



Updated Household Food and Drink Waste Estimates for Scotland

Scottish Household Food and Drink Waste in 2012

Zero Waste Scotland
January 2014



Contents

1	Key facts	4
2	Background: Estimating food and drink waste in Scotland and the UK	5
2.1	Previous Scottish estimates	5
2.2	UK estimates	5
2.3	Comparing Scotland and the UK	6
3	How much food and drink waste is there in Scotland?	7
3.1	Headline totals for food and drink waste in Scotland in 2012	7
3.2	Which food and drink is wasted and why?	8
4	How has this changed over time?	8
4.1	Why pick 2009 as a baseline?	8
4.2	The method for estimating 2009 data	8
4.3	How much food and drink waste was there in Scotland in 2009?	9
4.4	What can we say about change?	10

Zero Waste Scotland works with businesses, individuals, communities and local authorities to help them reduce waste, recycle more and use resources sustainably.

Find out more at
www.zerowastescotland.org.uk

1 Key facts

Household food and drink waste arisings in Scotland in 2012 are estimated to be around 630,000 tonnes. Of this, 380,000 tonnes (60%) was avoidable – had purchases been planned, stored, or prepared differently, then this food and drink could have been consumed.

The purchase cost of avoidable food and drink waste was approximately £1.1 billion. This is money we pay for food and drink that could have been eaten but ends up being thrown away. This is equivalent to £470 per household per year, or £39 per household per month.

Avoidable food and drink waste also accounts for 1.5 million tonnes of carbon dioxide equivalent (CO₂ eq) emissions. This relates not just to methane emissions when food waste is landfilled, but also to the energy and resources used growing, harvesting, processing, transporting, and preparing it – all of which also goes to waste when the food is thrown away. Preventing these emissions would offer the same CO₂ eq savings as taking 1 in 4 cars off Scotland's roads.

Approximately 430,000 tonnes of household food waste is collected by local authorities. This includes all collection routes (e.g. both food waste collections and general waste) and will be a mixture of avoidable and unavoidable food waste. The remainder is disposed of by other routes (e.g. home composting, disposal down the sink, fed to animals).

The figures above are calculated differently to previous estimates for food and drink waste in Scotland. The improved methodology is explained in the main text of this report.

The improved methodology has also been used to estimate comparable food and drink waste figures for 2009. This suggests 680,000 tonnes of food and drink waste arisings that year. Whilst this implies an apparent reduction in food and drink waste over the three years, the confidence intervals around the estimates mean that this reduction cannot be considered statistically significant. The extent to which change is likely to have occurred in Scotland should however also be considered in light of UK trends between 2007 and 2012, where a statistically significant reduction of 15% in overall food and drink waste was seen (and a 21% reduction in the avoidable fraction alone).

The 2012 estimates for Scotland have used some UK analysis where insufficient Scottish data was available for the period. A larger amount of Scottish data should be available by 2015, at which point we intend to update this analysis.

This report first explains the different methods used to calculate food and drink waste in Scotland and the UK as a whole in the past, and to the challenges associated with analysing changes in Scotland over time (section 2). It then gives more detail on the 2012 estimates (section 3). The next section explores what we can tell about changes over time, including the limits of what can be concluded (section 4).

2 Background: Estimating food and drink waste in Scotland and the UK

2.1 Previous Scottish estimates

The first study looking in detail at food and drink waste in Scotland was the *The Food We Waste in Scotland*, published in 2009¹. This work presented a detailed picture of what foods and drinks are wasted, how much is wasted, and why waste occurs, and was the first study of its kind in Scotland.

This work relied on extensive compositional analysis (where household waste is sampled and categorised), diary work (where households record what is wasted and why), survey work (which asked about behaviours), and evidence from previous UK studies. In this work a “per household” amount of food and drink waste was calculated for both local authority collected and non-local authority collected food waste, and this was scaled to the number of households in Scotland, accounting for household size. This “bottom-up” approach to estimating totals for food and drink waste requires per-household figures derived from a bespoke waste analysis designed to be representative of Scotland as a whole.

That method is different to that used to arrive at the 2012 estimate presented in this report (see below for an explanation of why this is), and so the two should not be directly compared. The 2012 estimate presented here uses a similar methodology to that used in recent UK estimates.

2.2 UK estimates

At the UK level, the first estimates for household food and drink waste were published by WRAP for 2007². These were based primarily of fieldwork in England and Wales. The original report, *The Food We Waste*, was updated in 2009, with the results published as *Household Food and Drink Waste in the UK*³. Since 2009, WRAP have published periodic updates on headline amounts of food waste, based on a synthesis analysis of local waste compositional studies, to facilitate reporting on progress against the food waste target under the Courtauld Commitment⁴. These synthesis studies were able to consider Scottish data towards the start of this period. In 2013, WRAP undertook extensive new fieldwork to update the 2009 findings in a high level of detail. This has been published as *Household Food and Drink Waste in the UK 2012*⁵.

The scaling methodology used in the UK reports since 2009 is different to that used in *The Food We Waste in Scotland*. The UK method calculates the percentage of food waste in the council-collected household waste stream, and then applies this to national waste data (a “top-down” approach). This has the advantage that even where only aggregated household data is available, an estimate can still be made, though it is still essential to have sufficient local studies to perform a robust analysis for a given time period (the non-household collected waste is estimated “bottom up” in this approach, as in

¹ WRAP Scotland, 2009, *The Food We Waste in Scotland*, <http://www.zerowastescotland.org.uk/content/food-we-waste-scotland>

² WRAP, 2008, *The Food We Waste*, (now superseded, but see detail at <http://www.wrap.org.uk/content/household-food-and-drink-waste-uk-2007-estimates>)

³ WRAP, 2009, *Household Food and Drink Waste in The UK*, (now superseded, but see <http://www.wrap.org.uk/sites/files/wrap/Household%20of%20food%20and%20drink%20waste%20in%20the%20UK%20-%20report.pdf>)

⁴ See WRAP 2012, *Estimates for Household Food and Drink Waste in the UK 2011*, <http://www.wrap.org.uk/content/estimates-household-food-and-drink-waste-uk-2011>, for an example of this periodic updating. The Courtauld Commitment is a UK-wide voluntary agreement to improve the resource efficiency of the grocery supply chain, and one of the targets relates to food waste. More information on the Commitment during this period can be found at <http://www.wrap.org.uk/content/courtauld-commitment-2-1>

⁵ WRAP, 2013a, *Household Food and Drink Waste in the UK 2012*, <http://www.wrap.org.uk/content/household-food-and-drink-waste-uk-2012>

Scotland). This approach has meant UK data has been subject to more recent updates than Scottish data, as bespoke fieldwork is not required for an update to the headline figures. Even where such fieldwork has been undertaken (as in the recent WRAP report for 2012) the headline totals have been calculated “top-down”. This provides consistency with other estimates, and with national waste data.

2.3 Comparing Scotland and the UK

The divergent methods identified above give slightly different estimates, even when the same compositional data is used as a starting point. For this reason, it has not been possible to contrast the 2009 Scottish estimate to the rest of the UK (or to the 2012 Scottish estimate below, which is calculated using the UK methodology), as any differences are likely to be methodological, rather than actual. Replicating the methodology deployed for the 2009 Scottish estimate in the present would involve repeating the extensive associated fieldwork - and it is not, in any case, clear that this scaling method offers significant advantages.

This report uses a “top-down” method to arrive at a Scottish estimate for 2012 (see section 3). It is also possible to make a new historical estimate for 2009 in Scotland using the “top-down” method. This report does so in section 4, to explore the extent to which change has taken place. In future Scotland will continue to apply the “top-down” method, to provide a consistent picture of change over time, and one that can be more frequently assessed⁶. This method of estimation is also in line with other Scottish studies of waste composition, including the comprehensive study of all local authority waste streams undertaken by Zero Waste Scotland in 2009/10, *The Composition of Municipal Solid Waste in Scotland*⁷, and Scottish national waste data.

In the period 2009 to 2012 it seems highly likely Scotland and the UK as a whole have behaved similarly in regard to food and drink waste trends. Behavioural studies do not show significant differences⁸, and 2009 data on amounts wasted (the last time sufficient data was available to compare the two) show no significant difference either⁹. Thus, while the current 2012 Scottish estimates are based to some extent on UK data, there is no reason to believe this is not applicable to Scotland. As policies and behaviour change initiatives diverge (for example Scotland’s roll out of food waste collections, and Scottish Government’s promotion of food waste prevention via its Greener Scotland campaign) this may become less true with time, and the need for Scottish data will be more acute.

Over the next two years (2013-2015) a large number of Scottish local authorities will be undertaking waste compositional studies, supported by Zero Waste Scotland. The main purpose of these studies is to enable local authorities to enhance their service offering, but the data collected will also allow for a fresh “top-down” estimate using Scottish data alone in 2015.

⁶ As the “top down” approach can, for local authority collected waste, conduct secondary analysis on existing compositional studies (provided sufficient studies are available for the period and location in question) it is much cheaper to conduct such analysis. Over the next two years in Scotland, we know sufficient primary studies will be carried out in Scotland to allow such secondary analysis to take place in 2015.

⁷ Zero Waste Scotland, 2010, *The Composition of Municipal Solid Waste in Scotland*, <http://www.zerowastescotland.org.uk/content/composition-municipal-waste-scotland>

⁸ See the reports already listed, which are supported by WRAP / Zero Waste Scotland behavioural tracking data (unpublished) over the period

⁹ See section 4 for a direct comparison

3 How much food and drink waste is there in Scotland?

3.1 Headline totals for food and drink waste in Scotland in 2012

The overall amount of food and drink waste in Scotland in 2012 was estimated based on a UK study conducted by WRAP and Zero Waste Scotland in 2013¹⁰. Carbon and cost savings are then derived from this total.

For local-authority-collected food waste, the 2013 study took data from local authority compositional studies in England, Wales, and Scotland to determine what proportion of local-authority-collected household waste consists of food. The overall amount of household waste collected by Scottish local authorities in 2012 was extracted from WasteDataFlow, the national waste management database. For non-local-authority-collected food waste (e.g. that disposed of on compost heaps, down the sewer, or fed to pets), the 2013 study used food waste diaries to estimate the amount thrown away by households. This was then scaled to the total number of households in Scotland in 2012.

Based on this approach:

- **The total amount of food and drink waste in Scotland in 2012 is estimated to be 630,000 tonnes**
- **Of this, 380,000 tonnes (60%) was “avoidable”.** The vast majority of avoidable food is composed of material that was, at some point prior to disposal, edible, even though some may not be edible at the time of disposal due to deterioration (e.g. it has gone mouldy). Avoidable food waste is the primary focus of any food waste prevention behaviour change campaign.
- **The remainder – 250,000 tonnes (40%) – was either “unavoidable” or “possibly avoidable”.** Unavoidable food waste is waste arising from food and drink preparation that is not, and has not been, edible under normal circumstances. This includes egg shells, pineapple skin, apple cores, meat bones, tea bags, and coffee grounds. Possibly avoidable is food and drink that some people eat and others do not (e.g. bread crusts, potato skins). As with ‘avoidable’ waste, ‘possibly avoidable’ waste is composed of material that was, at some point prior to disposal, edible.
- **Approximately 430,000 tonnes of household food waste is collected by local authorities.** This includes all collection routes (e.g. both food waste collections and residual waste) and will be a mixture of avoidable and unavoidable food waste. The remainder is disposed of by other routes (e.g. home composting, disposal down the sink, fed to animals).
- **The total cost of avoidable food waste was around £1.1 billion.** This is money we pay for food and drink that could have been eaten but ends up being thrown away. This is equivalent to £470 per household per year, or £39 per household per month.
- **Avoidable food waste accounted for 1.5 million tonnes of carbon dioxide equivalent (CO₂ eq) emissions.** This relates not just to methane emissions when food waste is landfilled, but also to the energy and resources used growing, harvesting, processing, transporting, and preparing it – all of which also goes to waste when the food is thrown away. Preventing these emissions would offer the same CO₂ eq savings as taking 1 in 4 cars off Scotland’s roads.

As previously discussed this methodological approach differs from that used in *The Food We Waste in Scotland* in 2009, reflecting improved understanding of food waste measurement methodologies in the interim. The revised methodology is also more cost-effective (though less detailed). This methodological difference means figures from the new estimate and *The Food We Waste in Scotland* should not be directly compared – section 4 explores change over time in Scotland.

¹⁰ WRAP, 2013a, as above

3.2 Which food and drink is wasted and why?

The 2012 estimates above are based on total amounts of food waste, and are only split into broad categories (avoidable food waste, and local authority collected waste). The most recent UK estimates for food and drink types wasted, and the reasons for this can be seen in WRAP's UK report¹¹. However, the fieldwork for this did not extend to Scotland. As a result, the best source for detail on food and drink types wasted in Scotland, and the reasons for this, remains the 2009 *The Food We Waste in Scotland*¹², the most recent study conducted here. Numbers for individual food and drink categories will still be broadly accurate, though we acknowledge the likelihood of some change over time. Estimated costs for specific food and drink types will, all other things being equal, now be underestimates, due to food price inflation in the interim.

Those interested in the detail of food and drink types wasted should continue to refer to the 2009 report. Some key facts from that report that are still relevant are:

- The most wasted food and drink groups by type
- The most wasted food and drink groups by value

At the same time the value of the UK report in providing insight into food waste behaviours in Scotland should not be underestimated – for example information comparing overall household purchases to food waste, which has only been analysed at the UK level.

4 How has this changed over time?

4.1 Why pick 2009 as a baseline?

As already identified, due to a methodological change, it is not valid to compare the 2009 *The Food We Waste in Scotland* figure with the new 2012 estimate, as they are calculated in different ways. However, it is possible to estimate a figure for Scotland in 2009 using the 2012 methodology.

Therefore, alongside the recent estimate for household food and drink waste in Scotland for 2012, estimates were made for 2009 using a consistent methodology for comparison. 2009 is a year in which Scottish specific compositional information is available (and is also the baseline year for Courtauld 2). It is anticipated that further Scottish-specific compositional data will be available for 2014 and 2015 from the recently started Scottish compositional analysis programme, against which progress from 2009 can be more definitively assessed. As such, the 2012 estimate for Scotland should be viewed as an indicative figure to interim progress, given that some of the data used was from the rest of the UK.

4.2 The method for estimating 2009 data

Estimating the data for local authority collected food waste

The method replicates that used for obtaining UK results, as outlined in *Synthesis of Food Waste Compositional Data 2012*¹³. This involves determining the proportion of food in residual waste from compositional analyses conducted in Scotland during 2009 – of which there were 8 – and applying this proportion to the total residual waste from Scottish households in 2009, as reported in WasteDataFlow. Estimates were also made for the following streams:

- Kerbside collections targeting food waste (separate food-waste collections and mixed-organics collections);

¹¹ WRAP, 2013a, as above

¹² WRAP Scotland, 2009, as above

¹³ WRAP, 2013b, *Synthesis of Food Waste Compositional Data*, <http://www.wrap.org.uk/sites/files/wrap/hhfdw-synthesis-food-waste-composition-data.pdf>

- Kerbside dry recycling (as contamination); and
- Household waste recycling centre (HWRC) residual waste¹⁴.

In keeping with the method used for the UK, the results were stratified by whether an authority collected food waste in targeted collections, and an adjustment was made to take into account differences in yields between authorities that had performed compositional analysis and those that had not.

Estimating other food and drink waste streams

Consistent with reporting in the technical paper for the household food waste target of Courtauld Commitment phase 2 (CC2)¹⁵, estimates were also made for the following disposal routes from the home:

- Sewer, mainly via the kitchen sink
- Home composting
- Fed to animals

The estimates for these come from UK data and are consistent with CC2 reporting. Estimates for these streams were obtained by assuming similar levels (per household) for Scotland compared to the UK in 2009.

4.3 How much food and drink waste was there in Scotland in 2009?

The table below provides estimates for household food and drink waste in Scotland in 2009: a total of 470,000 tonnes¹⁶ collected by local authorities, of which 97% was in the kerbside residual stream. A further 210,000 tonnes was poured down the drain, home composted or fed to animals. The total of 680,000 tonnes represents around 290 kilogrammes per household per year. The amount of food waste in target collections was relatively low (4,000 tonnes), reflecting the limited roll out of collections at that time.

The confidence intervals around these estimates are relatively large: for kerbside residual, the 95% confidence interval is approximately 45,000 tonnes (or 19 kg / household / year; around 10% of the estimate). Confidence intervals around the other streams are hard to quantify; these issues are discussed in section 13 of Methods Used for Household Food and Drink Waste in the UK¹⁷.

¹⁴ Estimates for contamination of kerbside dry recycling and HWRC residual waste were from 2010, for which results already existed. As these estimates are only a small proportion of the total, this is likely to have minimal impact on the results.

¹⁵ WRAP, 2013c, Technical Paper: Courtauld Commitment 2 Household Food Waste, <http://www.wrap.org.uk/sites/files/wrap/Courtauld%20Commitment%20%20Household%20Food%20Waste%20Technical%20Paper.pdf>

¹⁶ Different estimates were obtained by modifying some of the assumptions in the calculations. This led to changes of $\pm 25,000$ tonnes in the result for local authority collected waste; alongside the confidence interval, this gives an indication of the precision of these estimates.

¹⁷ WRAP, 2013d, Methods used for Household Food and Drink Waste in the UK 2012, <http://www.wrap.org.uk/sites/files/wrap/Methods%20Annex%20Report%20v2.pdf>

Stream	Food and drink waste in 2009	
	Total (tonnes)	Per household (kg / yr)
Kerbside residual	456,000	195
Kerbside collections targeting food waste	4,000	1.7
Contamination of kerbside dry recycling	1,000	0.4
HWRC residual waste	9,000	3.9
Total local authority collected	470,000	201
Total other	212,000	91
Total	682,000	292

NB: Note that in the majority of this report figures are rounded to two significant figures; there is therefore a slight divergence with this table.

The estimates for Scotland are similar in magnitude (per household) to those in the UK for 2009. Given that the confidence intervals quoted above are larger than this difference and there is also uncertainty associated with the UK estimate, this analysis provides no evidence of a difference in household food waste levels between Scotland and the rest of the UK at that time.

4.4 What can we say about change?

Although the estimate for 2012 is 630,000 tonnes (i.e. around 50,000 tonnes lower than the 2009 estimate), uncertainties around both estimates mean that a reduction in household food waste in Scotland cannot be considered statistically significant at this point in time.

However, the extent to which change is likely to have occurred in Scotland should be considered in light of UK trends between 2007 and 2012, where a statistically significant reduction of 15% in overall food and drink waste was seen (and a 21% reduction in the avoidable fraction alone)¹⁸. This reduction contributed to UK wide financial savings of around £3.3 billion per year for consumers, and £85 million per year in avoided landfill tax and gate fees for local authorities. 4.4 million tonnes of CO₂ eq were saved across the UK. Given the similar behaviours seen across the UK nations in this period (see section 2 above), it is highly likely real and significant benefits accrued to Scotland over this time span even though this cannot be proven with exclusively Scottish data.

It should also be borne in mind that the number of households and the Scottish population, have increased slightly over this period, though slower than for the UK as a whole. As a result, per household amounts of waste may have fallen slightly faster than the overall total (as has happened for the UK as a whole), though insufficient Scottish data is available to demonstrate this.

Whilst changes in the estimated carbon impact are directly proportional to the tonnages of food waste, the financial cost of food waste is related to both the amount wasted, and to food prices at the time. Since 2009 we have seen a period of sustained food price inflation. Thus, even though the headline estimate for food and drink waste quantities has fallen between 2009 and 2012, the value of the food and drink wasted has actually still increased at the UK level. We would expect this to be the case in Scotland as well.

¹⁸ WRAP, 2013a, as above, p4-5