This publication updates the 2009 guide and pulls together the findings from more recent studies and pilots conducted by WRAP and others. Through the various sections, this guide is designed to support local authorities by detailing good practice and evidence which can help inform the design and delivery of high capture, cost-effective food waste collections.

Section 9: Costs and productivity

This section explains how an understanding of the costs and productivity of a household food waste collection service is essential to ensure it’s delivered as efficiently as possible. It introduces WRAP’s ‘Kerbside Costing Tool’ which is available to local authorities via WRAP’s local authority ‘portal’ to compare the indicative costs of a range of collection scenarios, including the collection of food waste.

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9.1 Food waste collection costs

What costs are involved in a food recycling collection?

- Crew costs – salaries, pension, bonus, holiday cover, etc.;
- Supervisor – could be dedicated to the service or shared across recycling and waste teams;
- Vehicle fuel;
- Vehicle standing costs (i.e. costs incurred while the vehicle is in the depot): licences, road tax, depot charges and maintenance schedule;
- Vehicle finance – either bought outright or considered as annualised capital; leasing or contract hire costs;
- Containers (capital);
- Caddy liners;
- Overheads – costs related to the delivery of the service covering back office functions including legal, finance and management costs;
- Treatment – the gate fee (£/tonne) for treating food waste at Animal By-Products Regulations (ABPR) approved facilities; and
- Avoided disposal – whilst not strictly a ‘cost’ (rather an ‘avoided cost’), the potential savings from not treating food waste through a residual stream should be accounted for. For unitary authorities, the savings from avoided disposal are likely to be clear. But for collection authorities in two-tier areas, how savings in disposal costs are passed on to the collection authority may be subject to the levy or recycling credit arrangements with the disposal authority.

The pie chart in Figure 9.1 provides a breakdown of collection costs for a typical weekly separate food waste collection service. Employee costs represent the bulk of collection costs, followed by vehicle related costs.

**Figure 9.1 Typical breakdown of collection costs for a weekly food waste collection service**

Note: container costs (external and internal) are annualised over five years.
9.1.1 Factors influencing collection costs

The cost of delivering a food waste collection service depends on:

- the cost of the individual resources; and
- the number of these resources needed to service the specified number of properties in a local authority area at the required collection frequency.

The number of resources needed is normally a function of the number of collection rounds needed, or put another way, the average round size that can be achieved divided into the available working days. Clearly, larger round sizes will result in lower costs and are influenced by the scheme design and the level of efficiency it is able to achieve.

Benchmarking food collection services in terms of cost and performance can be difficult as local authority services operate in different geographical areas under regimes with varying scheme design and differing levels of participation.

Compared with dry mixed recycling or refuse, the quantities of food waste collected from each individual household are lower. Given the potential spare vehicle capacity, kerbside food collections are often shared with flatted properties, schools and sometimes business properties.

Food waste can also be co-collected with dry recyclables or refuse on split or multi-compartment vehicles. Although total food waste tonnage is reported through WasteDataFlow returns, tares of weight specifically for food waste are not always possible when crews use co-collection vehicles and so it is difficult to directly unpick the performance and the cost associated with food waste collections in particular areas and with shared services.

WRAP has updated its earlier Indicative Cost and Performance study of a range of recycling and waste collection systems to now include separate weekly food waste costs. The output results of this work can be found online in WRAP’s Kerbside Costing Tool, available on the local authority portal (http://laportal.wrap.org.uk). The costs and resources are calculated for collections of ground level properties in England assuming efficient collections with above average levels of set out and participation.

Costs and productivity outputs are provided for three types of weekly separate food collection depending on the type of dry scheme in operation. All food collection results presented are modelled with fortnightly residual collections. The options include free on-going liner supply which would be necessary to achieve and sustain high levels of participation. Combined garden and food collections are discussed in section 9.3 below and are not included in the Kerbside Costing Tool.

To enable local authorities to compare themselves with a particular region rather than a single average the results are categorised into six local authority areas. These ‘rurality’ groups have been devised as having higher or lower levels of housing density and
different levels of deprivation, both of which are known to affect collection costs and performance.

- **Deprivation** influences food collection costs primarily through associations with higher or lower levels of participation, which in turn, affect the number of containers that crews would have to collect and empty in a daily round.

- **Housing density** affects collection costs through the travel distances within the round and spatially how far apart houses are set, which can slow down or increase the rate at which crews can service properties in a set time period.

The on-line tool pre-selects the ‘rurality’ group of the local authority and enables the user to input a range of local scheme values such as gate fees to generate an individual result. Given that waste and recycling services are inter-related and often shared, both the overall costs and the different elements of the scheme costs are displayed. As well as showing costs, the tool also provides indicative collection round sizes for the services to outline how the resource levels would need to be deployed in order to achieve the costs presented.

Figure 9.2 is an example of an output from the Kerbside Costing Tool to illustrate how the tool can be used to compare the indicative kerbside costs for a range of collection scenarios. The example shown is for ‘Rurality Group 4’ (mixed urban/ rural, lower deprivation) and shows that the lowest cost option modelled is where food waste is co-collected with a weekly multi-stream dry recycling collection and a fortnightly residual waste collection.
Specifically for weekly food waste collections, the analysis underpinning the Kerbside Costing tool shows the following:

- Costs vary according to the rurality and collection profile. No one solution is the most efficient for all local authorities.
- The lowest cost method of collecting food waste weekly tends to be when it is included as part of a weekly multi-stream collection. This is because the need for a separate crew is negated and the costs are ‘shared’ across the services. Multi-compartment stillage or resource recovery type vehicles also cost less in both capital and operating cost terms than split-compartment or collection vehicles fitted with a separate pod.
- The separate collection crew option typically is the second lowest cost option and probably the most flexible, as it is not tied to a specific service profile. However, this
is not the case for more rural areas where it is less costly to co-collect with other materials than to run a food waste collection service using a separate fleet.

- The pod option generally is the more expensive option in urban areas. Although the collection is shared with the dry recycling service (either co-mingled or two stream), the capacity needed for the food compartment reduces the available capacity for the other materials.
- Round sizes are affected by frequency of collection and participation in the main material/refuse stream collection with the co-collection options.
- The co-collection options require the same end destination for all materials/waste streams to avoid additional drop-off time, which increases time and adds cost.

**Figure 9.3** Average costs derived from the Kerbside Costing Tool showing gross (collection only) costs for three main food collection scenarios

9.2 Productivity

9.2.1 Operational aspects affecting food waste collection costs:

There are a number of operational factors that you can influence to improve the productivity of your food waste collection service:

**Balance of productive and non-productive time**

The more time collection crews are ‘off’ the collection round travelling to unload, the less (productive) time there is available in the working day to service properties and
empty containers. Regardless of the contracted work hours, there will inevitably be non-productive time elements. However, reviewing opportunities to increase the proportion of time spent on the round can help reduce costs by extending daily round sizes and reducing the overall number of rounds.

**Set out rate**
The number of containers set out by residents has the largest bearing on work load and a high impact on costs. The more containers the crew empty, the smaller the round size as they’ll be able to pass fewer properties in day. In terms of collection efficiencies it is therefore important that householders use the service well and place all the food waste they produce in the food container (and not in the residual bin).

**Participation rate**
The number of participants has more of an influence on the overall tonnage captured than on crew workloads.

Somewhat surprisingly, participants on weekly food waste collections do not appear to participate on every collection opportunity (i.e. every week). Participation and set out rates in weekly food waste collections are known to be higher where residual waste is collected fortnightly.

A large gap between participation rate and set out rate for food waste on a mixed scheme suggests that residents may be using the containers primarily for garden waste.

**Fill level per container**
The amount of material presented per container should be high to offset the impact of going to each property. Collecting containers with limited quantities of food is likely to mean that the cost per tonne of collection will be high.

**Number of loads**
The number of loads vehicles need to discharge on a daily basis will impact on the available productive time. If the loads discharged per day are higher than anticipated then this may mean that round sizes need to reduce, thereby increasing the need for additional crews and hence costs.

### 9.2.2 General approaches to reducing food collection costs

Staff salary costs make up the largest fraction of the collection cost. How operatives are deployed on the collection rounds can have a significant impact on collection costs. Enabling crews to spend as much of their available time on collection and loading containers at a high rate has the biggest influence on scheme costs and hence where savings can be made if collections are not operating efficiently.
Maximise the available productive time of collection crews
Ensure collection crews are on the round for as much of the working day as possible. Review the travel distance to and from the treatment facility as this restricts the amount of collection time.

Consider the locations of the starting depots and the end treatment destinations, as careful choice of these can significantly reduce the overall travel time accumulated by all crews.

Scheduling collection vehicle entry times to depots can help reduce queuing and speed up turnaround times.

Consider whether co-collection would be a better option than separate collection
Using a dedicated fleet of vehicles can mean that the round sizes can be stretched and tailored to match the number of participants on different collection rounds which inevitably will vary across authorities, but particularly in more rural settings.

Co-collecting food waste, particularly with recyclables on a multi-compartment vehicle, will reduce costs by avoiding the need for a separate fleet. The limiting factor in deciding on co-collection is the capacity required for the other waste/material stream. The ‘core’ materials – usually dry recyclables or refuse – are likely to have a higher yield and set out rate than food waste. If the compartment sizes are constrained then the vehicle will need to unload more often, thus reducing the productive time available. The design of compartments should therefore favour the ‘core’ materials.

The logical time to consider changes in scheme design is when negotiating a new contract or when vehicles are to be renewed. WRAP’s Kerbside Costing Tool (see Section 9.1.1) can be used to provide indicative costs and performance for a range of collection scenarios.

Achieve a high pick rate
There are three main ways in which the number of containers picked up on a round by the crew every hour can be maximised.

- Ensure staff are well trained in how to load vehicles safely and efficiently, and how to deal quickly with issues or uncertainties at the set out point (e.g. contamination, side waste and damaged containers).
- Ensure there is some level of driver contribution to container pick up. For smaller gross vehicle weight (GVW) trucks, the driver may be able to leave the vehicle and help the rest of the crew empty containers. Some local authorities employ drivers and loaders to share responsibilities. However, this may not be possible with larger vehicles that need to be parked up before the driver exits the cab. For details on optimum crewing configurations see Table 9.1 below.
- Provide all households with clear communications highlighting the requirement to set out food containers at the curtilage of their property. Over the course of a round,
crews can spend a considerable amount of time walking to locate caddies that are not presented at or close to the designated collection point.

**Consider the loading points on the vehicle**
Avoiding crew queuing to unload containers will improve collection efficiencies. It is therefore important to consider how vehicles will be loaded prior to selecting trucks, as once purchased, the loading points cannot be changed. Low level, easy access loading points on multi-compartment vehicles enable crews to achieve an optimum loading rate.

On co-collection vehicles, loading points for food waste adjacent to those for the ‘core’ materials increase the loading rate. Where loading points for food waste and the ‘core’ materials are at opposite ends of the vehicle, especially when they need to be on the driver’s offside, more time is required for crew to walk around the vehicle for each empty.

**Provide flexibility of loading options**
Operatives like flexibility in how they load the vehicle in line with health and safety considerations. This is especially important when crews traverse a range of housing types, encountering different street layouts and other obstacles. In any given collection round, a crew may:

- empty individual containers directly into the vehicle;
- aggregate food waste bags from 3–5 households at a time and then make a return trip to leave replacement rolls of liners if required;
- deposit the food waste from 7–12 households into a wheeled bin (often referred to as a ‘slave’ bin) and then tip its contents into the collection vehicle; and
- use wheeled bins at flats, communal sites, businesses and schools to enable collections to be integrated with collections from kerbside properties.

**Consider loading times**
Automatic loading and emptying of containers slows the loading rate by crews. Emptying of containers directly into the vehicle by the crew is a much quicker operation and allows more properties to be serviced in the same time. Automatic loading and emptying is required for wheeled containers, but there may be opportunities to use a ‘slave bin’ (see above) to reduce the number of automatic lifts required on co-collection rounds using split-compartment or pod vehicles.

**Ensure good capture of food waste from every household**
The more food waste collected on each round, the more productive the service will be. Capture will be boosted if residents are:

- familiar with the wide range of food types collected;
- aware of the provision of free liners or where to access a liner supply; and
- aware how they can join/ participate in the service if not doing so already.

Good communications are essential here (see Section 6).
**Ensure the crew and vehicle capacity is appropriate for the area and collection system**

Different crew sizes are efficient for different vehicle types and in different geography. For efficient operations, the vehicle filling too early and additional return trips to unload should be avoided.

Small capacity vehicles with a driver plus two crew members may mean the vehicle fills up quickly, necessitating more time off round. Alternatively on larger capacity refuse collection vehicles (RCV) (11+ tonne payload), a driver plus two loaders may mean spare capacity which could be utilised by collecting from commercial premises, schools, etc. Table 9.1 gives the optimum crew configuration for different collection types and areas.

### Table 9.1 Optimum crew configuration

<table>
<thead>
<tr>
<th>Collection type</th>
<th>Number of crew</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate collection rounds 7.5 tonnes GVW</td>
<td>Driver + 1</td>
</tr>
<tr>
<td>Co-collection option (pod)</td>
<td>Driver + 3</td>
</tr>
<tr>
<td>Co-collection rural options</td>
<td>Driver + 2</td>
</tr>
<tr>
<td>Co-collection – multi-stream</td>
<td>Driver +1 (rural); Driver +2 (urban/ suburban)</td>
</tr>
<tr>
<td>Mixed garden and food waste</td>
<td>Driver + 2</td>
</tr>
</tbody>
</table>

#### 9.3 Mixed garden and food collection system costs

Since mixed garden and food collections tend to capture a high volume and quantity of garden waste, the service costs are heavily influenced by this waste stream. Garden waste is the largest single recyclable waste stream collected by local authorities and yet it varies significantly in terms of household generation across the UK. The variations are affected by:

- differences in housing stock with gardens in each local authority area;
- considerable variations in garden size by region; and
- differences in the quantity of shrub/ border type garden waste and grass clippings per property.

There are also difficulties in fully appreciating the amount of garden waste from terraced households, especially where properties may have limited space or have built over part or all of their gardens.

When compounded by seasonal and year-on-year weather issues, determining the quantity of potential garden waste is not easy. The potential yields of garden waste and the participation rate need to be understood to determine the required collection resources.
When a mixed garden and food waste collection is introduced, residents are normally encouraged to put food waste in an existing garden waste container, usually a wheeled bin which is collected fortnightly. Unless food waste participation is very high, the amount collected normally is not enough to require additional crews to support the collection rounds and thus increase collection costs. Additional crews would only be needed if the additional tonnage from food waste is sufficient to exceed the available spare capacity in the existing garden waste RCV fleet.

For a typical crew (i.e. a driver plus two loaders) using a 26-tonne RCV, the additional costs associated with the collection (but not disposal) of mixed food and garden waste tend to be marginal and associated with the supply of internal caddies, starter packs of compostable liners and communications. The (capital) cost of supplying the wheeled bins is assumed to have been accounted for as part of the set-up costs of the garden waste service.

9.3.1 Effect on collection costs of adding food waste to garden waste collection

The example below illustrates the impact on collection costs of adding food waste to an existing garden waste collection scheme.

- Average round size for garden waste collections: 1,500 households per day
- Average 0.5kg of food waste collected per household: this equates to an additional 0.75 tonnes collected per day
- The majority of garden waste rounds collect two loads a day, so a vehicle would need sufficient spare capacity to accommodate an additional 0.375 tonnes per load. This represents 3.4% of the available capacity per load or 6.8% if undertaken on one load. At these levels, additional crews are unlikely to be needed and it should be possible to deliver the additional service with existing resources.

Similarly if the yield per household was double the average rate at around 1kg per household, the 1.5 additional tonnes could be collected without additional crews unless the vehicle currently has no spare capacity. Given the seasonal variations in garden waste arisings, this is unlikely.

The travel distance to the treatment facility or an increase in participation in the service could also influence operational costs. Participation in garden waste collection services, particularly in services provided free of charge, can be high (≥70%). Since the workload is driven by the garden waste collection, increases in food participation within the system would increase the fill of the vehicle but not the workload for crews. However, changing the end treatment from open windrow composting to in-vessel composting (IVC) may involve a longer travel distance.

The major cost impact of adding food waste to an existing garden waste service is in the treatment costs (typically via IVC). The ABPR require all food waste (whether collected separately or mixed with garden waste) to be treated in a controlled environment (e.g. IVC); this precludes open air windrow composting. Given that gate fees for IVC are
typically at least double that of open air windrow composting, the treatment costs of a service collecting mixed food and garden waste are significantly more than would be the case if garden waste was collected without food waste.