



Report

Detailing the scope of Scotland's food and drink waste prevention targets

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This report reflects detailed discussions by a steering group composed of SEPA, Scottish Government, and Zero Waste Scotland in early 2016, as well as a growing body of evidence from elsewhere in the UK and around the world. Zero Waste Scotland would also like to thank WRAP for sharing their experience of the challenges inherent in creating robust food waste estimates, and their direct input into developing the estimates of household food waste presented here.

1 Food and Drink Waste Prevention Baseline: What's in scope?

1.1 What is “food waste”?

Scotland has adopted the definition of food and drink waste developed by Fusions, a European collaboration funded by the EU, as a working definition. This states:

“Food waste is any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed (including composted, crops ploughed in/not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea)”.

Further clarification states:

“Drink and liquid waste, fish discarded to sea and waste of any materials that are ready for harvest, but which are not harvested, are included in FUSIONS’s definition of food waste... FUSIONS also considers inedible parts of food (e.g. skin, bones...) as food waste in order to support the development of resource efficient and sustainable food systems in the EU.”¹

This is helpfully illustrated in the following diagram:

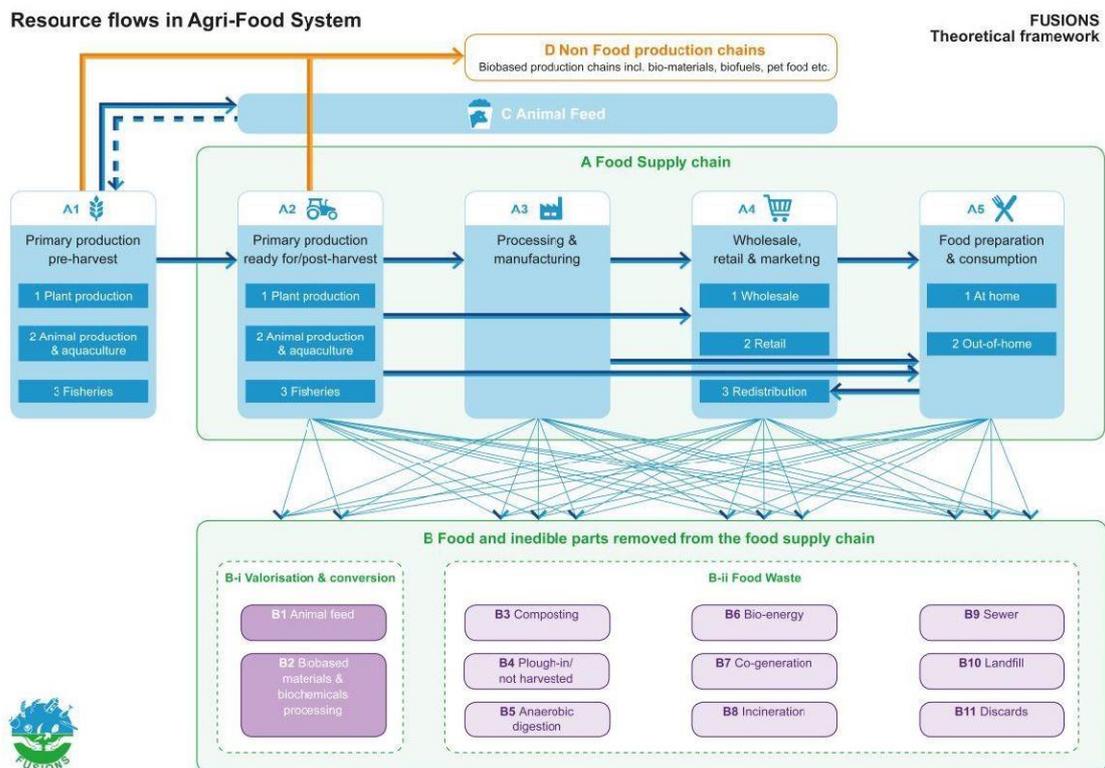


Figure 1.1 Illustration of food waste classifications as applied by the EU Fusions project. Source: Fusions

It is likely that this definition will underpin future EU guidance on food waste definitions, though if there are divergences in approach, it is likely the formal EU guidance will ultimately be preferred in Scotland.

However, the current Scottish baseline is narrower in sector coverage than the Fusion’s definition, reflecting both data constraints (specifically around liquid disposal), and a division between supply chain and consumer food waste (the focus of the baseline) and food waste arising from primary

¹ Fusions 2016, Food Waste Definition – Fusion’s Definitional Framework, <http://www.eu-fusions.org/index.php/about-food-waste/280-food-waste-definition>

production (which will be considered separately). The coverage of the Scottish baseline is explained in greater detail in the next section.

1.2 What counts towards Scotland's baseline?

The baseline year is 2013, the most recent year for which data on commercial and industrial food and drink waste was available when work was undertaken in 2015. Household food and drink waste estimates were available for 2009 and 2014. An interim estimate was therefore made for 2013 (to align with the commercial and industrial data) assuming a linear trend between these two measurement points.

The baseline covers food and drink waste arising from households, regardless of how it is disposed.

The baseline covers commercial and industrial food and drink waste captured in SEPA's national waste data. In this case experts reviewed the list of all waste codes (which record the type of waste) and identified those that were primarily, or partly, food and drink waste. In the cases of codes that are *partly* food waste (specifically mixed waste), desk research identified what proportion of the waste code was likely to be food waste.

The commercial and industrial waste baseline currently excludes:

- **Food waste from primary production**, for which there was too little evidence available to make a robust estimate in 2015. Additionally, pre-farm gate waste is treated separately from supply chain waste in the UN sustainable development goal on food waste – reflecting the greater variability and specific challenges in tackling it. Scotland's *Making Things Last* strategy identifies evidence work to fill this knowledge gap as a priority, and work to obtain a better understanding of this challenging area is underway. Year to year variation in this figure may be high.
- **Disposal to sewer**, for which there was too little evidence available to make a robust estimate in 2015. This too was identified as an evidence gap in *Making Things Last*, and Zero Waste Scotland is exploring how to best fill this knowledge gap for food and drink manufacturing, where quantities are expected to be significant. The value of adding this to the baseline, or managing this as a separate issue will then be assessed. Filling this gap in other sectors (specifically hospitality and catering) may not be cost-effective, given the challenges of measurement and the smaller volumes of waste involved. This will be reviewed in 2016.

Also excluded are:

- **Byproducts / coproducts.** These are materials arising from food and drink manufacture that are not legally classified as waste because they are used in other agricultural or industrial processes. Byproducts are therefore wholly out of scope for discussions of food and drink waste prevention, though improving how byproducts are used, by moving material to higher value applications, can give additional economic and environmental benefits. It is though possible that between now and 2025 new industrial processes provide opportunities to reduce food "waste" as the material can increasingly be directed to productive use as byproduct. This would legitimately count towards the target. Conversely if the market for any materials currently used as byproduct disappears, this material might be reclassified as waste. This would legitimately count against the target. Therefore understanding byproducts *is* important to understanding how Scotland progresses against its food and drink waste reduction target in future.
- **Waste managed on-site** (e.g. on-site AD). This is not counted in national waste data, and we are likely to retain this exclusion from the baseline. Data on on-site treatment is now available and understanding this matters, as, as with byproducts, shifts between treatment routes may complicate target measurement in future, and gains in environmental or economic performance may be obtained by treating this material differently, regardless of the contribution to the target.

Confidence in the baseline would be improved by focusing on some areas of commercial and industrial waste where certainty is lower:

- **Food surplus fed to animals** is not counted as food waste in emerging EU guidance, and Scotland will follow this lead. However, current practice among firms is inconsistent in this regard, and it is possible some food surplus destined for use as animal feed is counted in the site returns on which SEPA's waste data is based. This may lead to an overestimate in the 2013 baseline, and we will review and adjust this as the evidence becomes clearer.
- **Some non-food material may be counted in waste codes we have classed as food waste.** Recent UK research has suggested that as much as 50% of the commercial and industrial waste streams from food and drink manufacture considered to be organic waste consists of non-food and drink waste (specifically water from site cleaning processes, and soil and stones). We will work with SEPA, and the food and drink manufacturing sector, to identify if this is also the case in Scotland, and will amend the baseline if appropriate
- **Some fisheries and fish farm waste may not be accounted for.** Separate data is available on fisheries and fish farm waste, but some of this material may also be in the SEPA waste data. We will conduct a short review to identify any duplication or gaps in 2016, but currently anticipate this will lead to, at most, a very small adjustment.

2 How robust is the baseline?

Households

Data on households builds on several years of research in Scotland, and the rest of the UK. Overall our confidence in this part of the estimate is good, though the data for local authority managed waste is better than that for other disposal routes.

There is only a small uncertainty around scope – food fed to animals is counted as food waste in a household context, but not in commercial and industrial contexts. Food waste that is composted at home is also counted, whereas in a commercial and industrial context waste managed on site would not count. Scottish practice follows the approach to date across other UK nations, and fits to household-focused messages around food waste prevention. However, as EU guidance is clarified it may be appropriate to classify these elements of household waste differently. As we have data on both these elements individually, this would be a relatively straightforward adjustment to the baseline.

Commercial and Industrial

Data on commercial and industrial waste is less confident than that for households. Uncertainty primarily arises from:

- The possibility that some material in codes we have classified as food waste may be non-food material
- The possibility that sites may not classify all waste and materials consistently with our definitions for the baseline (specifically animal feed and byproducts)
- The possibility that waste may move between streams we can measure and those we cannot in future (for example sewer to solid disposal)

Other areas of uncertainty are clearly bounded – this includes pre-farm gate waste and waste managed on site. Liquid disposal may complicate future measurement of food waste levels if disposal routes change from solid to liquid or vice versa.

We will aim to improve our confidence in the baseline data, amending it where necessary, as evidence improves.

3 Detail on the household baseline

An estimate was made for Scottish Household food waste for 2014. Full detail can be seen in a separate report, *Household Food and Drink Waste in Scotland 2014*. For the purpose of devising the overall Scottish baseline for 2013, the reduction trend between the central estimates for 2009 and 2014 (the most robust Scottish measurement points available) was calculated on a linear basis, and a 2013 figure was estimated from this. It is therefore slightly higher than the actual 2014 figure.

All household food and drink waste, regardless of disposal route, is in scope for the baseline. This includes:

- Food waste disposed of in residual waste collections (estimated from Scottish compositional studies in 2013-2015)
- Food waste disposed of in separate food waste collections, or mixed garden/food waste collections (estimated from Scottish collection data (2014), and for mixed food/garden waste collections, UK data estimating the split (various years))
- Food waste disposed of down the drain (estimated from diary work at UK level, most recently in 2012)
- Food waste composted at home (estimated from diary work at UK level, most recently in 2012)
- Food waste fed to pets (estimated from diary work at UK level, most recently in 2012)

Whilst there is always some uncertainty around food waste estimates as this is a challenging area to measure, overall confidence in the estimates for household food and drink waste is good. The 2014 estimate was the best ever for Scotland, and builds on several years of experience at Scottish and UK level. Nonetheless, different methodologies can give somewhat different answers, so while we are confident this estimate is broadly correct, we acknowledge there are bounds of uncertainty around it.

The scope of the household data is very clear, with only a minor question arising around food fed to animals and home composting. This may be excluded from EU target guidance once finalised, but has always been included in household food waste research in all the UK nations. We will take a view in future, when detailed EU guidance is available, on the consistency of this approach. The tonnages involved are not large.

4 Detail on the commercial and industrial baseline

How was this calculated?

We reviewed the SEPA waste data for commercial and industrial premises covering the following sectors: Agriculture, Forestry, Fishing; Mining and Quarrying; Food and Drink Manufacture; Manufacturing of Wood Products; Chemical Manufacture; Other Manufacturing; Power Industry; Water Industry; Waste Management; Commerce.

We identified the codes listed below as eligible to be counted as food and drink waste, or likely to contain significant quantities of food and drink waste. To simplify this task, codes accounting for less than 100 tonnes of waste were excluded (and are not shown in the list below).

European Waste Classification (EWC) Category	EWC Sub-category	EWC Code	EWC Description
Mixed wastes	Mixed wastes	20 03 01	Other municipal wastes - mixed municipal waste
Mixed wastes	Mixed wastes	20 03 02	Other municipal wastes - waste from markets

Animal and mixed food waste	Mixed waste of food preparation and products	20 01 08	Municipal wastes (Household waste and similar commercial, industrial and institutional wastes separately collected fractions - biodegradable kitchen and canteen waste
Animal and mixed food waste	Mixed waste of food preparation and products	20 01 25	Municipal wastes (Household waste and similar commercial, industrial and institutional wastes separately collected fractions - edible oil and fat
Animal and mixed food waste	Animal waste of food preparation and products	02 01 02	wastes from agriculture, horticulture, aquaculture, forestry, hunting & fishing - animal-tissue waste
Animal and mixed food waste	Animal waste of food preparation and products	02 02 01	wastes from the preparation and processing of meat, fish and other foods of animal origin - sludges from washing and cleaning
Animal and mixed food waste	Animal waste of food preparation and products	02 02 02	wastes from the preparation and processing of meat, fish and other foods of animal origin - animal-tissue waste
Animal and mixed food waste	Animal waste of food preparation and products	02 02 03	wastes from the preparation and processing of meat, fish and other foods of animal origin - materials unsuitable for consumption or processing
Animal and mixed food waste	Animal waste of food preparation and products	02 05 01	wastes from the dairy products industry - materials unsuitable for consumption or processing
Vegetal wastes	Vegetal waste from food preparation and products	02 01 01	wastes from agriculture, horticulture, aquaculture, forestry, hunting & fishing - sludges from washing and cleaning
Vegetal wastes	Vegetal waste from food preparation and products	02 01 03	wastes from agriculture, horticulture, aquaculture, forestry, hunting & fishing - plant-tissue waste
Vegetal wastes	Vegetal waste from food preparation and products	02 03 01	wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation - sludges from washing, cleaning, peeling, centrifuging and separation
Vegetal wastes	Vegetal waste from food preparation and products	02 03 04	wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation - materials unsuitable for consumption or processing
Vegetal wastes	Vegetal waste from food preparation and products	02 06 01	wastes from the baking and confectionary industry - materials unsuitable for consumption or processing
Vegetal wastes	Vegetal waste from food preparation and products	02 07 01	wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa) - wastes from washing, cleaning and mechanical reduction of raw materials
Vegetal wastes	Vegetal waste from food preparation and products	02 07 02	wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa) - wastes from spirits distillation
Vegetal wastes	Vegetal waste from food preparation and products	02 07 04	wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa) - materials unsuitable for consumption or processing

Mixed wastes	Undifferentiated materials	02 01 99	wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing - wastes not otherwise specified
Mixed wastes	Undifferentiated materials	02 02 99	wastes from the preparation and processing of meat, fish and other foods of animal origin - wastes not otherwise specified
Mixed wastes	Undifferentiated materials	02 03 99	wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation - wastes not otherwise specified
Mixed wastes	Undifferentiated materials	02 07 99	wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa) - wastes not otherwise specified
Common sludges	Waste water treatment biodegradable	02 02 04	wastes from the preparation and processing of meat, fish and other foods of animal origin - sludges from on-site effluent treatment
Common sludges	Waste water treatment biodegradable	02 06 03	wastes from the baking and confectionery industry - sludges from on-site effluent treatment
Common sludges	Waste water treatment biodegradable	02 07 05	wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa) - sludges from on-site effluent treatment

Table 4.1 European Waste Classification categories and sub-categories considered to be in scope for calculating the commercial and industrial food and drink waste baseline in Scotland

One code was manually adjusted prior to inclusion in the baseline. The mixed waste category 20 03 01 describes waste that is disposed of in a residual bin. Some but not all of this will be food waste. We considered previous SEPA and Zero Waste Scotland studies to estimate the proportion likely to be food waste. Ultimately we assumed 24% of waste in this category was expected to be food and drink waste, in line with Scotland's carbon metric. Specific sector compositional studies also suggest figures in this range. While this approach seems valid for 2013, the composition of mixed waste is likely to change over time, in particular following the introduction of the Waste (Scotland) Regulations in 2014, and this will need to be considered in future progress updates.

One code (20 08 01) is dependent on waste management companies accurately splitting household and commercially collected food waste in their SEPA returns. We believe this split is broadly accurate, but this code may be vulnerable to consistency problems over time if individual waste management firms change their procedures.

Some codes may be judged out of scope in future – for example 20 03 02 “Mixed Waste From Markets” is probably not all food, but it is a very small category (less than 1,500 tonnes) in the context of the overall target. Other mixed waste categories (02 01 99, 02 02 99, 02 03 99, and 02 07 99) might also benefit from further consideration as to whether they are likely to be food in whole or in part (accounting for approximately 26,000 tonnes collectively).

As has already been highlighted, based on recent UK research, there may be other categories where non-food material makes up part of a code that has been classified as food and drink waste above, and this is the largest uncertainty in the method we have employed currently.

Separate estimates for food waste in mixed waste were available from compositional studies for the following commerce sub-sectors: Wholesale, Retail, and Motors; Health and Social Care; Education; Hospitality (see appendix for detailed figures). These can be used to estimate likely levels of food waste in these specific sub-sectors, and provide a sense check on the SEPA data. However some

caution is needed when doing this as these sub-sector estimates: are all older than 2013; exclude food and drink waste disposed of separately from mixed waste (though this is assumed to be small in the time period in question); and methodologically we know that scaling up from compositional studies tends to lead to inconsistent estimates to scaling down from national waste data. For this reason, while we do present these sub-sector totals in some contexts, these are lower confidence than our overall estimate for total food and drink waste. In presenting national totals we always ensure these sub-sector estimates fit to the headline SEPA data, and this should always be preferred in cases where data from bespoke compositional studies is directly contradictory.

What questions remain?

Risks of an overestimate

- If some waste codes in the food and drink manufacturing sector contain significant quantities of material that is not food and drink waste, as has been found at UK level in a recent study, then this might significantly reduce the baseline estimate. This may be a particular risk for sludges (which have a high water content). UK estimates for food and drink waste in food and drink manufacture have been reduced very significantly recently as a result of this.
- If some sites are classifying materials inconsistently (e.g. counting material destined for animal feed as waste) this would also inflate the baseline.

Risks to consistency over time

- Liquid disposal is not currently measured in national waste data. Over time some waste disposed of to sewer may come to be disposed of as solid waste (or vice versa). This may lead to increases or decreases in food and drink waste measured via the SEPA data irrespective of actual food and drink waste prevention. For this reason a better understanding of liquid disposal is essential to understanding future changes, as well as potentially being an important area of food and drink waste disposal in its own right. This consideration is most pertinent in the food and drink manufacturing sector, and Zero Waste Scotland is actively exploring the best way to obtain meaningful estimates for this. There may also be some hospitality and catering contexts where some food waste was macerated for sewer disposal in 2013 (prior to the Waste (Scotland) Regulations) but will now be being disposed of as solid waste. Otherwise, we think sewer disposal in non-manufacturing sectors will be broadly consistent over time.
- Pre-farm gate waste is currently excluded from the baseline due to a lack of evidence. Scottish Government have prioritised improving the evidence base in this area. In addition to being a potentially important area of waste in itself, changes to how food and food waste is managed on farm might lead to it occurring further along the supply chain in future. This would give the appearance of increasing food and drink waste, even if there was no actual change, posing a measurement challenge.
- Byproducts are not waste and are thus excluded from the target. It is possible in future that some material may be reclassified as waste / byproduct according to changing market conditions, new technologies, or regulation. This will legitimately contribute to target achievement or non-achievement. However understanding when this has occurred will help us to understand progress against the target.
- On site management is not counted as waste in national waste data and is thus excluded from the baseline. The consideration around this is similar to that for byproducts described above.
- We will undertake work to understand if fisheries and fish farm waste are already captured appropriately in the existing data.

Further work in 2016/17 will seek to address these areas of uncertainty.

5 How can change be measured in future?

The government's food and drink waste prevention target calls for a 33% reduction in food and drink waste by 2025, as against a 2013 baseline. The target covers the scope set out in section 1 of this document, with an expectation that the scope, and 2013 baseline, will be reviewed and if necessary revised, as evidence improves.

The target is a prevention target, so food waste collections and reprocessing will not contribute. Collections and recycling remain a key part of Scotland's wider waste policy, and give significant environmental and economic benefits. But prevention benefits are even greater, and are what the target is designed to help us achieve.

The target is set on a per capita basis, in line with the relevant UN sustainable development goal.

Scottish Government is actively considering the most effective ways to measure progress against the target in future, and the frequency at which this would be most beneficial. Based on our experience constructing the baseline (which drew on multiple evidence sources to ensure the best available evidence was applied in any given context) and the likelihood data availability and measurement methods continue to improve, it is likely the optimal approach will evolve over time. We also note that it will be easier to reliably measure larger changes over longer periods, than smaller changes over shorter periods, as there is a greater risk uncertainties in measurement may conceal genuine change in the latter case.

Appendix: Estimates for food waste in Commercial sub-sectors where studies exist

A number of specific sector studies in 2011 provided compositional analysis data on mixed waste from several sub-sectors that are counted as “commerce” in the SEPA waste data. These reports were based on visiting selected sites, measuring waste amounts and types, and then scaling these estimates to Scotland as a whole. These studies only covered “mixed waste” but we anticipate that this will be the majority of food waste thrown away in 2011, before separate commercial food waste collections became widespread. This scaling exercise is challenging, as seemingly similar businesses can often produce very different levels of waste. This approach will seldom match estimates derived top down from the waste data. In addition, since 2011, commercial waste data in Scotland has improved in quality, meaning some assumptions made in earlier scaling may tend to overestimate actual levels of waste.

Nonetheless, earlier work gives useful insight into where larger amounts of food and drink waste may be generated to consider these alongside the SEPA data on commercial waste. While the exact numbers and percentages are below average in confidence, their relative importance is likely to be a good representation of reality.

Sub Sector ²	Estimated Food Waste in Mixed Waste (tonnes)	As a % of all commercial waste (as measured by SEPA in 2013)	As a % of all commercial and industrial waste (as measured by SEPA in 2013)
<i>Motor</i>	830	0.5%	0.1%
<i>Wholesale</i>	11,000	6.3%	1.5%
<i>Retail</i>	31,000	18.0%	4.2%
Total for Motor, Wholesale, Retail	43,000	25.0%	5.8%
<i>Pre-primary Education</i>	700	0.4%	0.1%
<i>Primary Education</i>	12,000	6.8%	1.6%
<i>Secondary Education</i>	5,400	3.1%	0.7%
<i>Higher Education</i>	1,300	0.7%	0.2%
<i>Other Education</i>	2,300	1.3%	0.3%
Total for Education	22,000	12.0%	2.9%

² With the exception of hospitality, all data is from Exodus Research for Zero Waste Scotland, 2012, *The Composition of Mixed Waste from Scottish Health and Social Care, Education, Motor, Wholesale and Retail Sectors in 2011*, Zero Waste Scotland. Hospitality data is from WRAP, 2011, *The Composition of Waste Disposed of by the UK Hospitality Industry*, WRAP.

<i>Human Health Activities</i>	7,200	4.1%	1.0%
<i>Residential Care Activities</i>	8,000	4.6%	1.1%
<i>Social Work Activities Without Accommodation</i>	6,800	3.9%	0.9%
Total for Health and Social Care	22,000	13.0%	3.0%
Hospitality	54,000	31.0%	7.2%

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