
Final Report

Food Waste Collection Guidance



This document provides guidance on the collection of food waste for recycling. It draws heavily on the experience gained from the WRAP-supported food waste collection trials over the period January 2007 to March 2009.

WRAP helps individuals, businesses and local authorities to reduce waste and recycle more, making better use of resources and helping to tackle climate change.

Written by: Chris Mills and Jude Andrews, WRAP ROTATE

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1.0 Introduction

1.1 Aim of this Guide

This publication provides local authorities with guidance on the collection of food waste as a means of diverting household biowaste from landfill.

Reducing biowaste is a key objective of both national and European policy and legislation. Specifically, Waste Strategy 2007 for England identifies food waste as a key priority for improving the landfill diversion performance of local authorities. The Waste & Emissions Trading Act and Landfill Allowance Schemes (LAS) and the EC Landfill Directive include key measures to encourage local authorities to divert biowaste from landfill rather than face financial penalties.

All food waste collections, handling and processing must be compliant with the Animal Products By Products Regulations (APBR) introduced following the foot and mouth outbreak in 2003. This guide does not cover APBR in detail but will provide advice on designing a collection scheme that is compliant.

This guide describes different options and systems for collecting food waste at source, and highlights issues to consider when planning and implementing a scheme. It also provides advice on how to increase participation through effective promotion and communication activities.

1.2 Defining Food Waste

The following definitions are used in this publication:

- Biowaste: biodegradable materials from gardens and kitchens that are thrown away by householders as waste.
- Food Waste: waste generated during the preparation of meals and any food that is not consumed. It includes food that has been thrown away not used or partly used. It does not include packaging materials.
- Food waste may have meat excluded i.e.: vegetable peelings, fruit scraps, teabags, coffee grounds, egg shells, and dairy and bread products. Alternatively food waste can have meat included and so include cooked food, meat, fish, bones, etc.
- Garden waste: grass cuttings, woody garden waste, soil, plants, flowers, leaves, weeds.
- Commercial food waste: food waste generated by commercial businesses (such as catering establishments, retail outlets, supermarkets), food manufacturers and other public organisations.

'Catering Waste' and 'Kitchen Waste' are commonly used to describe food waste. These terms can be ambiguous and be misinterpreted so are avoided in this report.

1.3 Using the Guide

This publication provides information on all the main steps involved in setting up and running a food waste collection scheme. These include:

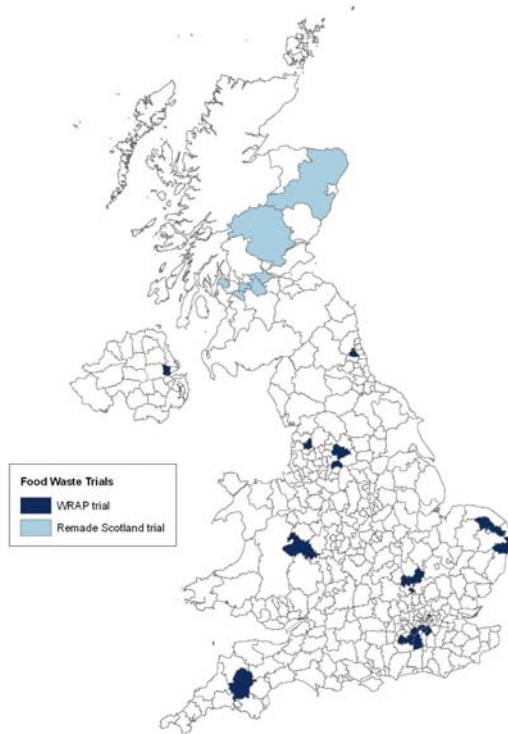
- assessing key issues such as waste diversion potential;
- locating a suitable treatment facility;
- choosing the right collection option;
- identifying appropriate equipment; and
- communicating service details to householders.

The guide also includes a number of 'Suggestion Boxes'. These are designed to present useful, practical ideas, tips, hints and other information relevant to the topic being discussed.

1.4 Further Information on Food Waste

In preparing this guidance we have drawn on both UK and wider European experiences of collecting food waste. In particular, between January 2007 and March 2009 WRAP supported 21 local authorities in the introduction of separate weekly food waste collections. The purpose of these trials was to provide a better understanding of collection costs and scheme performance in different parts of the country. The guide also draws on the experience of other local authorities, such as the Somerset Waste Partnership, who starting rolling out large scale separate collections of food waste in 2004 and has served 160,000 households since 2006.

Figure 1: Food waste trial locations



During 2008 Remade Scotland initiated a further seven trials, funded by the Scottish Government. These trials also aim to provide a better understanding of collection scheme costs and performance but in a Scottish context. Further information on the progress of the WRAP supported collection schemes is available on the website at <http://www.wrap.org.uk/fwct>

The trials were closely monitored and evaluated and the lessons learned from their experiences are included in a separate report and utilised in this guide.

Also available on the WRAP website is the report by Eunomia Research & Consulting that examines the costs and benefits of different approaches to dealing with household biowastes. Aspects of the original report were updated in 2008 to reflect the operational experience gained from the collection trials. These reports can be found at www.wrap.org.uk/local_authorities/research_guidance/food_waste

Assistance with the design and delivery of food, garden waste and dry recyclables collection schemes is available on application to WRAP at www.wrap.org.uk/las

2.0 Planning a Scheme – Issues to Consider

This section summarises the key issues that should be considered when planning a food waste collection scheme:

1. How can food waste be collected?
2. What are the benefits of collecting food waste?
3. How much food waste is available to divert and how much is likely to be collected?
4. How should the food waste be treated?
5. Should the food waste be collected separately or be co-mingled?
6. What legal issues need to be considered?
7. What are the costs?
8. Will the public support the proposed scheme?
9. Will a new scheme impact on home composting?

2.1 How can food waste be collected?

Food waste can be collected in four ways. Firstly the householder can save their food waste and place it in a home compost bin in their garden. This is only suitable for non cooked and non meat food waste although the quantities of suitable material are significant. This is also the best practical environmental option for about half of the food waste the average household produces. Further information on home composting can be found at www.recyclenowpartners.org.uk/local_authorities and www.recyclenow.com/home_composting

A local authority launching a food waste collection has three service options:

1. Collect food separately using a kerbside or bespoke vehicle.
2. Collect food separately but at the same time as other wastes or recyclables using a split bodied vehicle or at the same time as recyclables using a compartmentalised vehicle.
3. Collect food and garden waste mixed together in a single vehicle.

This guidance document should help inform local authority decisions relevant to these choices.

2.2 What are the benefits of collecting food waste?

Around 6.7 million tonnes of food waste is produced by UK households – that's about one-fifth of total household waste¹. Collecting food waste separately for recycling offers a wide range of potential benefits, e.g.:

- contributing to targets for diverting biodegradable waste from landfill;
- improving recycling rates;
- reducing waste disposal costs as landfill costs increase;
- reducing environmental impacts associated with landfill (toxicity in leachate, landfill gas emissions, etc.);
- reducing greenhouse gas emissions by removing the putrescent content from landfill sites;
- production of compost and liquid fertilisers for use as a soil improver;
- generation of heat and power through anaerobic digestion (AD) linked to combined heat and power plant or through use as a direct fuel; and
- complementing alternate weekly collections of refuse by collecting the odorous fraction weekly.

Collection of garden waste has become well established in the UK. By comparison, collections of food waste in the UK are relatively new although considerable expansion is expected in the next 10 years due to the need to divert

¹ Understanding Food Waste, WRAP March 2007: http://www.wrap.org.uk/local_authorities/biowaste.html

more biodegradable waste from landfill. It is possible to collect food waste separately or combined with garden waste. Although separate collection has proved successful in Europe until recently it was uncommon in the UK.

2.3 How much food waste is available and how much will be diverted?

Before committing to and investing in a food waste collection scheme, it is sensible to assess how much waste might be diverted from landfill as a result. This information can then be used to calculate potential benefits and cost-effectiveness, and to help shape the scope and design of the scheme.

At the beginning of the trials supported by WRAP the local authorities concerned believed food waste to be 20% to 40% of their overall household waste stream. It is not advisable to rely on average percentage of food waste when planning a scheme because different amounts of food waste are generated by different sectors of the community. Compositional analysis will provide a more accurate picture of the available food waste and enables the kgs per household produced to be determined.

Waste composition can also provide a break down of the types of food wasted. This will give an indication of how much food that is wasted could have been consumed vs that which is wasted in preparing meals. WRAP has studied this in The Food We Waste http://www.wrap.org.uk/local_authorities/research_guidance/food_waste/. Food waste can also be reduced through public awareness initiatives such as WRAP's Love Food Hate Waste campaign www.wrap.org.uk/love_food_hate_waste/partners

When determining how much food waste is available for collection, use data from a reliable, representative waste composition analysis. Focus on the kilogrammes available rather than the percentage in the waste stream.

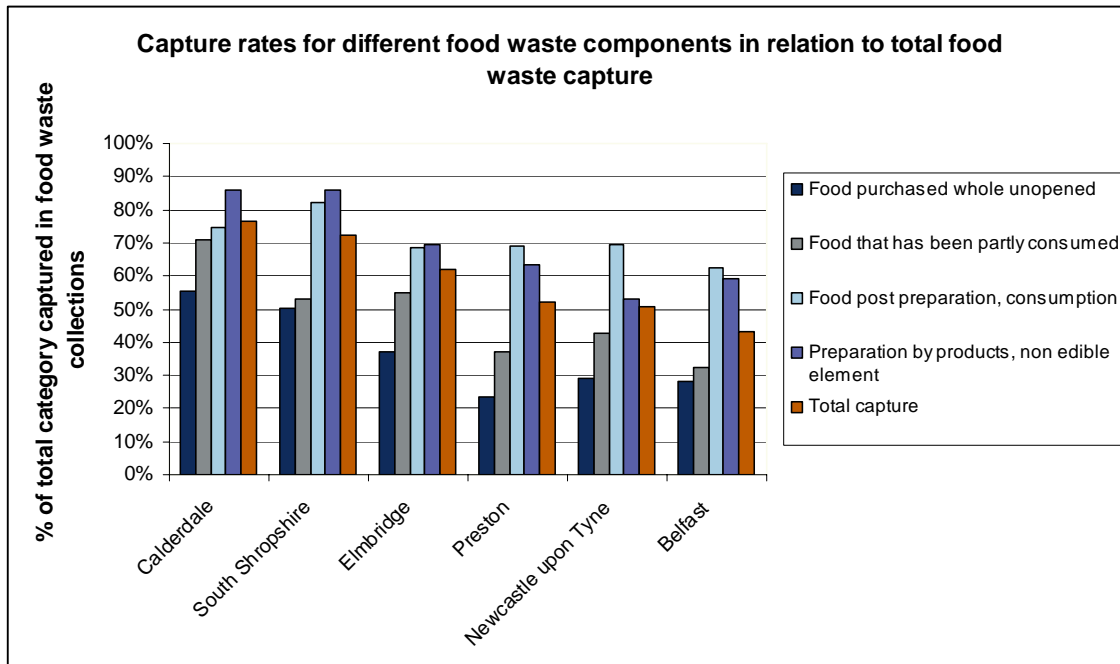
If your Authority plans to undertake its own waste analysis, guidance on conducting composition analyses of household waste is available on the Waste Information Network website www.win.org.uk

Whilst there is no substitute for specific local information the data collected from the Food Waste Trials supported by WRAP can be used as guide. See Section Four of the Food Waste Trials Evaluation Report www.wrap.org.uk/local_authorities/research_guidance/food_waste. This provides a ready reckoner for local authorities wanting to predict food waste yields that might be achieved by a separate food waste collection service.

It can be expected that only a proportion of the available food waste will be captured in the collection. This will depend on a number of factors depending on the community served e.g. commitment to recycling, cultural influences on cooking habits, home composting rates, amount of food left in packaging etc. WRAP commissioned capture rate analysis in six of the trial areas. It was found that the average capture rate for food waste (food waste presented for separate collection as a proportion of the total food waste put out at the kerbside) across the waste audits ranged from 43% to 77%, with an average of 59% across the six trials. See Figure 2 which shows the capture rates for different food waste components in relation to total food waste capture rate. It shows the largest fraction of food waste is unavoidable i.e. it is non edible peelings etc. This unavoidable fraction is 50% of total food waste.

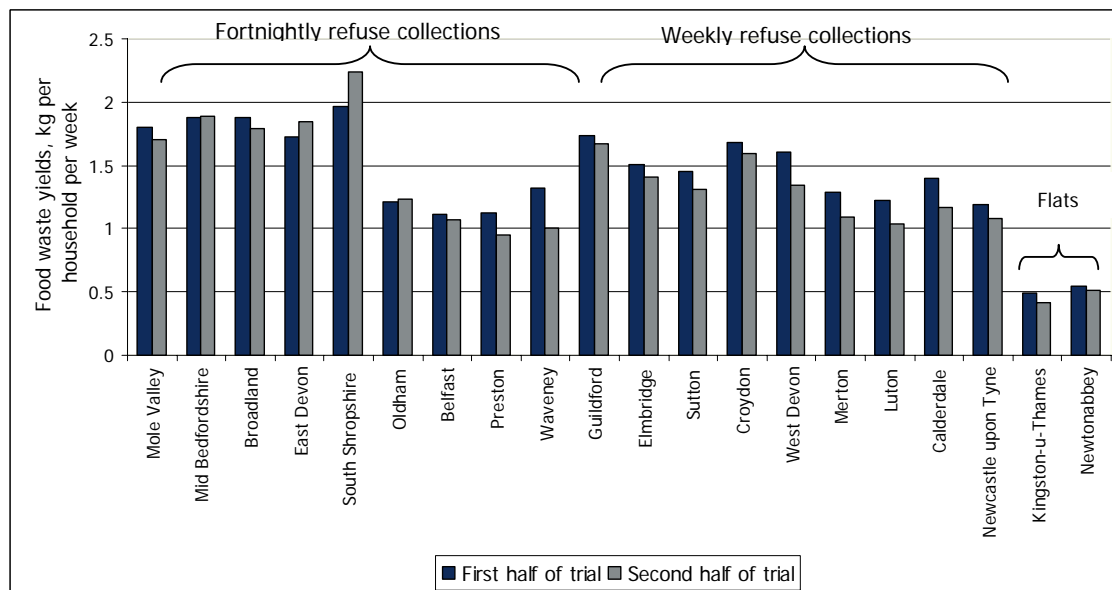
It is also worth noting that schemes with the highest capture rates were the ones where householders were able to put out all types of food waste and this was well communicated to them in particular in relation to cooked food, meat, rejected or partly consumed foods. For further discussion on Communications see Section 3.8.

Figure 2: Capture rates for different food waste components in relation to total food waste capture rate in six Food Waste Trial areas



The trials also recorded the tonnage of food waste collected on a weekly basis. The amount collected per household provided with a separate food waste service can be expected to be between 1kg and 2.2kg per week (see Figure 3).

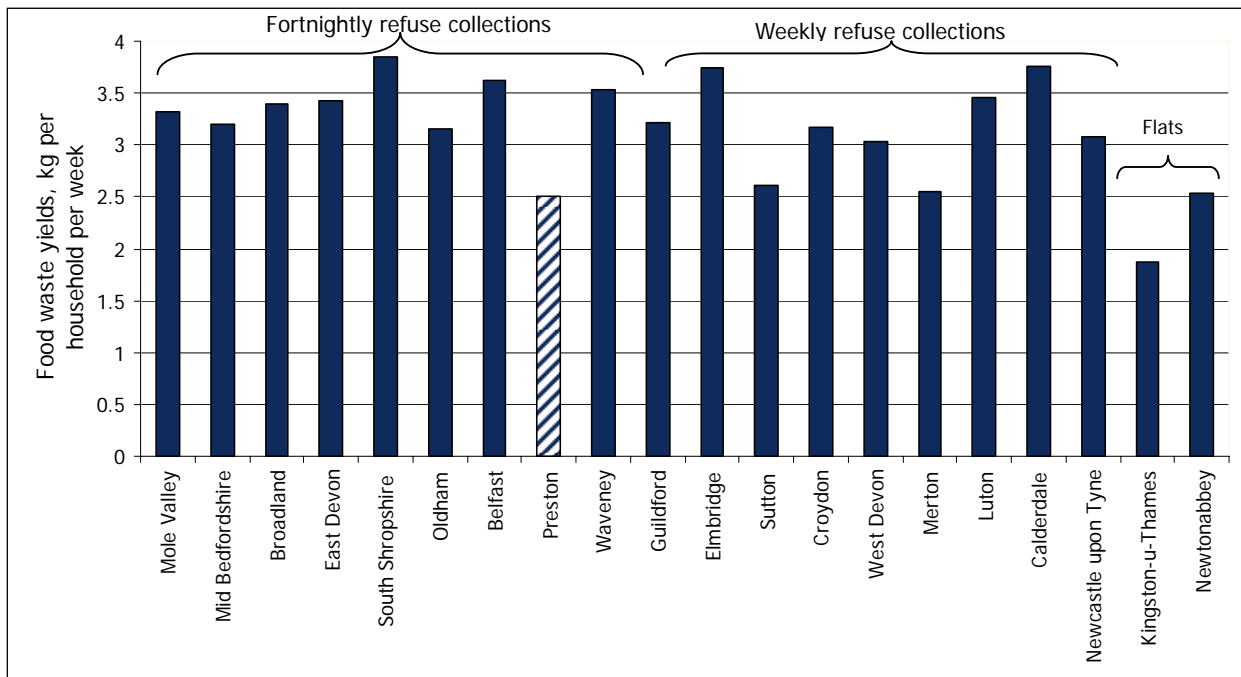
Figure 3: Weekly average food waste yields per household served



Note: Guildford had three trial rounds, all initially running alongside weekly refuse collections. However midway through the trials refuse collections for two of the rounds switched to fortnightly collections

The average food waste yield from each household setting out can be expected to be between 2.5kg to 4kg.

Figure 4: Average food waste yields per household setting out per week for WRAP supported trials

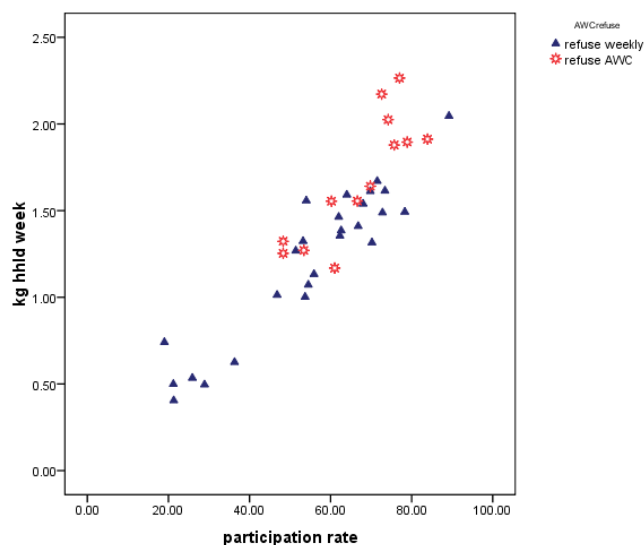


In general yields will tend to be higher in more affluent areas, where refuse collection is fortnightly and where the food waste service is backed up with an effective communications strategy.

The Somerset Waste Partnership has found that food waste yields are slightly higher in districts where the standard size of wheeled bins is 180 litres for fortnightly refuse collections compared to those where 240 litre bins are provided, so the capacity provided for residual waste can also influence food waste yields achieved.

Figure 5 shows the relationship between food waste yield and frequency and type of refuse collection. Areas with fortnightly refuse collections have higher participation rates in the weekly food waste scheme. Collections from multi occupancy properties have lower participation rates and yields.

Figure 5: Participation rate vs. yield (per household served)



When making assumptions about what can realistically be achieved in terms of set out, participation and capture rates in your authority it can be helpful to consider what is being achieved by schemes operating in other similar areas. The following conclusions on food waste collection set out and participation rates can be drawn from the local authority schemes currently in operation including the WRAP trials and other research to date:

- Refuse collection frequency is a statistically significant factor in the performance of food waste collections. Areas with fortnightly collections of refuse have higher weekly food waste participation and yields.
- Participation and yields can decline over time in areas with weekly refuse collections, whilst in areas with fortnightly refuse collections yield and participation is maintained.
- Areas with weekly black sack collections provide higher food waste yields than areas with weekly 240 litre wheeled bin refuse collections.
- Food waste yields may also be influenced by the size of the wheeled bin provided for refuse.
- Higher food waste yields will be found in more affluent areas.

2.4 How should food waste be processed?

Prior to the ABPR in 2003 many councils allowed meat-excluded food stuffs such as fruit and vegetable peelings to be included in garden waste collections for open windrow processing. Following the introduction of the 2003 Regulations food wastes that have been generated within the home should not be placed in garden waste collections intended for treatment at open windrow facilities.

Waste composition analyses indicate that food waste (meat excluded) and food waste (meat included) each account for around the same proportion of residual waste. In a 'meat excluded' food waste collection, the local authority will have to advise residents to separate food containing meat and fish from the remaining food waste before putting it out for collection. The local authority will also have to ensure that collection bins are clearly marked (e.g. 'no meat and fish'). Many ABPR-compliant treatment facilities now being designed and built will be licensed to take both meat included and meat excluded food waste.

To encourage householders to take part in a food waste collection, keep it simple, collect **all** food waste including meat and cooked foods.

Ensure that the treatment facility is licensed to process all food wastes and that it will have sufficient processing capacity to deal with the throughput resulting from the collection scheme over time.

All recycling and composting collection schemes should consider the opportunities for end markets over the short, medium and long term. Gate fees for pre-processed feedstocks and income from the sale of resulting composting products may change over time according to the processing technologies available, the volume of material generated and the range of market outlets/end use applications. With increased amounts of biowastes expected to be collected over the next 12 years in line with the Landfill Directive diversion targets, both increased and a wider range of end use applications for waste derived composts will become established.

When planning a food waste collection scheme, it is important to consider how and where the collected material will be processed. Currently, in-vessel composting systems (IVCs) are the most popular treatment method for food waste. Anaerobic Digestion (AD) of separate food wastes with energy recovery is becoming increasingly attractive in environmental and financial terms. There are two AD facilities in England accepting source-separated food waste from households and there are more sites under construction in England, Scotland and Wales. For a list of approved IVC and AD plants see the regularly updated Defra website www.defra.gov.uk/animalh/by-prods/approvals/list.htm or for a map of the sites in the UK web.adas.co.uk/wrap/maps/wrap/

Gate fees for the processing of food waste depend very much on the type and capacity of facility employed and subsequent end use applications for the products.

For more information on the technologies used to process food waste, there is a guide on in-vessel composting, published in 2004 (www.compost.org.uk) and the report by Eunomia Research & Consulting for WRAP - Dealing with food waste in the UK – available at www.wrap.org.uk/local_authorities/research_guidance/food_waste/.

The type of food waste collection scheme introduced (e.g. food waste only or food waste combined with garden waste) will have a major impact on the treatment options. Sites receiving food and garden waste separately may be better positioned to manage the blend of feedstocks for processing, allowing greater control over the quality of end products. Wet AD plants are not suitable for large consignments of garden waste. Composting facilities that accept food waste combined with garden waste may find it harder to control ratios of nutrients in the feedstock, which has implications for end product quality. This is because the quantities of food waste combined into a garden waste load are unknown and tend to be low.

Carbon and nitrogen ratios vary throughout the year according to the types of garden waste collected. Some collection schemes are further complicated with the addition of cardboard. Sites may receive large quantities of heavy nitrogenous material (grass clippings and food waste) in summer and drier, carbon-rich sources in winter. The composting facility has to balance out the peaks and troughs of different nutrient-rich materials over the course of the year to make material fit for use.

Determine the treatment capacity that will be required. Capacity requirements will vary depending on whether food waste is collected separately or combined with garden waste.

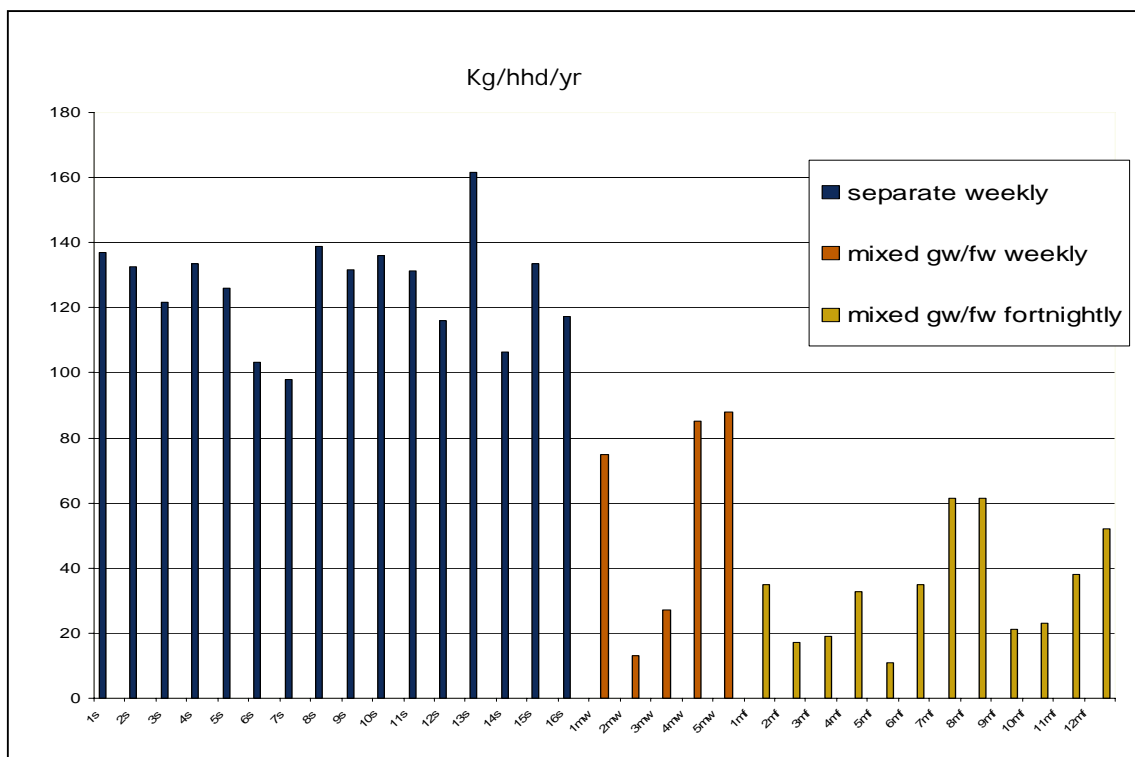
When introducing a collection scheme, it is advisable to:

- (i) Fix treatment costs by securing gate fees for the food waste over the medium term.
- (ii) Check that robust outlets have been secured for the finished compost.
- (iii) Speak to the operator about intended collection systems to ensure the mixture of feedstock can be regulated.
- (iv) Ensure expected yields are within the capacity of the plant all year round.
- (v) Continue to monitor yields over time.
- (vi) Ensure arrangements for dealing with contamination are specified in the contract (e.g. responsibilities, contamination limits, who pays if loads are rejected).

2.5 Should the food waste be collected separately or be combined with garden waste?

By spring 2009 60 local authorities in the UK had introduced food waste collection schemes where the food is combined with garden waste. There are various advantages and disadvantages to collecting in this way. The main advantage is that in most cases the collection system is in place and householders can add food waste into the wheeled bins provided for garden waste. Bins can be collected either weekly or fortnightly by a refuse collection vehicle – but most schemes collect fortnightly. The major disadvantage is that all the waste collected has to be treated at an ABPR compliant facility which can be costly. Recent WRAP research has shown that combined collections result in more food being left in the residual bin as the combined schemes, particularly if provided fortnightly, fail to capture as much food as separate collections. See Figure 6 below taken from a report on combined food and garden waste collections that will be published by WRAP in the summer of 2009 www.wrap.org.uk/local_authorities/research_guidance/food_waste

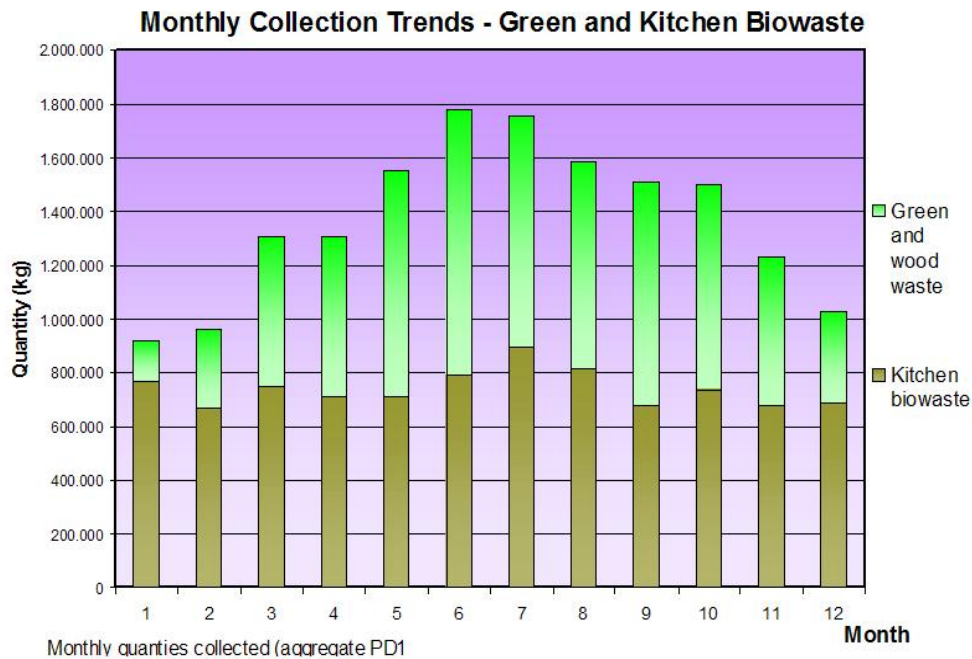
Figure 6: Comparison of average food waste yields per household per year for different collection options.



The proportion of garden waste in the available waste stream is an important factor influencing biowaste collection strategies. The main issues to consider if you are evaluating how much garden waste will be presented for collection are:

- Proportion of properties with gardens. Many urban authorities have high proportions of housing stock with either no gardens or small gardens where a separate garden waste collection service may deliver small amounts of garden waste.
- Garden size – properties with larger gardens will produce more garden materials. From WRAP's research on home composting it is clear that there are large regional variations in average garden sizes.
- Seasonality – garden waste increases in spring/summer/autumn and reduces in winter. Systems need to have enough spare vehicle capacity to cope with peaks in garden waste presented. On the other hand food waste shows little seasonal variation. See Figure 7 below.

Figure 7: Seasonal changes of food and garden waste collected



Participation in free garden waste collections can be high. Therefore authorities that do not currently collect garden waste should not base predictions of garden waste tonnages on levels currently in the residual waste stream alone. Even if current collection policies allow side waste and accept garden waste in residual waste containers, a new scheme will draw additional waste into the collection system. Many authorities have experienced additional garden waste being drawn into the collection system when free or unrestricted collections of garden waste are in place. This may increase the recycling rate but it will also lead to higher total waste arisings.

A key consideration for many largely urban authorities is whether to provide a consistent service for biowastes across their authority or whether the service profile should vary according to the different housing stock i.e. to provide a combined garden and food waste collection to some households but food only to others on the basis that they have small gardens or no gardens at all. Providing a range of services complicates communication messages and makes it more difficult to be clear to householders about which particular service they have.

Authorities are able to charge separately for garden waste collections under the Controlled Waste Regulations 1992. Around 130 English local authorities charge for garden waste collections. This has the effect of limiting additional garden waste entering the collection system. The income generated can help offset the cost of service provision and can support the promotion of home composting. If food is combined with garden waste it is not possible to charge for the collection.

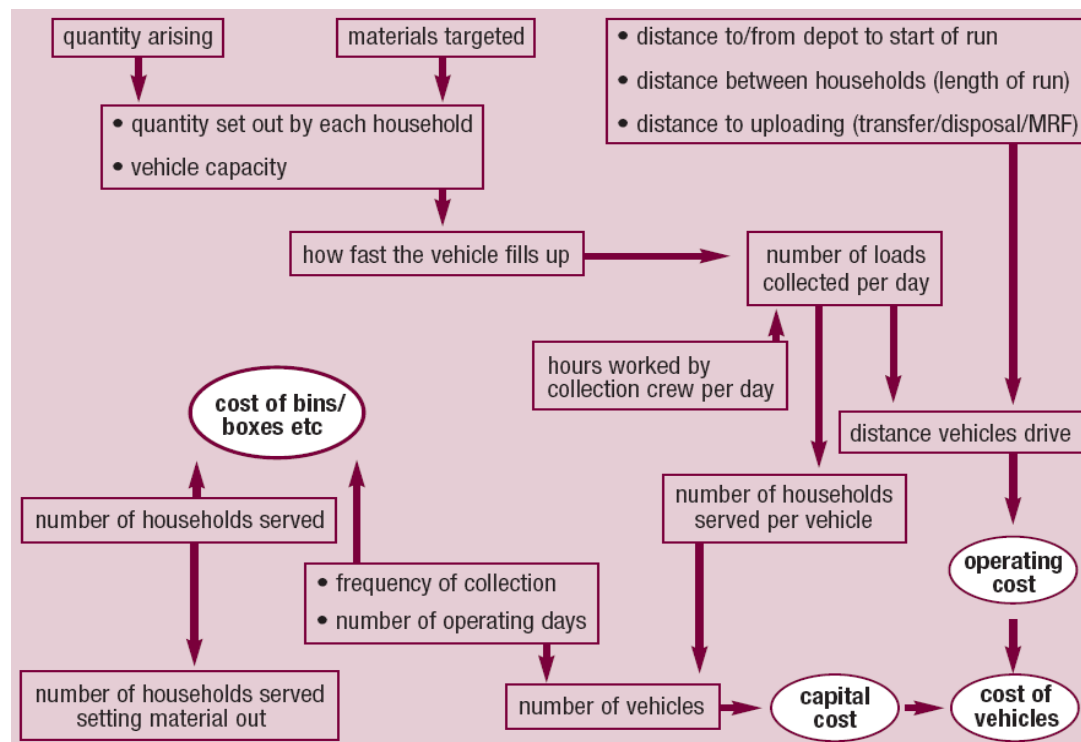
Where food and garden waste are combined not all householders may choose to put food waste out for collection making assessments of participation (in this element of the service) based on recording the number of containers placed out for collection (set out) unreliable. Also when food is collected with garden waste fortnightly food waste is likely to be disposed of via the residual collection in the alternating week making overall captures of food waste lower than for food only collections.

As mentioned above, if food and garden waste are combined it must be processed in an APBR compliant facility. If garden waste is collected separately to food then it can be composted by windrow or other non enclosed systems. There are a great number of these facilities available around the country and gate fees generally are much lower. Facilities able to take food waste are more limited in number but as noted already increasing demand is improving availability.

A wide range of factors will determine the most cost effective means of collecting and treating food waste in a given local authority area. Figure 8 below is from the manual for the Kerbside Analysis Tool (KAT) and highlights the range of factors which influence the cost and performance of different collection service options.

KAT is a spreadsheet tool designed to allow users to make projections of standardised costs of different collection options. KAT is free to use and can be downloaded from the WRAP website; www.wrap.org.uk/local_authorities/toolkits_good_practice/index.html. KAT has recently been updated to include timings for food waste collections and so can be used for evaluating food waste collection options.

Figure 8: Kerbside Analysis Tool (KAT) Chart



The final key issue to consider when comparing collection options is cost. Multiple factors make cost a difficult variable to calculate. The initial work to compare system costs was commissioned by WRAP in 2006 and led to the publication of two reports which were influential in the backing for separate food waste collections and AD in Waste Strategy 2007 for England.

This work asserted that the separate collection and treatment of household food wastes appeared overall to deliver greater net benefits than the combined collection and treatment of food wastes with garden wastes. It also asserted that this system would be cheaper for local authorities, taking into account the marginal cost of disposal. However, at the time the work was undertaken there was very limited UK experience in operating separate food waste collections and there was limited data from combined food and garden waste schemes. As such, assumptions used in the original modelling were in the main based on experience from overseas.

Since that time the number of UK food waste collections has increased - by spring 2009, around 60 local authorities were operating some form of dedicated food waste collection in all or part of their area. The experience gained and data generated from the WRAP Food Waste Trials were used to update the original modelling in 2008. Other changes to assumptions included the landfill tax rising to £48/tonne by 2011 and updated gate fees for AD, IVC and residual waste disposal were also incorporated.

The revised modelling confirms the findings and recommendations of the previous report and found them to be robust. Indeed the messages that can be drawn from the modelling are strengthened as the benefits of separate

food collection costs were more favourable, in comparison, to the original estimates in part due to the increase in the cost of the alternatives and the rising landfill tax.

In considering a future collection strategy for food waste, it is important to evaluate the overall cost of mixing food waste and garden waste compared with collecting them separately. Higher treatment costs (gate fees) will apply to garden waste when the materials are collected together.

KAT can be used to help calculate the costs of the different collection options and is available to download from the WRAP website at www.wrap.org.uk/local_Authorities/toolkits_good_practice/index.html.

Alternatively, contact WRAP for support and advice on the evaluation of collection options for biowaste. lgs@wrap.org.uk

To summarise, some of the key factors to consider in evaluating combined garden and food waste collections and separate food waste collections are:

- an authority's requirement for higher captures of biowaste – local policy / waste strategy context;
- amounts of garden waste available and how much is currently captured through other methods (e.g. civic amenity sites, home composting) and how much might it increase if a kerbside collection service is provided;
- anticipated participation and set out rates for food waste collections;
- capacity of vehicles and available capacity in the current system;
- vehicle travelling distance to the IVC/AD facility;
- difference in gate fees between ABPR compliant facilities and open windrow processing;
- cost of the collection service and the overall treatment costs. Cost savings made by diverting materials from the residual waste and likely impact on Landfill Allowances;
- residents/members preferences for a particular frequency of service, containment preferences etc.; and
- whether a mixed collection could be seen as a transitional step to encourage people to start to separate food waste in the kitchen and prepare the ground for a move to a separate collection at a later stage.

2.6 What legal issues need to be considered?

While in many European countries, it is legal to compost food waste in aerated static piles or open windrows in the UK it is not. The ABPR, introduced in 2003, aim among other things to control the processing and end-use of composted material derived from food waste (which the regulations refer to as 'catering waste').

The main implication for local authorities is that food waste must be treated at an approved Animal Health Service (SVS) facility. Garden waste, in contrast, falls outside the ABPR and can continue to be composted using open windrows. If a local authority decides to collect garden waste and food waste in the same container or combined together in the same vehicle, the whole load will be classed as catering waste and will have to be processed in compliance with the ABPR.

Specific details of ABPR can be found at www.defra.gov.uk/animalh/by-prods/legislation.htm

Defra has issued specific Guidance Notes on the legislation. The key points relating to collection can be found in the Consolidated Text; Part 7 & Annex 2.

Key points from Defra's Guidance are:

- local authorities (Trading Standards Officers) to enforce the regulations on Collection Authorities;
- household food waste is classed as category 3 catering waste;
- food waste requires one or two stage process treatment (barrier system) according to whether meat is excluded or included;

- any food waste that is deemed to have entered the 'Kitchen portal' should be considered as category 3 material. This includes vegetable peelings and fruit;
- food waste must be properly secured in collection containers and on the vehicle to prevent any release;
- consignment notes are required to track loads of catering waste - Article 17;
- a specific Guidance Note on "Loading – Unloading" has been prepared. In some cases the bulking of food waste may be required prior to onward treatment;
- designated clean and dirty areas on treatment sites should be maintained;
- food stuffs should be stored undercover in a bay or enclosed skip;
- drainage systems required at facilities to prevent leachate release;
- Sch 1 Pt 1 para 5 "only the wheels (of vehicles) need to be cleaned"; and
- vehicle compartments should not be interchanged for use without cleansing.
- Other legal requirements include accordance with environmental health and waste management legislation and regulations. It is recommended that local authorities engage with the Environment Agency as plans develop. It should be noted that the aforementioned points are a summary and the detail of each point should be agreed with the enforcing Authority before commencement of a new collection service.

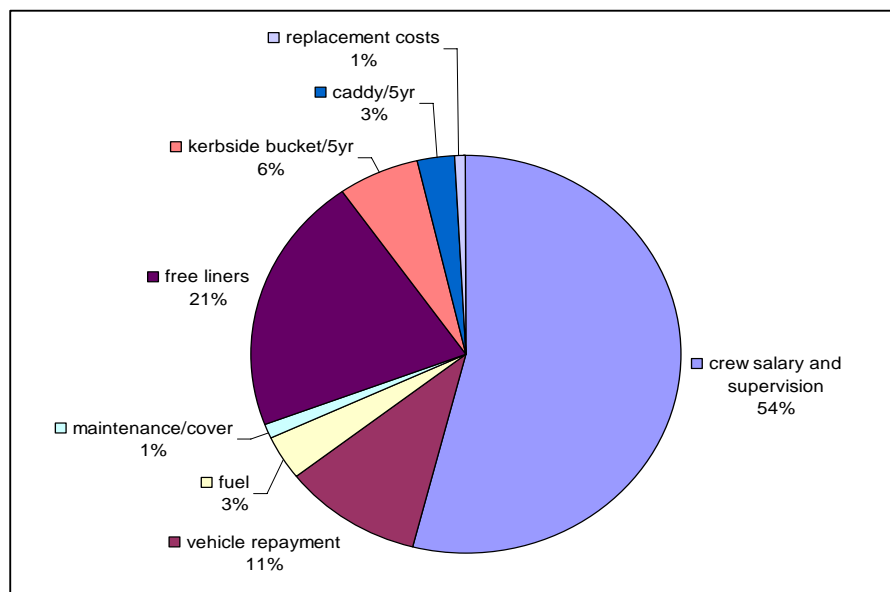
2.7 How much will it cost?

It is not possible to give a specific cost per tonne or cost per household figure for food waste collections as it will be different in each Authority. The cost of a scheme will depend on the services already in place and the biowaste collection methods chosen. The cost of a scheme will be affected by:

- number of loaders;
- local wage levels;
- if existing vehicles are utilised e.g. adding to an existing kerbside service or new vehicles are leased or purchased;
- requirement for any vehicle modifications;
- vehicle running costs and fuel;
- containers provided to residents (dependant on size and quality);
- type and number of liners provided to residents;
- round efficiencies in terms of size, set out rates, pass rates and crew productivity;
- level of capture or diversion achieved;
- communications approach adopted; and
- monitoring requirements.

The first year of a scheme may incur high capital costs due to purchasing collection containers and vehicles (although these could be leased). The chart below shows capital items factored over the first five years of a scheme. The chart shows that over half of the annual revenue costs are for staff including salaries and supervision. It assumes a two person crew, collecting food only on a weekly basis. The cost of providing household caddy liners free of charge will add a further fifth to annual costs.

Figure 9: Breakdown of costs for a food waste collection scheme



It is important to not only include the costs incurred in your calculations but also to factor in savings that will be made elsewhere in the system. Collection of food waste will help ameliorate the rising cost of refuse disposal, and possible fines for not meeting landfill diversion targets.

Good participation levels are vital to a cost effective scheme. A well designed system, delivered reliably with clear messages to householders will provide good yields therefore reducing the overall cost per tonne.

Once a scheme is in place look at ways to increase efficiencies and minimise collection costs which will improve the overall cost per tonne.

2.8 Will the public support food waste collections?

As with any recycling collection scheme it will be important to ensure that the design of the scheme attracts the public's support and active participation. This means that the scheme should be designed so it is:

- easy to use and residents are provided with suitable containers (kerbside, kitchen caddies, liners, etc.);
- flexible enough to meet the needs of all residents;
- delivered consistently and reliably; and
- residents are provided with clear instructions on how to use the service.

Participation in the scheme will vary according to the factors such as demographics and levels of deprivation. However experience from the Food Waste Trials show that separate weekly food waste collections have been well received by the public. Figure 10 shows that in more affluent areas such as Mole Valley and Mid Bedfordshire participation rates of 70% or more can be achieved with yields of about 3kg per participating household. The graph also shows that more deprived areas such as Calderdale can attain around 55% participation, with a yield of 2.5kg per participating household.

Figure 10: Participation rate and food waste yields in Food Waste Trials

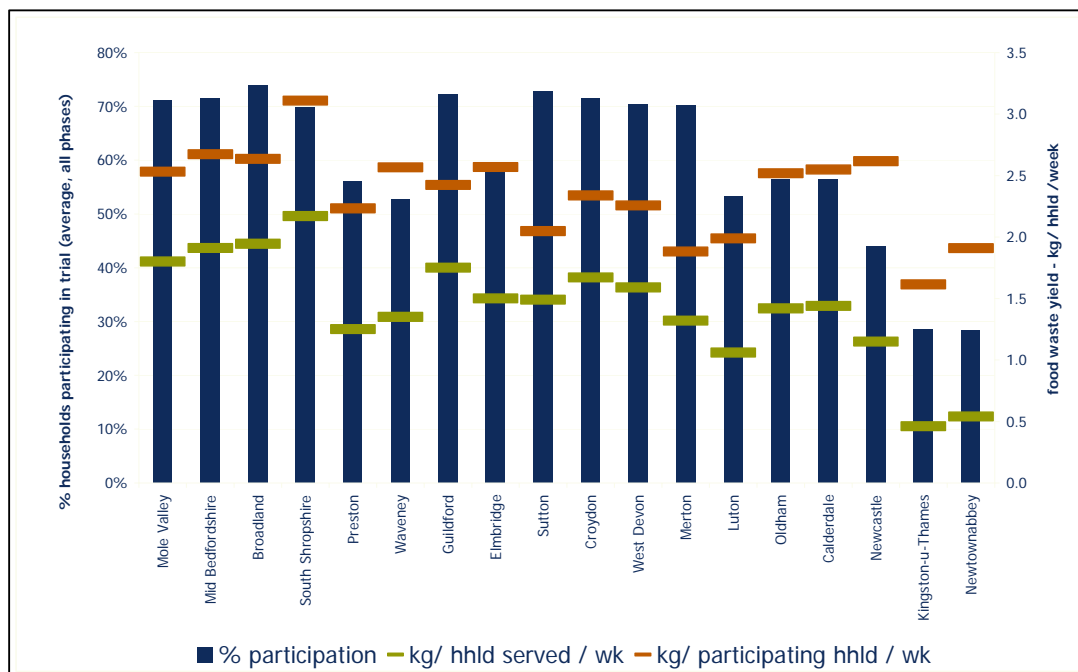


Figure 10 also shows results from Kingston upon Thames and Newtownabbey for door to door multi-occupancy property collections. These show that participation rates from flats can be expected to be lower than for other housing stock.

In terms of participation it is clear that if a scheme is designed and delivered well, the public will support food waste services. The residents on the food waste trials had limited experience of food waste prior to the scheme start but participation in most trial areas was good. Similarly residents in other schemes in the UK which have been operating for longer, such as in Somerset, participate to high levels (60% plus).

Attitudinal surveys carried out for the Food Waste Trials revealed the most common reasons given by respondents for not participating in food waste collections. The main reason given was that they believed they did not produce enough food waste (21% of non-participants) followed by use of home composting (9% of non-participants).

Other stated reasons for non-participation related to concerns about potential hygiene, odour or vermin issues (24%, all issues added together for non-participants). However these issues were considered less important by residents who participated in the collections (6% of participants), indicating that these concerns are often due to pre-conceptions rather than actual problems with hygiene, odours or vermin.

Also some of the participating households (4 to 8%) claimed to have changed their attitudes or habits relating to food purchasing and consumption as a result of taking part in the food waste collection service.

Providing a simple to use system and communicating messages effectively are vital for public acceptance. Demographics and refuse collection frequency will have an effect on the number participating. Understanding the different communities in an authority area and providing suitable communication methods will greatly enhance public understanding and participation.

Guidance on improving communications in low participating areas is available at:
www.wrap.org.uk/local_authorities/research_guidance/communications/low_participation_areas/index.html

2.9 Will a new scheme impact on home composting?

Home composting sits high in the waste hierarchy because it minimises waste at source. It has been supported extensively by WRAP through the Home Composting programme. As long as participation in such schemes is widespread and sustained, home composting offers a real opportunity for minimising the impact of garden waste and reducing biowaste going to landfill. If a particularly successful initiative involving home composting is in place, then it will be the case that less food waste will be collected than if the initiative was absent.

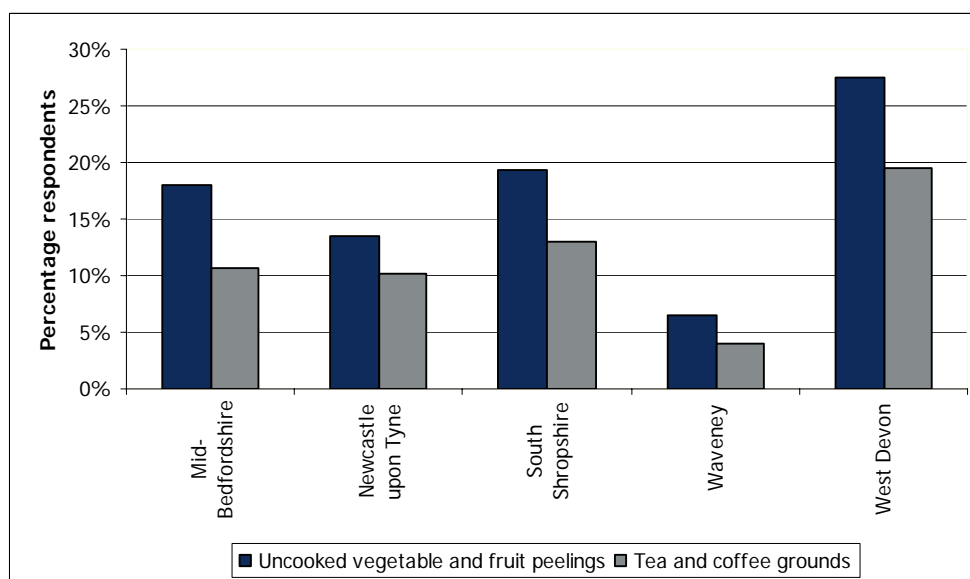
Many local authorities have chosen to introduce kerbside collections of garden waste and food waste to help them meet their targets, with the side effect, in some cases, of diverting material, away from home composting. Good education and support as well as other appropriate collection policies (regarding bin size and collection frequency, or charging for garden waste collections for example) can help counter this, and mean that home composting can operate effectively alongside kerbside and other collection systems.

Surveys in the WRAP Food Waste Trials indicated that 24% of respondents claimed to carry out home composting. This compares with a national figure of about 35%. These respondents were asked if the food waste collection service had changed their home composting activity:

- 63% said the it had made no difference;
- 24% reported that they home compost less than they had done previously; and
- 5% stated that they home compost more than they had done prior to receiving a food waste collection service.

Residents were also asked about how they deal with different types of food waste. The types of food waste that were dealt with through home composting were predominantly uncooked vegetable and fruit peelings and tea and coffee grounds.

Figure 11: Proportion of respondents stating they home compost food waste



The proportion of respondents stating that they home compost these types of food waste are shown in Figure 11. It is worth noting that the trial areas in Waveney and Newcastle on Tyne are densely populated urban areas (many terraced properties with yards), with low potential for home composting in comparison to the other trial areas shown in Figure 11. The majority of these respondents also stated that they participate in the food waste collections, indicating that they recycled other types of food waste via the trial collection services.

Introduction of a food waste collection will have a small impact on home composting rates where residents compost fruit and vegetable peelings. When launching a new collection scheme include details of home composting on the scheme leaflet and encourage residents to continue home composting.

3.0 Implementing a Food Waste Scheme

This section aims to inform those planning to implement a food waste collection. It summarises the key practical lessons learned from the WRAP-supported food waste collection trials. The following issues are explored:

1. Collection vehicles
2. Collection crew
3. Collection rounds
4. Collecting from multi-occupancy properties
5. Reprocessing and the quality of collected material
6. Containers and liners
7. Distribution (initial roll-out of collections)
8. Communications
9. Monitoring and evaluating scheme effectiveness

Additionally several case studies have been produced which look at various aspects of the WRAP supported Trials in greater detail than presented here. These case studies are:

- food waste collection trials alongside fortnightly refuse collections;
- food waste collection trials in areas with high density housing;
- food waste collection trials in areas with low density housing;
- food waste collection trials from multi-occupancy properties;
- liners for food waste collections; and
- communications and publicity for food waste collections.

These case studies can be viewed and downloaded at: www.wrap.org.uk/fwct

3.1 Collection vehicles

The choice of collection vehicles and how they are operated by crews is vital in developing efficient and cost effective services, particularly for food waste collections. Decisions on choice of vehicle will depend on a number of factors including:

- geography/demographic characteristics/property types;
- nature of existing dry recyclables/refuse collection system and vehicle fleet;
- options available at the time;
- health and safety considerations; and
- cost.

It is not the objective of this section to endorse a particular vehicle or manufacturer but to highlight some key thinking and feedback from the operations to date. Appendix 1 shows examples of vehicles that are being used to collect food waste.

Key factors that should be considered in vehicle design choice include:

- To be ABPR compliant collection vehicles should be leak proof and apertures closed when not being loaded. Leakage is unlikely to be an issue if householders use liners as the food and liquids tend to be held securely.
- Unloading must comply with ABPR and vehicles must tip into a secure area either at the treatment facility or an intermediate bulking point. Both Defra and DARD (Northern Ireland) have produced guidance on loading and unloading of animal by-products www.legislation.gov.uk

The high water content of food waste means that food might not easily be ejected from collection vehicles and high degrees of lift might be required before waste is fully tipped from the body into designated containers (see Photograph 1). Unloading directly from small vehicles into larger trucks or shipment containers will minimize the non-collection time associated with direct haulage (see Photograph 2).

Image 1: Localised bulking in Elmsbridge – from vehicle directly into roll-on off skip



Image 2: Unloading of food collection vehicle into RCV for onward haulage - Northern Italy



- Ensure the capacity is appropriate to the tonnage and volume collected. The vehicle should have sufficient capacity to contain the amount of waste presented daily. Ideally food waste should be collected in one load to minimise downtime. Vehicles may need extra capacity if schools or businesses are to be covered and to allow for changes in household participation. Weight should be monitored to avoid overloading but it is not necessary to worry about volume as food waste is dense and has a high weight to volume ratio of 550kg to 600kg per metre cubed.
- The vehicle should have sufficient space i.e. seats for extra crew, space for cleaning materials, place to store liners and leaflets, somewhere to clean hands etc.
- Multiple loading points are important to avoid concentrating weight over one axle or one side of the vehicle and creating imbalance. An even distribution of weight over the body of the vehicle can be attained by careful manual loading or by using vehicles with sweeping plates to spread food across the vehicle body.
- There are limited benefits to using compaction. Food is dense and does not compact well. Compaction will squeeze water from the food leading to the risk of leachate being produced. Ensure compaction can be turned off manually on any vehicle bought or leased.
- Loading times can be maximized if the vehicles could be loaded both with a bin lift for wheeled bins and manually by crew members simultaneously. Therefore it is necessary to ensure that the loading height is low enough to ensure safe manual handling.
- There are a number of specialised food waste collection vehicles now available (see Appendix 1 for some examples). The cost of these vehicles is the region of £40,000 and they have lower running costs than traditional refuse vehicles which can help reduce on-going revenue costs. Along with rising fuel costs, authorities need to consider the potential costs associated with increasing vehicle fleet sizes and the

associated overheads, insurance, tax, maintenance and other related charges. Vehicles have varying running costs according to their size, complexity and how they are utilized within the collection rounds. Smaller 7.5 tonne (GVW) collection vehicles have good fuel economies (12-15mpg) compared to larger refuse collection vehicles (3-6mpg).

- Food waste can be co-collected with dry recyclables on vehicles with kerbside sorting, which reduces the number of vehicles required for collections and can improve efficiency. Examples of co-collection vehicles used and tested in Somerset are shown in Appendix 1.
- Food waste can also be co-collected in split vehicles along with refuse, dry recyclables or garden waste – co-collecting with other materials in split vehicles can be another way of reducing the number of vehicles required for collections however available vehicle capacity/payload and off-loading sites are important factors to consider.

All these are important but do not represent an exhaustive list of criteria. It is important that vehicles whether procured directly by councils or by your contractors are seen in operation prior to purchase to ensure that all parties are comfortable with the selection.

Consider small collection vehicles (gvw of 7.5 tonnes with a 2.5 to 3 tonne payload) as they have proved to be highly effective in a UK setting for collecting food waste.

Vehicle choice will differ for each authority depending on local circumstances and current fleet. Seek advice from Authorities who have used these vehicles and ensure the factors above are considered and vehicles are road tested before decisions are made will help your authority make informed choices.

3.2 Collection crew

The number of staff required to carry out each collection round is an important resource consideration for food waste collections. The most significant cost element of running collection teams typically is related to the numbers of staff and their salaries. Ensuring good crew productivity is important when considering how schemes might be rolled out. Another important consideration is ensuring the staff can carry out their work safely and efficiently.

Image 3: Collection crew in West Devon



The average number of households per round for the collection trials was around 1,300 households. (Although there was large variation due to the amount of set outs, housing density and travel times on the round).

Most of the trials operated successfully with one driver and one loader. In some urban settings it was considered necessary to have one driver plus two loaders per vehicle. For example, in Luton where two loaders with slave bins collecting from different sides of a street were used. Loading difficulties caused by parked cars meant that they wanted to reduce the number of trips to the vehicle to empty containers, hence the use of slave bins.

A driver plus loader per vehicle provides a crewing level that, in most contexts, is likely to maximise the productivity of staff and vehicles. Good practice has shown that the loader can continue collecting kerbside containers whilst the driver is moving the vehicle up the road; and the driver can assist the loader when the vehicle is parked. Modelling work commissioned by WRAP has been carried out to address these issues and other financial costs/benefits issues in relation to food waste collections; see http://www.wrap.org.uk/local_authorities/research_guidance/food_waste

This guidance does not provide specific advice on health and safety matters. However, the importance of carrying out risk assessments and adopting appropriate methods of work cannot be overstated. WRAP will be working with local authorities currently undertaking collections to develop guidance in this important area.

Good standards of hygiene, weekly collections, appropriate loading techniques and vehicle design will minimise risks.

The average weight of each container presented is likely to be no more than four kilos. This is well within acceptable parameters for repeated lifting at the frequencies likely to be experienced. Lifting, carrying and loading techniques need be assessed and operatives appropriately trained and equipped.

For further general guidance on health and safety for kerbside operatives, refer to the Health and Safety Executive, www.hse.gov.uk/waste

Further advice on manual handling and the training and motivation of crews can be found in section five of the report evaluating the WRAP Food Waste Trials www.wrap.org.uk/fwct.

Recommendations from the report include:

- Have dedicated crews and the crews become dedicated! If you recruit well using interviews and select people interested in the role then the crew will develop ownership and pride.
- Carry out risk assessments - while there are similarities in services each collection configuration, depot layout, off-loading requirements, etc. are different.
- Before the new service starts provide training - covering the details of the collection scheme (why, what and when); health & safety and manual handling issues; what happens to the food waste after it's been collected.
- Arrange for crews to visit the treatment facility - to improve their understanding of the whole system and so they are clear about process and contamination issues.
- When the scheme launches, go out with the crews for the first two weeks - to answer questions and discuss issues.
- Have clear operational procedures – and make sure the crews stick to them.
- Have early morning briefings - to catch issues early and get feedback.
- Provide crews with a brush and shovel – handy if spills do occur.

3.3 Designing Efficient Collection Rounds

A key challenge is to design efficient rounds that match the capacity of the vehicles and collection crews. If too many properties are included on rounds then there is risk to service quality as the crew will struggle to finish rounds on time. Rounds set with low pass rates contribute to a relatively high overall collection cost and a less efficient service.

The issues below should be considered when endeavouring to design efficient collections:

1. Use appropriate pass rates and pick rates for the vehicles and crew. These will vary depending on whether you are collecting in an urban or rural area, set out rates, etc - if you are unclear how to evaluate these ask for ROTATE support www.wrap.org.uk/las
2. Minimise downtime during collection rounds.
3. Decide whether to mirror the refuse collection rounds.
4. Calculate anticipated volumes of food waste.
5. Predict set out of food waste.
6. Estimate the amount of food waste put out by householders.
7. Build some spare capacity into the system to allow for fluctuations in participation.
8. Educate residents to set out food waste at the appropriate location.

Several useful practical lessons were learned from the trials, with respect to collection rounds:

- Due to variations in set out or unforeseeable operational difficulties, it is important to have a suitable back-up collection vehicle available at short notice.
- If there are problematic areas within a particular round, for example due to access difficulties to properties, then – where possible – these areas should be visited as early as possible during the round, so that there is an opportunity to deal with any issues that might arise on the same day.
- Use slave bins to assist collections if it is appropriate to the setting as this will reduce collection times. By reducing the number of trips from the vehicle to properties and back, collection times are reduced. However, slave bins can be heavy even if only partly full. It is suggested that a slave bin (240 litre) should be emptied after five to seven houses - this equates to 15- 20g of food waste. A risk assessment should be undertaken.
- Authorities where refuse is collected in black sacks found that refuse sacks in their trial areas were lighter and less prone to damage by vermin, presumably due to the diversion of significant amounts of food waste from the refuse stream.
- Adding primary schools to collection rounds may improve the fill of vehicles without significantly increasing round times.

To achieve efficient collections your authority should endeavour to:

- align round sizes with contracted work hours for crews;
- increase crew productivity through good skills levels and motivation, and where appropriate the use of slave bins to reduce loading times;
- minimise travel time to IVC/AD plant; and
- minimise vehicle capital and running costs by choosing an appropriate vehicle.

3.4 Collecting from Multi-Occupancy Properties

WRAP has published guidance on collecting recycling (including food) from flats www.wrap.org.uk/flats. It is advisable to refer to this on-line resource in conjunction with this guidance. Collection methods are different for multi-occupancy buildings, compared with ground floor access properties. Systems vary depending on, for example, the type of property, storage space available, container choices, and location.

There are three options of food waste collection systems for multi-occupancy housing:

1. Kerbside collections
2. Bring site (near entry collections)
3. Door to door collections

Kerbside Collections

Image 4: Food Waste presented by flat occupants at an external collection point in Milan, Italy.



Residents are asked to present their external food waste container, for collection at the curtilage, in a similar way to kerbside properties. The containers are emptied using the same collection vehicle as kerbside collections. This method is only suitable for low-rise flats and maisonettes where residents do not have far to take their container to the collection point. Each property should be treated on an individual basis and risk assessed to see if suitable for this type of system.

Bring site (near entry collections)

There are a few examples of authorities providing bring site collections, for example Hackney, Bristol and several communities in Italy. Residents are asked to bring their food waste to a central point where secure, rigid containers are located. The containers are typically wheeled bins (or variants thereof). The ABPR requires food waste to be contained from the moment it leaves the resident's property. Therefore where communal food waste bins cannot be placed in a covered bin store, housing units should be considered. See photo 4 for an example. This prevents the food waste from being exposed as a result of e.g. leaving a wheeled bin lid open.

Image 5: Food Waste Collection Container in Hackney



The collection point needs good access to enable the operatives to empty the containers on collection days. To make it convenient for residents to use, the food waste container should be sited as close to the existing communal recycling/waste facilities as possible.

The collection vehicle requires a bin lift. Smaller-size wheeled bins are preferred as larger containers (e.g. Eurobins) can easily become overweight due to the dense nature of food waste and can present manual handling issues as well as potential mechanical lifting problems.

Communal containers for food waste can be located internally (e.g. in a ground floor store room). Collections need to be frequent and aeration during initial separation in the home and/or storage area can be encouraged by providing residents with vented food waste caddies or by supplying vented wheeled bins.

A caretaker or building manager should be involved in locating and managing the site and could be encouraged to store a supply of liners.

Residents should be provided with a kitchen caddy and liners. An advantage for residents using liners is that they can deposit food waste as they are leaving the building and do not need to return a container to their property. Distribution of bio-bags/liners can be more difficult in a high-rise building and residents may be asked to collect replacement bags from a central point. Some residents may prefer to wrap food waste in newspaper.

Door-to-door collection

A door-to-door system is the most labour-intensive option and consequently tends to be more costly. To reduce trips collection operatives often empty the contents (usually in a liner) of individual containers placed out for collection into a trolley or wheeled bin. Although using a trolley to collect on each floor is efficient, some time is lost moving between floors. These trolleys are then taken to a central point for emptying.

Image 6: Door to Door collections in London Borough of Kingston upon Thames



Door to door collections from flats can pose a problem in terms of access. Many have gates or doors that are locked and can only be accessed with a key or code. If the collectors are unfamiliar with the access arrangements then this can prevent collections taking place.

Participation rates in door to door flats schemes have so far proved to be lower than ground level properties. See Figure 10. This maybe because flats tend to have small kitchens and therefore little storage space. The waste food can not be stored outside or any outside space is communal and may be spilt. Some authorities (such as The City of London) have increased the frequency of door to door collections from flats to try and boost participation levels.

Food waste scheme design should make appropriate provision for multi-occupancy properties. Solutions will depend on the style of property, demographic of the area and available budget. For further information on food waste collections from multi occupancy properties refer to the Trial report www.wrap.org.uk/fwct and the Case Study on multi occupancy housing.

3.5 Treatment and quality of collected food waste

An important issue in identifying a suitable treatment facility is its proximity to the collection rounds. Where bulking up of food waste is required, it is important to consider the logistics of collection vehicles delivering waste to the bulking location and the onward delivery of the bulked up material for treatment, particularly in regard of ensuring that collected food waste is not stored for a period of time in excess of statutory requirements. For example, the Environment Agency recommend that food waste is not stored overnight in a collection vehicle as this might increase the risk of a fire, create odour, attract vermin etc..

Local authorities are advised to liaise with all relevant bodies, such as the Environment Agency and local Animal Health Department, in order to iron out any potential problems in relation to compliance (particularly in relation to the Animal By-Products Regulations) as early as possible or where services are contracted out, check that their contractor has the correct permissions in place.

Local authorities should check with reprocessors about their opening times during bank holidays in order to arrange their collections with regard to these.

Contamination of food waste by non targeted materials can be an issue for some schemes. Potential contaminants can include plastic bags, biodegradable but *not compostable* bags, packaging, cans, and cutlery. Although very little contamination was reported by the local authorities running the collection trials, where it did arise it tended to be in less affluent areas, particularly where a higher proportion of the population did not have English as their first language.

Image 7: Contamination tag displayed on an external food waste collection container



Image 8: Contamination tags left on the handle of the external food waste bin



Contamination issues are more likely to occur when a new service is introduced so it is important to nip this in the bud as early as possible. The need to avoid contaminating the vehicle load may mean that contaminated containers cannot be collected. If this is the case make sure that householders are provided with an explanation as to why their container has not been emptied. Contamination tags or face-to-face contact can be effective. One Authority that estimated a 40% contamination rate in their less affluent areas adopted this approach and contamination was reduced to a negligible level almost immediately.

3.6 Containers and Liners

The following section provides information on:

1. External Containers
2. Internal Containers
3. Liners

3.6.1 External Containers

Residents must be provided with a container in which food waste can be presented for collection (i.e. an external container). A rigid plastic container with a lid (preferably lockable) prevents leakage, avoids attracting vermin and satisfies ABPR requirements.

Image 9: External containers suitable for food waste collections. The largest stands 45cm high.



A 20-25 litre container will be ample for the majority of households on a weekly separate food collection cycle. This size has proved successful in many UK food waste schemes including Somerset and the Food Waste Trials. These containers will cost £3.50-£7 (excluding VAT), depending on size, design and quantity ordered. This style of container is slim and easy to store either inside or outside the home. It is practical to handle for the resident. In many models when the handle is placed behind the bin the lid is locked shut which prevents spillages.

A 35-40 litre container could be supplied to large families or those who do a great deal of food preparation. Larger food waste buckets, however may raise manual handling concerns and may be more difficult for residents to clean out as they do not fit under a kitchen tap. It is suggested that such families are offered two standard size containers to ensure they have sufficient capacity for all their food waste.

If food waste is to be collected with garden waste, then typically a 140-240 litre wheeled bin will be needed. The exact size depends on collection frequency and average garden size. It is important to consider if the container's capacity is sufficient for the household size. Containers with a capacity too large for the average household are likely to draw in additional garden waste which would not previously have been collected and spark concerns about visual impact in some areas. Oversize containers may also hide contamination. Some flexibility and choice for householders will help schemes fit local circumstances better.

A wheeled bin is not an ideal container for food waste and is not recommended for food only collections. They provide more capacity than is required by the average household and are more expensive than buckets. Food waste will stick to the sides if liners are not used and it can be difficult for householders to clean down to the bottom of the bin.

3.6.2 Internal Containers

The term 'kitchen caddy' (often also referred to as a food caddy) is used to refer to an internal container used by a householder to store food waste. It is not the same as an external container that is placed out for collection at the kerbside or other collection point. Providing practical ways for householders to manage food waste inside the house as well as outside seems to be important in encouraging use of the system and it is recommended that local authorities provide all residents with kitchen caddies (free of charge).

Image 10: Vented kitchen caddy and liners



The Food Waste Trials successfully distributed 5 and 7 litre sized kitchen caddies in solid and ventilated forms. Caddies are relatively inexpensive and cost between 90p and £1.20 each (excluding VAT). 10 litre caddies are also available. The vented style provides good aeration and reduces smells however liners must always be used. Caddies with solid sides do not necessarily need liners and can be lined with paper. Kitchen caddies need to be emptied regularly to avoid smell (when full or at least twice a week) to avoid smell and prevent the build up of micro-organisms or moulds.

A number of good practice steps can be taken in connection with caddies:

- Kitchen caddies need to be wide enough to allow residents to empty plates into them and shallow enough to allow easy cleaning.
- A 'no plastic' or 'compostable liners only' message can be printed on kitchen caddies to remind residents not to use plastic bags as liners and to remove food from packaging before putting it in the caddy.
- An alternative is to issue stickers for caddies but these will become worn over time.

Image 11: Printed food waste caddy provided to residents in Somerset



3.6.3 Liners

Liners are bags that fit inside the caddy. Liners should be made from compostable organic material (like corn or potato starch) or paper. Liners are defined as compostable if they comply with standard test methods for biodegradability/compostability (e.g. CEN standard EN 13432).

Liners require mechanical strength to retain their contents. The liners used in the Food Waste Trials were 18 micron thickness and were found to be very satisfactory in quality to residents. Generally a minimum of 16 micron gauge would be sufficient for food waste liners. Experience from the WRAP food waste collection trials suggests that the number of liners used per household ranges from 2 to 4 per week and in some cases liners may be changed daily.

The advantages of liners are:

- the system is more attractive to use and may encourage more householders to 'give it go' and start to segregate their food waste for collection;
- the need to clean the caddy is reduced. Usually a swill under a tap will suffice;
- the potential for odours is reduced, especially if liners are used in conjunction with a vented caddy;
- food does not stick to the inside of the external container, again reducing the need for cleaning. This also aids collection as food waste is more easily emptied from the containers. This prevents damage to containers from the tendency of crews to bang them on the side of the vehicle in order to remove the contents which are stuck; and
- food and liquid stays contained in transit and the risk of any leakages or spills is reduced.

If liners are not used there is a risk that participation rates will be lower which then results in an under utilisation of other resources i.e. containers are not used, rounds sizes are not optimised, cost per tonne is increased.

The results of the attitudinal surveys in the Food Waste Trial areas showed that the majority of residents found the liners helpful, as illustrated in Figure 12.

Figure 12: Attitudinal survey findings on levels of satisfaction with liners

Question	Response	% respondents
Did you find the [liners] provided useful?	Yes	97.9%
	Too big	0.0%
	Too small	0.6%
	The liner is hard to tie	0.2%
	The liners leak	0.9%
	Other	0.3%

Note: area level averages across five surveyed Trial areas, 2,542 respondents in total.

The disadvantage of providing free liners is the cost to the local authority of their on-going provision. For this reason some, such as Somerset Waste Partnership, have chosen not to provide free supplies of liners. In Somerset, it is recommended that newspaper is used to wrap food waste or line kitchen caddies, but compostable liners can also be used and are sold in local shops. Somerset's composting contractor bulk purchases liner packs and supplies these on a commercial basis to retailers, who initially were encouraged to stock these by Somerset Waste Partnership. Other retail suppliers have also emerged in Somerset and most of the major supermarkets have sourced their own supplies, but, in all cases, certified compostable liners are sold and food waste collectors are trained to reject any non-compostable liners that are mistakenly used. Somerset reports yields that match those achieved where liners are provided.

Image 12: Food Waste presented in Somerset



As a result of current experience three main options are available to local authorities regarding the use of liners:

1. A free continuous supply provided by the local authority
2. A free initial supply with the introduction of a new scheme, after which residents are encouraged to buy their own from designated outlets.
3. Householders are recommended to use a sheet of newspaper or buy their own liners from the outset.

Based on experience to date WRAP recommends that liners are used and that local authorities provide a free supply of liners at the start of a new scheme. If budget is available then local authorities can continue to provide liners at the householder's request. The Trials found that a note on the top of the kerbside container asking for a further supply was the best distribution method. Crews can keep a supply of liners in the cab and distribute as necessary. Blanket distribution of liners to all households at regular intervals is not recommended as this means non participating households receive liners. This is costly and a waste of resources.

In the UK prices of compostable (starch) bags for 5 to 7 litre caddies vary from 2p to 4p each in rolls of 10 to 52, depending on size required and quantities ordered. It is anticipated that growing demand in the UK, bulk purchasing and further manufacturing development will cause prices to fall slightly. WRAP understands that the cost of paper liners is reducing and is now comparable with the prices for starch liners. Alternatively local authorities can engage which companies who market liners directly to local retailers so that residents can easily purchase replacement supplies in corner shops and other local retail outlets (garden centres, petrol stations, etc). Residents typically can purchase rolls of 50 liners from local retailers for about £4 (e.g. Somerset, Waveney).

It is suggested that if an authority decides to supply liners to residents (free of charge) then they should budget for at least 150 liners per household per annum. As liners do degrade over time, especially in damp conditions in stores, it is recommended that liners are not kept too long. At the start of scheme an order for the first four to six months should be sufficient to gauge demand and allow time for restocking.

West Devon provided a roll of free liners at the start of collections in two trial areas. For the first trial in Tavistock a free supply of liners were supplied for the first year and then residents were asked to purchase their own. When the Council extended the service to Oakhampton it was explained to residents that the first roll of liners was free of charge but further supplies would have to be purchased. There has been little difference in the participation rates and attitudes of the residents in each town suggesting that an ongoing free supply may not be necessary once residents have started to participate. This of course must be taken in context as other areas may not have residents with a 'willingness to pay'.

As the starch liners look like plastic to many, there is a risk that some residents may use standard plastic bags once their liner supply is exhausted. There are various products on the market and consumers can be easily confused, for example, some liners sold in supermarkets as biodegradable are not compostable. Liners made of the wrong material or use of plastic bags can be a source of contamination. As a result some composting facilities do not encourage the use of liners of any sort. Good communications are required so that residents understand these issues. Residents should be advised to use *compostable* liners and understand the difference between these and biodegradable and plastic bags.

Liners purchased should have a slightly bigger capacity than the caddy to ensure that they can be folded or tied when full. Liners with T shaped tops are available to aid tying. It was found in the Trials that flat top liners tie very easily so the extra cost of T handles was unnecessary.

Some authorities have chosen to distribute liners for the external container on the basis that only one liner per household per week is required. Such a liner will need a good specification (check micron gauge and seams) as it will carry more weight of food waste. Larger liners will cost more and could easily equate to the same price as three or four smaller liners.

Local authorities deciding to provide liners should:

- encourage residents to change liners at least once or twice a week to reduce the possibility of bags degrading and tearing;
- although they should be changed frequently, encourage residents to fill liners before depositing them in external containers;
- not provide a year's supply of liners at the start of a scheme. Providing a roll of 26 to 52 liners should be enough to cover at least the first three months of collections. In this way losses can be minimised;

- make liners available on demand for residents who want them by notifying the crew. Do not do house to house liner drop offs;
- ensure the design of liners is easily distinguishable from plastic bags to prevent contamination. Discuss with this with the treatment facility operator to ensure that any concerns they have about contamination are addressed; and
- it may sound obvious but check the liner fits the caddy you select. The dimensions of the caddies vary for different manufacturers. So double check your 7 litre liner fits the 7 litre caddy model.

If liners are not provided, local authorities could ask residents to present material loose in their external containers. Alternatively they can suggest that they wrap their food waste in newspaper. Recent research in Somerset showed that although residents are encouraged to wrap food waste in newspaper the majority bought liners. Therefore it is suggested that authorities inform residents where they can buy liners and be proactive in setting up a network of local outlets where residents can purchase liners. More information about the Somerset scheme can be found at http://www.somersetwaste.gov.uk/pdf/Sort_It.pdf

Liners provide a cleaner system for householders and their use is recommended.

Local authorities not in a position to supply liners should consider setting up a retailer network to enable residents to purchase liners at local shops and other outlets.

Provide residents with an initial roll of liners free when the service starts and provide clear details of how they can obtain or purchase more.

3.7 Distribution (initial roll-out of collections)

Delivery of external containers and caddies can be time-consuming and costly. Depending on the precise nature of the food waste collection scheme, the following items may need to be distributed:

- external container;
- kitchen caddy;
- roll of liners; and
- publicity materials, leaflet, caddy sticker and possibly also a calendar.

Food waste containers can be distributed using Luton-style vans. To aid distribution containers can be pre-assembled as a pack with the small caddy, liners and communications materials inside the external container. However this will take up more space on the vehicle and require more trips back to the depot. Authorities who tried this have not found any cost or time benefits in doing this.

The lid and the handle of food waste containers make it difficult to stack them in large quantities. Stacking the items separately results in longer delivery times as packs are assembled in the street; however this method has proved to be efficient and satisfactory. For the distribution from a van, a full risk assessment should be carried out and any health & safety measures enacted. If items are pre-packed at a depot, they must be kept in a dry storage area, particularly if liners are being supplied, since the liners will start to decompose if they get wet.

Most authorities found that that with one lorry and three staff containers could be distributed to 500 to 600 households per day. Distribution to multi-occupancy properties can take two to three times longer in comparison to other residential housing.

Although some manufacturers can provide a delivery service, most local authorities preferred to use their own staff to distribute containers. Many used agency staff to cover the usual daily operations whilst permanent staff were engaged in the roll out. Some authorities in the trial also linked the delivery with door to door canvassing to promote the new service. This is recommended if resources will allow.

A collection scheme can be introduced on either an **opt-in** or an **opt-out** basis. Using an opt-in system the householder is given the choice of whether to use the service. Only those households who have expressed an interest will be given a collection container. This approach is not preferred as it is likely to result in a lower overall take up of the service. Lower set out rates will diminish round efficiencies, with more unproductive time incurred travelling between fewer set-outs.

An opt-out style service is recommended. All householders are provided with the service but are under no obligation to use it. This approach may result in some containers not being used but participation rates will be improved and round efficiencies maximised.

Some of the Trial areas distributed containers over a period of two weeks ahead of the start of their Trials (using one van and 2/3 staff). However this meant there was two weeks of food waste to collect in the first week collections started as some householders started using their new containers immediately. This caused some difficulties for the collection crews, who were also having to learn how best to carry out the rounds and sometimes had to deal with contamination issues.

To overcome the potential for excess food waste on the first collection the feedback from the trials suggests that, where it is feasible and practical to do so, authorities should distribute containers in the week prior to the scheme launch. This may require additional resources to be deployed but over a shorter time period compared to distributing containers over a longer time period with fewer resources. However, much will depend on the size of the scheme and the phasing of the roll out. For authorities introducing borough/district-wide schemes container distribution may need to take place over a longer time period, however in these situations it is advisable to make it very clear to residents when they should starting using their container.

3.8 Communications

This section looks at the pivotal role played by communications with householders in ensuring the success of a food waste collection service. When launching a scheme it is good practice to issue some pre-launch communication so householders are prepared for the new service. Then when the new scheme is rolled out more detailed information about the service and how to take part can be distributed.

3.8.1 Pre-launch Communication

Before introducing a food waste collection scheme, it is essential that all householders are provided with information about the new service. Pre-launch communication should include an information leaflet, advert or notice informing residents that a new service is being introduced. It should address:

- What the new service is, when it will be introduced and why (i.e. what the benefits will be for the resident).
- What householders will be able to recycle and how.
- Who to contact with queries (e.g. a helpline and website).

Image 13: Example introductory leaflet from the Food Waste Trials

The benefits of recycling food waste

- Gives you the opportunity to recycle more of your waste.
- Reduces the odour caused by rotting food waste by providing a special containment system and regular service.
- It's easy and convenient as householders are provided with doorstep collection services.
- Reduces the amount of waste that has to be landfilled which helps to cut down the cost of waste disposal.
- Reduces the amount of methane gas produced in landfill sites, which is a cause of global warming.
- Your treated food waste will be used for horticultural purposes. **75% recycled**

This newsletter is available in large print, Braille, audiocassette and other alternative formats at your request. Please also inform us if you require this document in a different language. You can contact us on **01483 444499** for the alternative format version you would like. We will send it to you as soon as we can.

If you have any queries about this new collection please contact our helpline below:

Contact Guildford
01483 44 44 99
www.guildford.gov.uk
recycling@guildford.gov.uk

recycle for Surrey GUILDFORD BOROUGH SURREY

3.8.2 New Service Communication

To follow up the pre-launch leaflet, local authorities should produce another communication to support the launch of the service. This can be delivered with the new containers. This communication usually takes the form of a 'service leaflet' and should include the following information:

- How householders can participate (in terms of collection dates and what to do with their collection container).
- What they will be able to recycle.
- Who to contact if they have a query (e.g. a helpline and website).
- Practical advice on how to make the most of the system and deal with any potential problems.

The leaflet should:

- incorporate the Council's waste and recycling branding;
- adopt simple, eye-catching messages and make good use of pictures;
- contain a clear call to action; and
- refer to food waste collections for recycling rather than kitchen waste collections for composting.

As with any communication, it should be presented in 'Plain English' and avoid jargon. Depending on the local authority, the communications materials may need to be made available in other languages spoken in the area.

Image 14: Four page leaflet from Food Waste Trials with tear off section for future reference

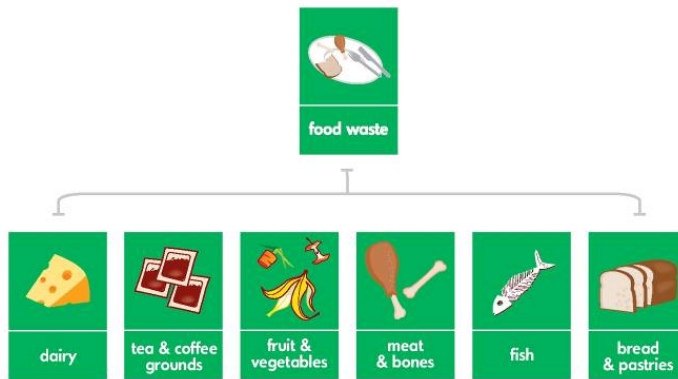


Key messages and useful strategies in design of promotions are:

- Whilst most residents will be keen to participate there will be some who may need more persuasion. Most non participants feel they do not have enough food waste. This maybe because they do not prepare much fresh food or that food is not wasted through using up leftovers. The 'Food We Waste' research http://www.wrap.org.uk/local_authorities/research_guidance/food_waste/ found that all sectors of a community produce food waste so this opinion maybe based on perception not reality.
- Communications should show the full range of waste that can be put in the food containers and encourage even those with small amounts to present on a weekly basis. It is not necessary to devote a lot of space to concerns about flies and smells especially if liners are used and regularly changed.
- Ensure home composting is still encouraged as this is the best environmental option for non meat and uncooked food waste.
- In addition to printed literature door to door visits at the beginning of a scheme will enable dialogue and encourage engagement. Do not at this stage encourage residents to opt out. Alternatively conduct participation rate monitoring and engage with those identified as non-participants.
- All printed media should include simple instructions and use pictures: The leaflet used in the Trials avoided long explanations and favoured icons in preference to photographs. This can be particularly helpful for residents who do not have a good command of written English.

Photograph 15 shows a range of icons developed by WRAP to illustrate the whole range of materials that can be accepted. Waste composition data has suggested low captures of certain types of food waste such as post consumption meat and bones compared to preparation waste such as vegetable peelings.

Image 15: Illustrative iconography used in food waste leaflet



3.8.3 Other Promotional Tools

Depending on budget and how widely the new service is being provided within your area, a range of promotional activities can be used to support the introduction of the service:

- roadshows and events;
- helplines;
- websites;
- canvassing and face-to-face dialogue;
- outdoor advertising – billboards, adshells, bus backs;
- press and radio advertising.

A communications plan should be prepared and include a schedule detailing when activities will take place. To help select the right communication tools/materials, local authorities can refer to the WRAP toolkit 'Developing Recycling Communications Campaigns' www.wrap.org.uk/local_authorities/research_guidance/communications

Access the communication materials used in the Food Waste Trials on the Recycle Now Partners website www.recyclenowpartners.org.uk

Develop a communications plan outlining the purpose of the communications, as well as the promotional tools that will be used. The plan should include a budget and a schedule outlining what activities will take place where and when. For promoting a new service authorities should allow a budget of £1.50 per household.

Ensure that the food waste collection service provided is well designed and operated effectively. There is no point spending money promoting a poor service.

Monitor and evaluate the effectiveness of the communication methods used and adapt your approach accordingly.

3.9 Monitoring and Evaluating Scheme Effectiveness

At the inception of the food waste scheme a monitoring and evaluation programme should be considered. WRAP has published guidance and a Monitoring and Evaluation Toolkit http://www.wrap.org.uk/local_authorities/research_guidance/monitoring_and_evaluation_guidance/index.html

A monitoring and evaluation programme will enable an Authority to establish the outputs and outcomes from the scheme. There are various methods that can be employed to demonstrate the effectiveness of a scheme.

1. Tonnage data analysis
2. Set out and participation rate monitoring
3. Waste capture analysis
4. Stakeholder feedback
5. Communication evaluation

3.9.1 Tonnage Data Analysis

Daily yields of food waste can be obtained from the treatment plant. This data can be logged in a spreadsheet and trends observed. Useful calculations are kgs per household and kgs per participating household. This will allow comparisons between rounds or with other food waste schemes to be made and relative performance can be tracked.

This method can also be employed to monitor the effectiveness of new communication campaigns as the scheme progresses. However the weekly variations in collection tonnages may make changes hard to identify.

3.9.2 Set out Rate and Participation Rate Analysis

Set out rate is defined as the numbers of containers that are set out for collection within a target area for a kerbside collection, divided by the total number of households within that area. Participation rate provides similar information, but takes into account the fact that some householders may not set out a collection container on a specific day, e.g. because they are away on holiday or do not have sufficient waste to put out for collection. It is defined as the number of households within a target area that participate in a waste collection at least once during the monitoring period (typically 3 consecutive collections), divided by the total number of households within that area.

Participation rate monitoring can be undertaken by council or contractor staff or an external consultant can be employed to undertake the analysis and produce a report. Participation rate monitoring can be used to identify non participating households so they can be targeted for door stepping or promotional work to provide them with more information on the service. Further participation monitoring can be done after a campaign to understand the impact of the campaign.

3.9.3 Food Capture Analysis

Capture rate is defined as the percentage of the targeted material that is actually captured from participating households during a collection. This can be determined by collecting refuse and food waste from a representative sample of households and taking it to an appropriate venue for sorting, classification and weighing. Although this provides a snap shot of a limited number of properties it does provide useful data on the amount and type of food waste being recycled and that remaining in the waste stream. This type of work needs to be conducted professionally and a number of consultancies offer the service. WRAP has a standard protocol for this type of analysis which allows for comparison of local results with similar local and national surveys. It is however a labour intensive form of monitoring and therefore is more expensive than other data collection methods. A small (50 to 80 households) but statistically significant sample can be analysed be undertaken for around £7,000. If you are planning to do this residents should be informed that it is taking place and given the option of opting out if they do not wish to take part.

Waste analysis can be undertaken in demographically representative areas of your authority before a new food waste collection service starts. This will establish a baseline and may inform where to target extra communications activity to ensure good scheme understanding and participation. After the service has been operational for a while the analysis can be repeated to establish capture rates.

3.9.4 Residents' Feedback

There are various methods of obtaining feedback from residents. Focus groups can be conducted to gather opinions or surveys can be undertaken. WRAP has devised a standard householder survey containing 20 questions that can be used to evaluate the attitudes and satisfaction of householders in food waste collection schemes (a copy is available from lgs@wrap.org.uk on request). Although questionnaires can be distributed and returned by post this does not generally return a good response rate. Door to door surveys ensure that questions are delivered and understood appropriately and that a representative demographic can be found for respondents.

It is also important to gather feedback from reprocessors and collection crews to ensure operations are suitably evaluated and adjustments made as necessary.

3.9.5 Communications Evaluation

It is highly advisable to monitor and evaluate the effectiveness of all communication methods used. This will help you ensure that future communication activities benefit from lessons learned regarding:

- ways of targeting different audiences; and
- the ability of different formats to get a message across and stimulate the biggest response.

Guidance on monitoring the impact of communication activities for new services is available in WRAP's Guide to Monitoring and Evaluation - www.wrap.org.uk/monitoringandevaluation

Consider using the WRAP Monitoring and Evaluation Toolkit to help plan your M&E programme.
www.wrap.org.uk/local_authorities/research_guidance/monitoring_and_evaluation_guidance/index.html

Develop a plan outlining the purpose of the monitoring as well as what methods will be used, where and when. The plan should include a budget and a schedule of activities.

4.0 Action Checklists

This section provides checklists for local authorities to use if they are considering introducing a collection service for food waste. This is not an exhaustive list and other activities may be needed depending on local circumstances.

Before you settle on a preferred scheme it is necessary to consider...

- Is there an ABPR compliant facility nearby? This is a crucial first piece of research. If there is not a facility nearby this may not prohibit a scheme as long as you have suitable bulking and transport facilities.
- What kerbside collection system for refuse, garden and dry recyclables is in place/planned? How will the new food waste service relate to these services? Consider collection frequencies, collection infrastructure, contract requirements, etc.
- If you plan to change the frequency of refuse collections will you launch the food waste collection at the same time or in advance of these changes?
- What costs will your preferred scheme generate in comparison to the alternatives and what benefits will it bring?
- Do you need additional support and if so what type?

Checklist 1: Initial Steps

Evaluate if a food scheme will be feasible:

- Evaluate whether/when food waste needs to be collected to meet required levels of biowaste diversion;
- Is an APBR treatment facility available with sufficient capacity and/or what are the likely build and approval timescales (planning, ABPR, etc)?
- What treatment capacity will be required over time?
- Where is the treatment facility located?
- What are the contract terms available at the treatment facility?
- If you are in a two-tier area liaise with the Waste Disposal Authorities (WDA) and other partners on your proposed plans and treatment requirements.
- Who is likely to provide the collection service (in-house or contracted out)?
- If contracted out – will the new service need to be tendered or can it be delivered by a contract amendment? Consider timescale issues.
- Can costs of the scheme be offset by a change in refuse collection frequency?
- What communication techniques will attract the support of local people?

Checklist 2: Information Gathering

Gather information on:

- Methods of refuse and recycling collection (e.g. kerbside sort/co-mingled). The scope for and impact of collecting food waste alongside.
- Average set-out rates of current services to inform expected participation in food waste collections.
- Uptake of home composting and provision of home composting bins.
- Urban/rural mix of properties and types of properties. Numbers of households in multi occupancy properties will affect scheme design and yields.
- Average round and crew sizes for dry recyclables and garden waste schemes (if applicable).
- Compatibility of proposed food waste collection with existing collections and vehicle fleet.
- Available space/requirements at the bulking depot and licensing requirements.

- Health and safety implications of different systems.

Checklist 3: Policies and Consultation

- Set out how the scheme will meet current policies and targets for the authority.
- Involve Members and budget holders. Be mindful of decision making timescales.
- Gain public support for the service and particular elements of scheme design as necessary. A consultation period may be required.
- Establish realistic implementation timescales. Decide if a district wide or phased roll out will be most appropriate.

Checklist 4: Cost & Expenditure Issues

Prepare a budget including the following:

- Container costs – internal and external.
- Provision of liners for caddies and how you will deal with ongoing supply.
- Relative merits of the vehicles available and opportunities to lease or purchase outright.
- Bulking/depot facilities and associated costs of meeting ABPR.
- Gate fees at treatment facilities (build an annual increase to these fees into your calculations).
- Service delivery costs by DSO or external contractor.

Checklist 5: Approval Stage

- Prepare a Delivery Plan. Use the information gathered to design a scheme that will gain budget holder and Member approval. Ensure the rationale, scheme design, timetable and budget are clear.

Checklist 6: Scheme Implementation and Roll out

- Establish the Delivery Partner. Depending on local circumstances the service may need to be tendered or be included in the delivery plan of the existing contractor for recycling and refuse. Alternatively a budget and programme may be set with the in-house service provider.
- Enter into a Service Agreement / Contract with the delivery partner. Establish a start date that is realistic considering the preparations needed.
- Enter into a Service Agreement / Contract with the treatment facility. Establish an understanding of the capacity and fees over the contract period. In two-tier areas this contract may be between the WDA and the treatment facility in which case a service level agreement may be needed between the collection authority and the WDA.
- Procure (lease) the vehicles. Confirm that the vehicles meet APBR with Trading Standards. Ensure the programme timescales fit with the delivery of vehicles and any modifications that will be needed.
- Prepare the depot. Design off loading arrangements and confirm that it meets ABPR with Trading Standards. Ensure any capital works needed (e.g. drainage) are scheduled in time for the start of the service.
- Procure containers, caddies and liners. Finalise storage of equipment. Programme the distribution.
- Prepare the communications plan. Establish the budget and programme. Review food waste communications on the Recycle Now Website and adapt for local circumstances. Concept finalisation and sign off always takes much longer than you originally think. Engage design and printing to ensure the materials are ready in time for the start date. Programme the distribution.
- Prepare a monitoring and evaluation plan. Establish the M&E programme and budget. Employ a consultancy if needed.

- Recruit the crew – this may require new staff to be recruited or existing employees to be re-deployed.
Implement training programme.
- Six weeks to a month before the start date distribute introductory leaflet.
- One week (or see section 3.7) before the start date distribute containers, liners and instruction leaflet on how to use the service to residents.
- Make additional crew available at the start of a scheme to ensure rounds are completed and contamination issues rectified.
- Implement identified monitoring and data collection procedures.

5.0 Further Information

If you have any questions or would like further information on food waste collections, contact Local Government Services at WRAP. Expert advice is available to help you to identify and assess different food waste collection options suited to your particular circumstances.

In addition, 'hands-on' and practical advice is available for local authorities in England and Northern Ireland on a wide range of issues related to the:

- Design and operation of kerbside and bring collection schemes and household waste recycling centres.
- Procurement of service.
- Local communication and awareness programmes.

To find out more, call Tel: 01295 819661 or email lgs@wrap.org.uk

Alternatively, you can obtain a request for support form online at www.wrap.org.uk/las and submit this by e-mail to lgs@wrap.org.uk

Appendix One – Vehicles for Food Waste Collections

The following are examples of vehicles that can be used for separate food waste collections.

Hydraulic assisted bin lift vehicles used in the WRAP Food Waste Trials

Image A: Bespoke design used in Preston



Image B: Farid Minimatic on Iveco chassis



Image C: Terberg Toploader used in Mid-Bedfordshire



Image D: Mid Bedfordshire vehicle loading



Image E: Farid Minmatic Food waste collection in Broadland



Image F: Food waste collection in Broadland



Image G: Farid Micro lifting the slave bins in Elmbridge



Image H: Returning containers in Elmbridge



Image I: Farid Minimatic Food waste collected in Guildford



Image J: Farid Minimatic Food waste collection in Hackney



Manual Load Vehicles

Image K: Electric powered vehicle manufactured by SEV, used in South Shropshire



Image L: Vehicle used for food waste collection in Kingston upon Thames



Vehicles used for co-collecting food waste with other materials/ waste

Image M: Stillage Vehicle used in Somerset



Image N: Food waste being loaded into stillage in Somerset



Image O: 2009 New Vehicle used in Somerset separates food, paper, card, glass, plastics, cans, foil, clothing and car batteries.



Image P: Food waste being loaded into the 2009 Vehicle in Somerset



Image Q: 3 way split vehicle tested in Somerset with pod for food waste and compaction chambers for plastic and cardboard



Image R: Split bodied vehicle used in the Isle of Wight for combined food and garden waste collections



**Waste & Resources
Action Programme**

The Old Academy
21 Horse Fair
Banbury, Oxon
OX16 0AH

Tel: 01295 819 900
Fax: 01295 819 911
E-mail: info@wrap.org.uk

Helpline freephone
0808 100 2040

www.wrap.org.uk/local_authorities

