.3.4. Step 4 – Take action to prevent and reduce food and drink waste

Key to the success of any voluntary collective action programme – that businesses within it collectively achieve the objective – is the actual delivery and implementation support provided. This should be provided by the organisation responsible for the voluntary collective action programme along with key delivery partners. The extent of this should not be underestimated and neither should the fact that it may need to be sustained over a number of years and that the strategy will evolve over that time period.

When engaging with businesses, it is important to present evidence to key sector bodies who can influence their peers and members. Work with them to develop consistent messages and act to promote the evidence and guidance you develop.

Use the evidence, guidance and tools developed in Step 3 to provide this support on a one-to-one basis or a one-to-many basis (e.g. training).

Partnerships are central to success. The partnership approach in the context of a voluntary collective action programme is based on everybody working together to drive positive change – working towards a common goal – the target. This common goal also means that the sector adopts consistent measurement and follows the same direction of travel. This is likely to lead to wider positive impacts in the sector, as it means that this more consistent approach becomes the way the sector works, rather than multiple initiatives and goals leading to a wide variation in focus and potential inefficiencies. It is worth noting that waste is often generated in companies as a result of market failure, because of the actions of others in the supply chain. That is why partnership and working across supply chains is so helpful.

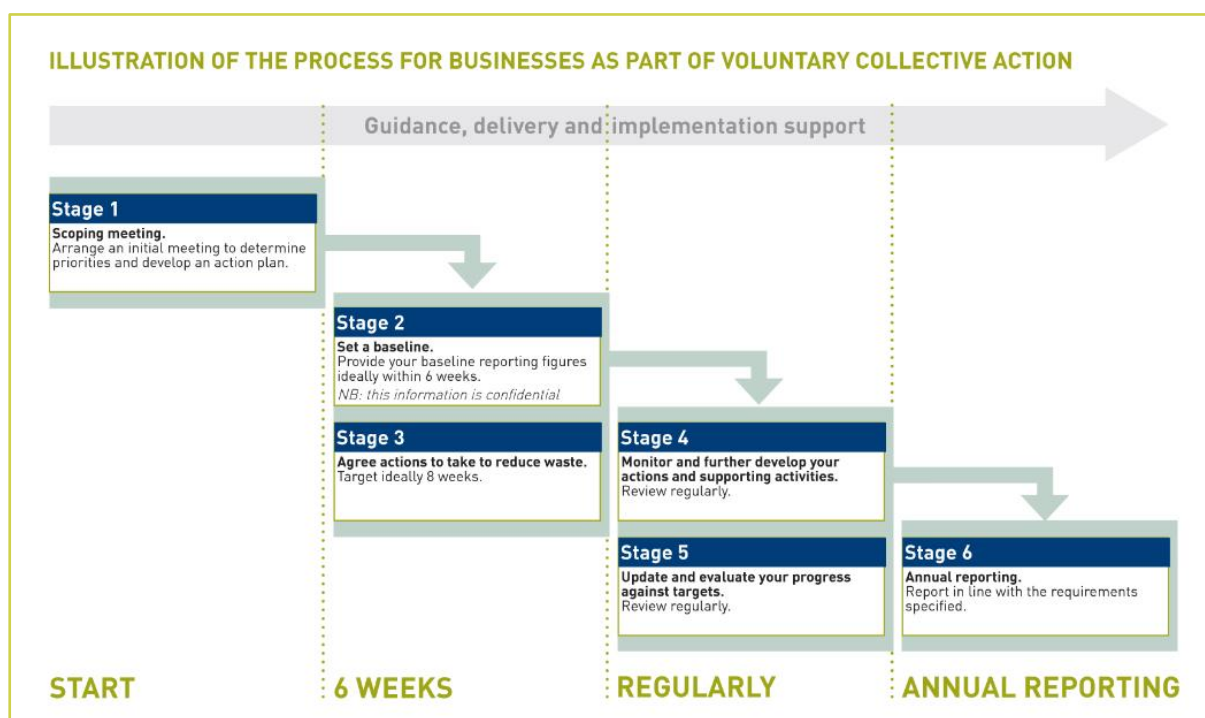
Steps that the organisation(s) responsible for delivering voluntary collective action or businesses working unilaterally can take include:

- Setting a waste prevention target (often businesses may have a ‘zero waste’ target referring to recycling waste or diverting it from landfill, rather than prevention and reduction at source);
- Embedding this target as a key performance indicator in operations, supply chain and employees;
- Measure waste coming from their operations, in tonnes and financial value;
- Use this data to identify the main areas of waste – i.e. the biggest opportunities for prevention – focus on these to start – don’t try to tackle everything;
- Produce a waste prevention plan to capture this and update on progress. Because there are many reasons for waste, it is important to focus time and effort on changes where they can have the greatest impacts. Focusing on the significant waste streams and one or two ways to address them can have substantial impact on waste reduction and prevention;
- Using continuous improvement principles (for example, the WASTE process outlined above);
- These are likely to require changes in behaviours, work instructions and operational systems rather than capex investment;
- Consider the role of changes such as ordering and production planning (shelf life and relationships with suppliers / customers might identify behaviours that might lead to waste and how they could be overcome e.g. does the drive for “on time, in full” delivery to retailers mean that sometimes there are wasteful practices, when forecasting and communication can be improved);
- Consider how you can drive and support your suppliers to reduce waste e.g. by setting minimum standards, working collaboratively (see case studies) and include waste considerations in commodities sourcing;
- Identify how you can change your products and packaging to help consumers waste less e.g. clear date labelling and storage guidance, increasing shelf life and “open” life of product
- Identify how you could use consistent common messages on waste prevention e.g. Think Eat Save and Love Food Hate Waste;
- Increasing redistribution of food to institutions that assist the provision of food insecure people (e.g. food banks, charities);
- Where there are sector-wide issues which need to be overcome, identify where industry working groups can be convened and terms of reference agreed to tackle the barriers to waste prevention and reduction, and develop and embed solutions into the operations. For example, to develop model mechanism of embedding waste prevention requirements and guidance within franchise business models and processes; and
- Measure and report on waste (to show progress towards target) and also to share learning and success from what actions have been taken (see Section 4.3.5).

It's important for us to recognise that businesses will already be looking to prevent waste to run an efficient and effective business operation – this is about going further and faster to play a part in tackling food waste globally.

For an organisation committed to voluntary collective action, this process is illustrated in Figure 32 below.

Figure 32 Illustration of the process for businesses as part of voluntary collective action



There is a need to work over a sustained period of time to establish baselines, evidence, guidance and working methods, and evolve these into more specific areas (as knowledge within the organisation(s) and the sector develops).

Example 39

REDUCING WASTE IN BUSINESSES IN PORTUGAL

In Portugal, a dedicated central structure was established to work on the identification of the causes of waste and to take action with other business areas, defining the necessary measures to minimise waste, such as: adjusting variety, space and quantity devoted to every item in every store (according to their sales potential), adjusting the ordering process, adjusting the supply units (number of units per box), correcting packaging problems (reducing losses by handling), ensuring the fast management of overstocking situations and optimising processes. More than €100 million worth of waste reduction between 2002 and 2012.

**Example
40****REDUCING WASTE IN SANDWICH PRODUCTION**

Sandwich producer the Greencore Group implemented 6 food waste initiatives at their sandwich manufacturing factory, Manton Wood, in the UK. Food waste was reduced by 788 tonnes annually – equivalent to 4.5 million sandwiches

1. **Bread** – targeted reduction of waste at source, among other things, realising savings of over 600 tonnes per year;
2. **Tomato ends** – implemented new process whereby tomato ends are used as diced tomatoes, reducing tonnage by 97.9 every year;
3. **Sandwiches** – overproduced sandwiches are now being collected for redistribution to charity, leading to savings of 40 tonnes per annum;
4. **Cutter loss and belt-end waste** – zoomed in on cutter loss and replaced cutters with ones that create less vibration and waste. Savings of 24 tonnes have been achieved;
5. **Ham ends** – sent ham ends back for re-usage by supplier, saving 13.1 tonnes every year; and
6. **Sausages** – developed methods to re-use sausage ends in stuffing, saving 7.8 tonnes every year; and replaced cutters with more modern ones which contribute to savings of 5.4 tonnes per year.

The waste initiatives were developed within the W.A.S.T.E framework. To understand all inputs and outputs from both financial and environmental points of view, a System Boundary Map was developed. This is essentially a mass-balance for the whole factory. The analysis showed that 7,542 tonnes of waste were generated (including food and packaging waste). This high level overview helped the team focus on the most significant waste streams, and highlighted where waste was generated and helped the team focus on the most significant issues which led to waste generation.

At this stage a project facilitator assembled the team members, which were then assigned key food waste hotspots. They then analysed the collated information and developed a thorough understanding of the root causes of why the waste was occurring. Subsequently, the teams solutions and evaluated these following the Plan-Do-Check-Act cycle, eliminating those solutions which proved unsuitable during the “Check” phase. For the viable solutions, the teams created a detailed cost benefit analysis to create a business case. These solutions were then implemented – leading to the waste reductions identified above. Packaging waste was also reduced through this process and the full case study can be found on the WRAP website.

**Example
41****UK RETAILER CENTRAL ENGLAND CO-OPERATIVE SOCIETY LIMITED* AND FRUIT COMPANY FYFFES COLLABORATE TO REDUCE BANANA WASTE BY OVER 80 TONNES PER YEAR**

Both the Central England Co-operative and Fyffes worked in partnership to prevent banana waste between factory-in-gate and till. The waste prevention solutions identified that banana waste can be reduced by 83.7 tonnes per year – which would represent a reduction in the rate of waste as a proportion of sales of 50% – and save 270 tonnes of CO₂e per year (equivalent to the annual carbon footprint for two convenience stores).

Working collaboratively has delivered benefits to both Central England Co-operative and Fyffes, including: breakthroughs achieved by working across functions and basing actions on trial results and other evidence; transferable learnings for all those involved; and opportunities for employee development by learning new skills.

Smaller box-size

The partnership identified that introducing small 12kg banana boxes in 8 convenience stores would reduce waste by 90% and CO₂e emissions by 56 tonnes every year. This solution was created as it was identified from the project that 18kg boxes were too large for convenience stores.

The smaller boxes minimised stock carry over at the end of the day's trading and had the added benefit of maintaining product quality for the consumer. More frequent replenishment meant the fruit was fresher and less marked or bruised, which resulted in additional sales. Consumers benefited from a better quality product and less food was wasted in store.

Bagging up loose bananas to reduce-to-clear

A process for stores to bag up loose bananas and put them up for sale as reduce-to-clear items, thereby reducing waste, was trialled in 6 stores.

During the trials, stores completed data capture sheets to record banana waste. Employees were required to record data on different types of bananas (e.g. loose, small, value, and organic bananas) for three weeks, identifying the following criteria: amount wasted by weight/count; amount reduced by count; reason for banana wastage; and total value of product.

Other opportunities

The waste prevention work has accelerated plans to install banana hammock displays to reduce bruising from overfilling and optimise the banana display.

To improve in-store practices, the team used posters and trialled an intensive visit and coaching regime. However, this proved to be ineffective. Therefore, the approach has been modified and to improve banana care, Central England Co-operative plan to use their new 'Store Manager Buddy System', whereby the managers of the best banana waste prevention performing stores will 'buddy up' with the managers of the worst performing stores to share best practice. Fyffes will then coach the 'Store Manager Buddy' teams regarding in-store banana care. All stores will receive a banana care kit, developed by Fyffes.

*At the time of this trial the retailer was named "Midlands Co-operative Society Limited"

4.3.5. *Step 5 – Measure, monitor and report*

Use the method in this guidance to measure and report the total impact of the voluntary collective action programme. Often, the progress of individual businesses can be commercially sensitive. By collating information and reporting overall progress, you can overcome this barrier. Using this cohort of businesses and the measurement methods, can show in a robust way the impact on food and drink waste arisings. This is a key way to measure and demonstrate progress towards a waste prevention and reduction goal.

4.3.6. *Measuring waste arising from a cohort of businesses not part of a collective action programme*

When working with a cohort of businesses, an important point to note is that information reported each year allows a fair comparison to be made between different years within the agreement, i.e. it covers the same companies, the same waste streams, and is measured in a consistent way by the individual businesses.

In addition to monitoring progress, the creation of the baseline provides the co-ordinator of any voluntary collective action with information that can be used to update the amount of waste generated by a sector.

There is also the question of what companies might do in the absence of a voluntary collective action programme. This helps understand the 'counterfactual' to the collective action, i.e. what would have happened without the collective action, and helps provide more confidence in the evidence used to determine progress towards the targets. This should be considered if possible, although it is likely to be challenging.

Ways to measure this may include the following:

- Monitoring waste of a sample of businesses **not** in the voluntary collective action programme. The sample needs to be as closely matched to the businesses in the voluntary agreement to allow a fair comparison. Variables used for matching should include those that influence food and drink waste levels, including the type of business and its size. This approach may not be possible if you have successfully recruited the majority of a sector. Also they may be influenced by the other companies involved in the VA or through their trade body.
- Economic forecast modelling. For example, if data are available on national GDP projections, this can potentially be used to model future food and drink waste arisings, assuming there is a proven link between GDP and waste. The waste projections would be compared against the monitoring of signatories on an annual basis to estimate how much net impact the agreement has had.
- Asking companies who have committed to a voluntary collective action programme the extent to which any changes have been the result of being part of the voluntary collective action. Questions should be asked as part of a structured survey. Care needs to be taken to ask the appropriate person or people within an organisation, and the questions should be phrased in such a way as to minimise any bias in the response.

Guidance for the organisation(s) responsible for voluntary collective action

Throughout the development and delivery of your strategy to prevent food waste, you should conduct work to measure changes. You should use this information to inform your on-going strategy and delivery.

You should use the data submitted to you to report changes to the quantity (in tonnes) of food and drink waste, and the associated financial and environmental benefits.

Learning from Voluntary Collective Action

WRAP has learnt the following tips while working with retailers and manufacturers on the Courtauld Commitment*:

- For companies with on-site waste treatment facilities, the input into these facilities should be reported so as to be consistent with other companies.
- For material going down the sewer, companies need to make an estimate about the amount of product being wasted. The dilution level as it goes down the sewer means that this will require estimation from data such as suspended solids or chemical oxygen demand (COD).
- It is useful to record food distributed to people by charities and material going to animal feed, even if they are not classified as waste in your country. This information helps understand the flows of material and may explain trends in waste.
- It may be useful to record sales through company shops (to company staff) and returns from retailers to manufacturers.
- It is very useful to obtain information on the proportion of food and drink waste that is avoidable and unavoidable, as this is key in identifying which waste streams could be reduced and prevented.
- To prioritise confidentiality, to build trust, but at the same time to be transparent, trustworthy and robust in what data are gathered and reported.

WRAP has learnt the following tips while working with outlet business operators on the Hospitality and Food Service Agreement:

- Contract caterers, i.e. businesses that operate a hospitality and/or food service on behalf of a client (often on the client's premises), can encounter barriers to reporting on waste quantities and management routes as waste collection is often outside their control. In addition, waste material is often co-collected with wastes from the client's business activity, which may be unrelated to hospitality and food service. This could mean that waste quantities cannot be used without further work to attribute the waste amounts concerned. Monitoring their waste streams may be an innovation for such a business.
- Businesses that operate a business model that includes franchising or tenancy agreements may also not have sufficient influence over some of their outlets either to measure the required data or enforce waste reduction interventions.
- Food and drink waste going to sewer can be significant in some sub-sectors, such as large-scale catering. Therefore it is important to capture this and enforce the fact that it is waste, as some businesses see it as the 'zero landfill' option. Experience shows that it can be measured.
- If different stages of the supply chain are involved in the agreement, you will need to be careful that double counting does not occur and either have clearly defined reporting boundaries or confidence that any double counting is insignificant. For example, both a supplier and an outlet operator may collect information on food waste from distribution. Clearly defining the scope of reporting to signatories is essential.

*<http://www.wrap.org.uk/node/62/>

Tip: Document your data collection

It is recommended that you document your data collection process, including your approach, methodologies, assumptions and key data sources and contacts. This way, it will be easier to compile your data for the next year of reporting. It may be that different people are responsible for different areas of data. However, one representative from your company should check and approve data before it is submitted. This data enables you to track progress against the target you have established.

4.4. Summary

Preventing food waste in businesses requires partnership working alongside evidence-based guidance. This is to encourage and support businesses to make changes that contribute to food waste prevention. A sustained and evolving strategy, at a national or large region level, supported by commitment and delivery within businesses and across supply chains, is more likely to yield significant results. Investment will be needed to establish and deliver this work at a national or regional scale, but cost and effort can be reduced by using learning from this Guidance document and by modifying existing resources where suitable. The examples in this section illustrate the range of elements and results that can be achieved through developing and delivering a food waste prevention programme with businesses. Businesses and supply chains can establish targets, embed them and take actions to prevent and reduce food and drink waste at little or no cost. Measurement of waste within businesses and supply chains is more challenging. Overall, however, costs can be significantly outweighed by the benefits achieved from food waste reduction. Many resources additional are available free of charge from www.thinkeatsave.org and www.wrap.org.uk/food.

About the UNEP Division of Technology, Industry and Economics

Set up in 1975, three years after UNEP was created, the Division of Technology, Industry and Economics (DTIE) provides solutions to policy-makers and helps change the business environment by offering platforms for dialogue and co-operation, innovative policy options, pilot projects and creative market mechanisms.

DTIE plays a leading role in three of the six UNEP strategic priorities: **climate change, harmful substances and hazardous waste, resource efficiency**.

DTIE is also actively contributing to the **Green Economy Initiative** launched by UNEP in 2008. This aims to shift national and world economies on to a new path, in which jobs and output growth are driven by increased investment in green sectors, and by a switch of consumers' preferences towards environmentally friendly goods and services.

Moreover, DTIE is responsible for **fulfilling UNEP's mandate as an implementing agency for the Montreal Protocol Multilateral Fund** and plays an executing role for a number of UNEP projects financed by the Global Environment Facility.

The Office of the Director, located in Paris, coordinates activities through:

- > **The International Environmental Technology Centre** - IETC (Osaka), promotes the collection and dissemination of knowledge on Environmentally Sound Technologies with a focus on waste management. The broad objective is to enhance the understanding of converting waste into a resource and thus reduce impacts on human health and the environment (land, water and air).
- > **Sustainable Consumption and Production** (Paris), which promotes sustainable consumption and production patterns as a contribution to human development through global markets.
- > **Chemicals** (Geneva), which catalyses global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
- > **Energy** (Paris and Nairobi), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
- > **OzonAction** (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
- > **Economics and Trade** (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies. This branch is also charged with producing green economy reports.

DTIE works with many partners (other UN agencies and programmes, international organizations, governments, non-governmental organizations, business, industry, the media and the public) to raise awareness, improve the transfer of knowledge and information, foster technological cooperation and implement international conventions and agreements.

For more information,

www.unep.org/dtie

www.unep.org

United Nations Environment Programme
P.O. Box 30552 Nairobi, Kenya
Tel: ++254-(0)20-762 1234
Fax: ++254-(0)20-762 3927
E-mail: unepub@unep.org



For more information, contact:

UNEP DTIE

**Sustainable Consumption and
Production Branch**

15 rue de Milan

75441 Paris CEDEX 09

France

Tel: +33 1 4437 1450

Fax: +33 1 4437 1474

www.unep.fr/scp

ISBN: 978-92-807-3346-4

Job Number: DTI/1688/PA