
Final Report

Collecting food waste from small businesses and schools



This document provides information on collecting food waste from small businesses and schools. It highlights a series of key issues which local authorities should consider when thinking about rolling out food waste collections to businesses and schools.

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Executive summary

Increasing numbers of local authorities across the UK are providing food waste collections to households in their area in order to keep food waste out of landfill. Similarly, most large commercial producers of food waste arrange to have it collected separately for recovery by private sector service providers. By contrast, many schools and local businesses are not offered a food waste collection service, and their unsorted mixed waste is sent for disposal even where the food element is a significant proportion of the waste stream and could be recycled.

This situation presents an opportunity for local authorities to increase their commercial waste service provision to include separate food waste. Offering such a service to local schools and businesses can bring environmental and social benefits, and meet the growing expectations of the local community.

This document explores the potential for local authorities to provide schools and businesses with affordable food waste collections. It investigates the main considerations to take into account, and reports on the experiences of authorities and others who have already taken this route.

Why would schools and SMEs be interested in food waste collections?

As people become used to new ways of food waste being collected at home, they may look for the same in the workplace or at school.

Recent research for Defra found that many larger SMEs are keen to have their food waste recycled. A major driver is the landfill tax, which is currently £48 per tonne and due to increase by £8 per tonne each April until it reaches £80 per tonne. This will push up the cost of disposal of mixed waste that includes food waste. As long as a food waste service is structured so that business customers can make savings on their refuse disposal costs and not pay an increase in their costs overall, they are likely to show interest.

The service will be particularly relevant for those businesses that produce food waste in significant quantities or where food waste forms a large part of their waste stream. These businesses will predominantly be within the hospitality sector, for example hotels, cafés and restaurants. Equally, schools with canteens are likely to generate food waste in quantities that justify separation at source.

Schools additionally are likely to be interested from a sustainability perspective, particularly as there are educational benefits to separating waste at source. Introducing food waste collections in schools brings the issue of food and the environment to children in a practical way, and there is the potential integrate it within the curriculum.

Why should my authority consider offering food waste collections?

Apart from providing a service that currently may not be available in an area, local authorities themselves may benefit from reduced landfill tax obligations and reduced risks of meeting landfill allowances obligations. If a local authority is responsible for the disposal cost of school waste, it will be paying increasing amounts of tax each year on any waste sent to landfill. Where food waste collections allow local schools to keep this dense, heavy material out of the residual waste stream, landfill disposal costs will be reduced.

Another important benefit for authorities is being able to offer a comprehensive suite of commercial waste services: residual waste, dry recycling and food waste collections. This is likely to be particularly attractive to schools and businesses, and, if planned and priced correctly, will provide full cost recovery with no impact on local taxpayers.

Local authorities best placed to provide a commercial food waste collection service are likely to be those that:

- run household food waste collections;
- collect trade waste service; and
- can benefit financially from reduce residual disposal, for example from their schools.

However, this does not mean that authorities which do not 'tick all three boxes' should not consider rolling out food waste collections to schools and businesses.

What are the environmental benefits?

In the majority of cases, when food waste is disposed of in the residual waste stream, it is consigned to landfill. Here it breaks down anaerobically and produces methane, a potent greenhouse gas. While some landfill gas is often collected, the separate collection and treatment of food waste ensures that these emissions are avoided.

Food waste is mainly treated in one of two controlled ways: by anaerobic digestion (AD) or by in-vessel composting (IVC). Where it is sent to an AD plant, it can be used to generate electricity, mains gas, heat, or transport fuel. And both AD and IVC produce products which can be beneficially applied to agricultural land.

For parts of the UK with rapidly depleting landfill capacity, the benefits of diverting material to other more sustainable methods of treatment are clear to see.

What are the main practical considerations?

It is essential to make an accurate assessment of the resources needed to run the service, calculate the costs of the service, and estimate the revenues. Only by making these calculations in advance will the authority be able to ensure that the new service covers its costs. Costs will include:

- infrastructure;
- personnel;
- waste treatment gate fees;
- marketing; and
- a proportion of overheads.

In order to estimate the necessary resources, it is recommended to make a realistic assumption of service uptake. This will inform projections of the number of container lifts that will be required each week, and the associated labour and vehicle requirements. This report has full details on how best to make projections.

Pricing is an important consideration. A business should expect to pay a reasonable charge for the collection and disposal of its waste, and the authority has a duty to ensure all its costs (for both collection and treatment) are covered by its charging tariff. This should be determined taking account of all collection and treatment costs including the fixed costs of capital assets. Authorities should be able to charge rates that are competitive with other service providers. Cost recovery from schools is complicated by current rules, which only allow for collection costs, and not disposal costs, to be recovered by the collector although the Government is consulting on changes to these arrangements.

Any food waste collection service needs a suitable treatment facility at acceptable distance. This could be an AD or IVC facility. Transporting food waste long distances is likely to affect the financial viability of the service, and leave it more vulnerable to increases in fuel costs.

How can it be done most efficiently?

Integrating a new schools and business service into an existing household food waste collection system offers the simplest solution, particularly where the number of customers is expected to be moderate. A dedicated round, separate from the household collections, is likely to provide greater service flexibility where there are sufficient customers to warrant it albeit costs of service provision may be higher.

Collection costs and the need for intensive communications (sales and scheme set up) represent the largest investment in the new service. Situations where these resources and contacts with businesses are already in place represent the biggest opportunities for efficiencies to be made. Targeting of business types which generate high proportions of food waste along with good scheme design and communications to maximise capture means that collection costs per pick up can be reduced.

The development of a schools and business food waste service as a means of making fuller use of existing collection capacity, may also improve the efficiency of current food collections to households.

What difficulties might we experience?

Any new service is likely to experience teething problems, but experience suggests that the following might be encountered:

- Attracting customers in sufficient numbers. There may be some barriers to be overcome when recruiting businesses for a new food waste collection service. Businesses will take longer to engage with than householders and this can require significant marketing input. With schools, it can sometimes be difficult to identify the individual responsible for waste management arrangements. The local authority should embark on a market assessment before committing to the service, to ensure it understands the size and nature of the local market.
- Appropriate containment. It is important to provide customers with adequate suitable containers (both internal and external) for their food waste, and to consider providing liners to maintain standards of hygiene.

With suitable containers, appropriate frequency of collection, and fully informed customers, odour and hygiene should not be a problem.

- Contamination. It is possible that contamination of the food waste stream with other waste products may be an issue, particularly from secondary schools. This will make the collected food waste less effective in IVC or AD. There are ways to reduce incidences of contamination, principally by effective communication with customers, explaining why it is important to keep the waste stream free of non-food items.

Where can I find further information?

This report and its appendices contain detailed information on planning and implementing a food waste collection service for schools and small businesses, covering all the above points and more. However, if you would like to get in touch with someone at WRAP to discuss your particular situation, please contact WRAP's Local Government Services team on 01295 819661 or email lgs@wrap.org.uk.

Contents

1.0	Introduction	1
1.1	Current food waste collection activity	1
2.0	Structure of the Document	Error! Bookmark not defined.
3.0	Legislation and key responsibilities	4
3.1	Waste collection authorities (WCAs)	4
3.2	What are authorities' statutory responsibilities to businesses?	4
3.3	What are authorities' statutory responsibilities to schools?	4
3.4	Animal By-Products Regulation (Amended 2009)	5
4.0	How well placed are local authorities to collect food waste from businesses and schools? ...	6
4.1	Authorities well-placed to implement business food waste collections	6
4.2	Authorities well-placed to implement schools food waste collections	10
4.3	Chapter summary	13
5.0	Estimating the quantity of food waste which could be collected	14
5.1	Available data	14
5.2	Potential influences upon food waste arisings	15
5.3	Potential influences upon food waste capture	15
5.4	Food waste in businesses	15
5.4.1	Waste composition	15
5.4.2	Food waste yields	16
5.4.3	Food waste capture rate	17
5.5	Food waste in schools	17
5.5.1	Waste composition	17
5.5.2	Food waste arisings	17
5.5.3	Food waste yields	18
5.5.4	Food waste capture rate	18
5.6	Chapter summary	18
6.0	Containment and receptacles	19
6.1	Average yields	19
6.2	Health and safety issues	20
6.3	Using internal containers - caddies.....	20
6.3.1	Use of liners	22
6.3.2	Odour and hygiene issues.....	22
6.4	Ensuring low contamination of the collected material.....	23
6.5	Chapter summary.....	24
7.0	Container placement, storage and presentation for collection	25
7.1	Internal container placement.....	25
7.2	External container storage	25
7.3	Container presentation for collection	25
7.4	Chapter summary.....	25
8.0	Frequency and timing of collection	26
8.1	Collection frequency	26
8.2	Time / day of collection	26
8.3	Chapter summary.....	27
9.0	Marketing services - approaches and resources	28
9.1	Potential customers	28
9.2	Marketing methods.....	29
9.2.1	Businesses	29
9.2.2	Schools	31
9.3	Marketing messages	32
9.3.1	Key messages for different customer groups	32
9.3.2	Addressing concerns	32
9.4	Timing and resources	33
9.4.1	Links with household services	33
9.4.2	Resource requirements.....	33
9.5	Chapter summary.....	34
10.0	Treatment of collected food waste	35

10.1	Location of facility	35
10.2	Type of facility	35
10.3	Waste inputs.....	36
10.4	Gate Fees	37
10.5	Chapter summary.....	37
11.0	Designing a service - resourcing the service	38
11.1	Predicting uptake and yield	38
11.2	Collection options.....	38
11.2.1	Practical issues related to collecting on the household round.....	39
11.2.2	Practical issues related to collecting on a separate pass.....	42
11.2.3	Practical issues related to collections on a shared residual / recycling pass	44
11.2.4	Evolution of services if collecting on household rounds	44
11.3	Chapter summary.....	46
12.0	Costing the service	47
12.1	Basic principles	47
12.2	Marketing and promotional costs	48
12.3	Costed examples of services (Appendix F)	48
12.3.1	Time restricted vs. volume / payload restricted	50
12.3.2	Key observations and considerations	50
12.4	Chapter summary.....	53
13.0	Pricing the service	54
13.1	Recovering Costs.....	54
13.2	Costs for collection and treatment of food waste.....	54
13.3	Approaches to charging structures.....	56
13.3.1	Food waste collection to businesses, no other waste services offered	56
13.3.2	Food waste collected from business, refuse collection offered, charges determined for each service separately.....	56
13.3.3	Food waste collected from businesses, refuse also collected, charging structure used to incentivise take-up of food waste service.....	58
13.4	Additional considerations for incentive based charging.....	61
13.5	Convergence of approaches where the authority offers refuse services	61
13.6	Chapter summary.....	61
14.0	Summary of key issues	63
14.1	Looking forward	63
14.2	Legislation and key responsibilities.....	63
14.3	Food waste quantities and captures	63
14.4	Containment and receptacles	64
14.5	Frequency and timing of collection.....	64
14.6	Marketing approaches and resources	64
14.7	Issues regarding treatment of collected food	65
14.8	Designing a service - resourcing the service.....	65
14.9	Charging for the service.....	66

1.0 Introduction

Increasing numbers of local authorities across the UK are providing food waste collections to households in their area. Similarly, most large commercial producers of food waste arrange to have their food waste collected separately for recovery by private sector providers. By contrast, many schools and small businesses are not offered a food waste collection service, and their unsorted waste is sent for disposal even where the food element is a significant proportion of the waste stream and could be recycled.

This situation presents an opportunity for local authorities to increase their commercial waste service to include separate food waste services to their customers. Offering such a service to local schools and businesses can bring environmental and social benefits, and meet the growing expectations of the local community.

This document explores the potential for local authorities to provide schools and small businesses with affordable food waste collections. It investigates the main considerations to take into account, and reports on the experiences of authorities who have already taken this route. It builds on research undertaken by WRAP (Waste & Resources Action Programme) and others, and draws from examples of current food waste collection services. It is aimed at local authorities and their contractors, as well as advisors, and is intended to help local authorities to:

- identify if they are well placed to provide a food waste collection service to local businesses and / or schools; and, if they are;
- to design a food waste collection service that builds on their current service configuration.

Due to the relative infancy of food waste collection from schools and small businesses the research has spanned both the public and private sectors. Case studies are presented in full in Appendix I, but valuable experience is drawn out throughout the document in example boxes.

No document can definitively highlight 'the best way' to design and develop a service. However, this document highlights the important factors which need to be considered. Moreover, provision of food waste collection services might not be suitable for all authorities, and this document offers some observations regarding the authorities who are best placed to offer such services.

The document focuses on the provision of services to those small businesses which are most likely to be producing food waste in significant quantities or for whom food waste represents a large proportion of the waste they produce. These businesses will predominantly be within the hospitality sector - for example, hotels, cafes and restaurants. These types of small business are considered a good group to target when first rolling out a service, but of course most businesses, even those which are office based, produce some food waste.

1.1 Current food waste collection activity

Across England, Scotland and Wales, there were only some 20-25 organisations offering separate food waste collections to small businesses (including a few social enterprises, some private contractors and, mainly, local authorities), at the time the research was conducted for this study. The reasons for this are likely to include a range of linked factors, from basic economics of service provision (and what this might imply for customers' bills), lack of knowledge regarding best approaches to collecting food waste, uncertainty regarding customer uptake of new services, lack of clear demand, and the lack of local facilities for treating the collected food waste. The average size of the customer base is 53, but this ranges from as few as four to over 100 businesses¹.

¹ From a review of existing activities carried out for the study. See Appendix H.

Similarly, around 25 organisations (again, predominantly local authorities) were, at the time this research was conducted, collecting food waste from schools. The number of schools covered by a scheme ranged from just one to 163, with the average across all schemes being 38.

This paints a picture of a relatively untouched market. There is significant scope for local authorities to collect this waste separately for appropriate treatment, not least as some of the obstacles discussed above are diminishing in significance. Key factors encouraging the provision of food waste collection services are:

- the landfill tax escalator, which is set to continue increasing annually by £8 per tonne to reach £80 per tonne in 2014, which when added to the gate fee makes landfill an expensive waste disposal option (in excess of £100 per tonne based upon median gate fees for landfill²);
- increasing awareness and sensitivity of businesses to their waste management bills³;
- offering food waste services may reduce landfill allowance-related risks of local authorities, particularly those operating trade waste collections;
- a desire on the part of local authorities to improve service provision to local businesses and schools to allow for greater recycling.

In addition, Defra and WAG have consulted upon the feasibility of landfill bans, which includes consideration of a restriction on landfilling food waste⁴. The Government is not minded to introduce landfill bans in England at the present time, but will reach a view on the best way to achieve zero waste to landfill as part of the Waste Policy Review announced by the Secretary of State earlier in 2010. The National Assembly for Wales is currently considering a Measure which would allow Ministers to introduce regulations for landfill restrictions on a Wales-only basis.

Whilst there are opportunities for local authorities to engage in food waste collection, barriers remain to be overcome to encourage small businesses to make use of food waste collection services. Generally, therefore, it is advisable that where a local authority is considering rolling-out a food waste collection (either in-house or via their contractor), it should embark on a market assessment prior to committing, and it should be appraised of the issues raised in this document.

² See WRAP (2010) *Gate Fees Report 2010: Comparing the cost of alternative waste treatment options*, Available: http://www.wrap.org.uk/downloads/2010_Gate_Fees_Report.c241f5cb.9523.pdf

³ Defra (2010) *Recycling Activities in SMEs: A Survey*, Available: <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16965#RelatedDocuments>

⁴ See: Defra and WAG (2010) *Consultation on the Introduction of Restrictions on the Landfilling of Certain Wastes*, March 2010. <http://www.defra.gov.uk/corporate/consult/landfill-restrcitions/20100318-landfill-restrcition-condoc.pdf>

2.0 Structure of the Document

This document aims first and foremost to meet the needs of waste officers interested in understanding how to roll-out food waste collection services to schools and businesses. Other readers may also be interested, either in the whole document or in particular aspects. Therefore it is structured to help the reader navigate to the points of particular interest. Technical information is provided in the Appendices.

- **Section 3.0 Legislation and key responsibilities:** summarises the statutory responsibilities that collection authorities have for the provision of waste management services to schools and businesses, and their responsibilities and powers in respect of charging for these services.
- **Section 4.0 How well placed are local authorities to collect food waste from businesses and schools?:** identifies the characteristics of authorities that are likely to be better placed to provide a food waste collection service to businesses and schools. Authorities which currently offer a household food waste collection, have a trade waste service in place and can benefit financially from reduced residual waste disposal are thought to be the better-placed.
- **Section 5.0 Quantity of food waste for collection:** seeks to understand the likely arisings and potential captures from businesses and schools through compilation of currently available data. Due to the great variation across schools and businesses there are problems associated with identifying averages and authorities are advised to collect local data where practical.
- **Section 5.0 Containment and receptacles:** discusses containers and provides basic advice with regard to health and safety, how to address potential concerns regarding odour and hygiene and how to achieve a high purity of collected food waste.
- **Section 7.0 Container placement, storage and presentation for collection:** considers issues and case study material regarding container placement, storage and presentation.
- **Section 8.0 Frequency and timing of collections:** highlights that where business customers are serviced on the same rounds as householders collections tend to be made on the same frequency (i.e. weekly), whereas those operating a dedicated service can be more flexible in the frequency of collections offered. Issues of timing are highlighted for both businesses and schools.
- **Section 9.0 Marketing approaches and resources:** provides some pointers with regard to approaches to marketing services and the level of resource which may be needed.
- **Section 10.0 Treatment of collected food:** discusses issues regarding food waste treatment with a focus on the location of the treatment plant, because distance to the plant is an important consideration when setting up the service, and the type of facility, because the authority should be aware of the potential impacts of adding more food waste to the collection.
- **Section 11.0 Designing a service – resourcing the service:** illustrates important considerations when designing the service by referring to worked examples of different service configurations.
- **Section 12.0 Costing a service:** summarises key findings from worked cost examples.
- **Section 13.0 Pricing of the service:** offers advice on charging structures for services.
- **Section 14.0 Summary of key issues:** provides an overview of the key messages highlighted throughout the document.

3.0 Legislation and key responsibilities

Waste management policy is evolving, and increasingly may vary across the four nations⁵. It is therefore not the intention here to consider every piece of existing or impending legislation. Rather we focus here on key responsibilities which impact on local authorities that become involved in food waste collection. Appendix B contains details concerning the relevant sections of legislation.

3.1 Waste collection authorities

Waste Collection Authorities (WCAs) have a statutory responsibility to provide waste management services to schools and businesses. The law also clarifies responsibilities and powers in respect of charging for these services. Relevant legislation includes:

- Environmental Protection Act (EPA)1990;
- Schedule 2 of The Controlled Waste Regulations (CWR) 1992; and
- Animal By-Products Regulation (ABPR).

3.2 What are authorities' statutory responsibilities to businesses?

A WCA has a duty to arrange for the collection of waste from a business upon request by the business and may fulfil this duty in one of the following three ways:

- arrange for the waste to be collected as part of the authority's trade waste collection services; or
- arrange for collection of the waste by a waste collection contractor by acting as a broker between the business and the waste collection contractor; or
- provide contact details of the authority's incumbent waste collection contractor, directing the business to them directly.

Having requested a waste collection service from a WCA the business should expect to pay a 'reasonable charge'⁶ for the collection and disposal of the waste. WCAs also have a duty to recover the costs of waste collection and disposal from the business unless it is considered by the WCA to be inappropriate to do so. In two-tier areas in England, the costs of disposal will reflect the costs of disposal set by the Waste Disposal Authority.

The relevant legislation is summarised in Table B1 in Appendix B.

3.3 What are authorities' statutory responsibilities to schools?

Waste from schools is classed as 'household waste' therefore the WCA has a duty to collect waste from schools when requested. The WCA can apply a direct charge for the collection of waste, but not for disposal.

The relevant legislation is summarised in Table B2 in Appendix B.

⁵ See: Defra and WAG (2010) Consultation on the Introduction of Restrictions on the Landfilling of Certain Wastes, March 2010, <http://www.defra.gov.uk/corporate/consult/landfill-restrictions/20100318-landfill-restrictions-condoc.pdf>

⁶ See 'Appendix G: Legal position: reasonable charging' for further details on issues surrounding what may constitute a reasonable charge.

3.4 Animal By-Products Regulation (Amended 2009)

Under the Animal By-products Regulations (ABPR) it is illegal for food waste to be fed to farm animals. Where food waste is separately collected for biological treatment, it must be treated in either an ABPR approved enclosed / in-vessel composting facility or anaerobic digestion (biogas) plant. Appendix B (Table B5) provides further details.

Under certain circumstances, schools may be exempt from the ABPR if they are treating the food waste produced on their premises and if the resulting product is being applied to land at the same premises. See Appendix B for further details.

4.0 How well placed are local authorities to collect food waste from businesses and schools?

An authority's current waste collection service set-up will have a bearing upon the initial ease with which a food waste collection service to businesses / schools can be provided, as well as the prospects for operating such a service at a competitive cost. This section discusses the implications of different local authority starting points.

4.1 Authorities well-placed to implement business food waste collections

The flow diagram shown in Figure 1 poses a series of questions to help define how well suited a local authority's current service configuration is for the roll-out of a food waste collection service for businesses. The diagram assumes legislation as at September 2010. If, for example, the law were to change so that all businesses were required to segregate food waste, the costs of gaining customers might fall significantly, though equally, competition from others may be more of a threat than at present.

The following numbered sections, which correspond with the numbers shown in the flow diagram (Figure 1), provide further explanation for each step as required.

1. Current delivery of trade refuse services?

This is the first important criterion which begins to define whether an authority is in a good position to develop commercial food waste collections.⁷ If the authority or its contractor (acting on its behalf) collects trade refuse from a reasonable number of customers, then having this service in place means that the following (amongst others) will already have been established:

- a. a customer base;
- b. appropriate back-office resource;
- c. some resource for marketing of the service;
- d. appropriate invoicing procedures; and
- e. a good understanding of set-out points and access issues.

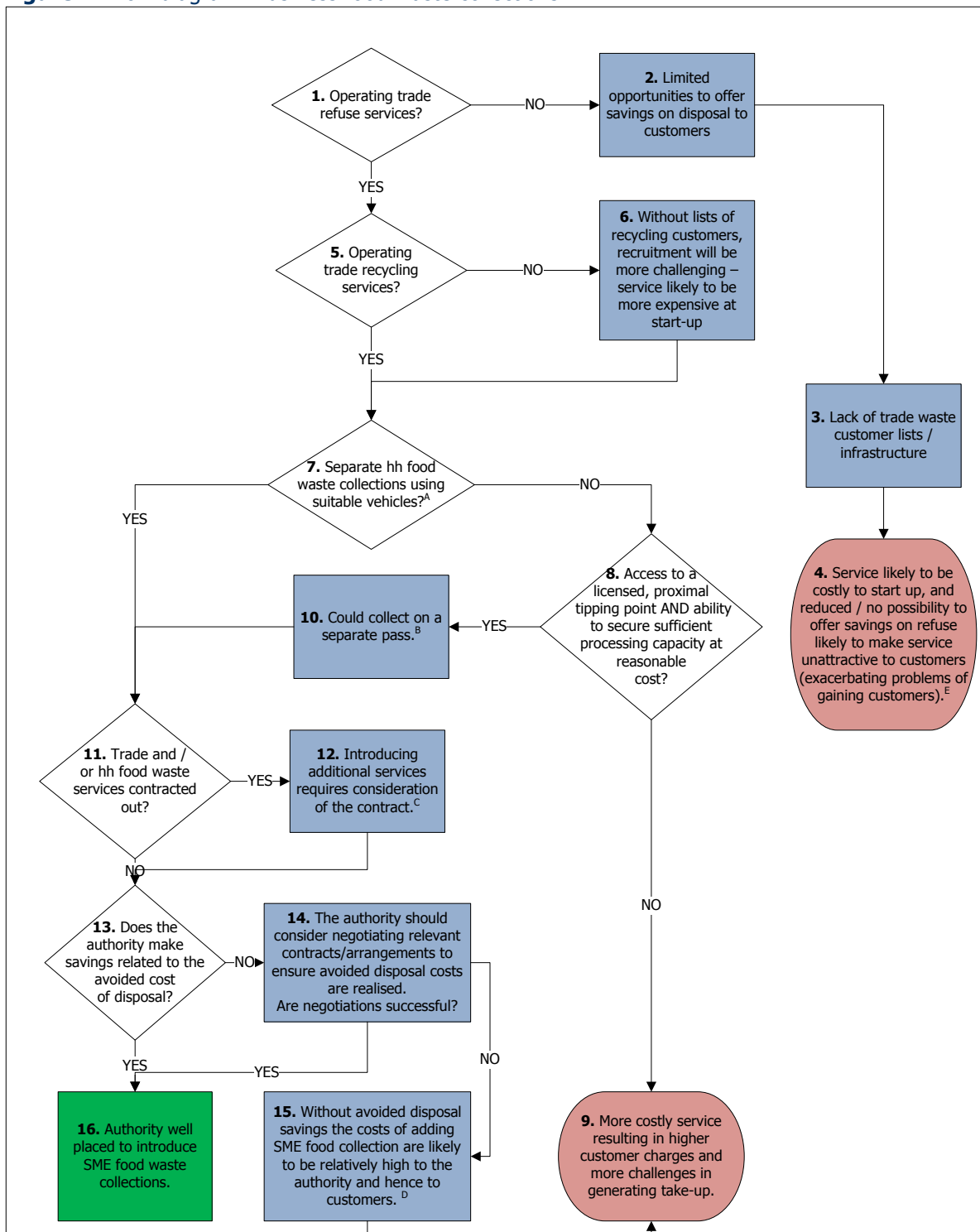
2. No trade refuse service

For businesses, unless they are strongly committed to using a food waste collection service (for environmental / Corporate Social Responsibility reasons), there is likely to be a desire to keep the costs of waste management down. Since their main opportunity for cost savings will lie with reduced refuse collection / disposal costs, then unless the authority offers both refuse and food waste collections, it will be difficult to demonstrate what savings the customer might make if they use a food waste collection service.

In principle, potential savings could still be made, but their magnitude would depend on the charging structure used by the existing refuse collection contractor. This may lead to the food waste service appearing to be (and sometimes being) relatively expensive as the customer would be paying for an additional service, with no counterpart savings in refuse costs. These issues are explored further in the sections on costs of commercial food waste collections and the pricing of this service (see Sections 12.0 and 13.0).

⁷ 65% of local authorities in England offer a collection service of residual trade waste. Of these 89% of the services offered are delivered by local authorities themselves and not by a private contractor. Source: WRAP (2010) Local Authority Trade Waste and Recycling Survey – June 2010, Available: http://www.wrap.org.uk/downloads/TW_survey_report_v1.9.48c1216d.9521.pdf

Figure 1: Flow diagram: Business food waste collections



^A Collecting food waste from commercial premises on the existing domestic rounds will in most circumstances offer the most cost effective collection method.

^B It may be possible to develop a collection service collecting commercial food waste on a separate pass. Density of customer uptake will need to be relatively high. Vehicle selection and matching the selection to the daily yield of food waste will be important.

^C In most cases it is likely that introducing food waste that is cost effective (and attractive to authority and contractor, as well as user) could only be achieved at the point of procuring the overall domestic and trade waste services contract. Although it may be possible to negotiate a contract variation this is less likely to provide good value for money.

^D It is important to check whether the Authority or the Contractor will be able to realise the benefits of avoided disposal at the margin by introducing food waste collections (there may be issues with minimum tonnage contracts for disposal). This is important from the perspective of offering an attractive and cost competitive service to customers.

^E It will be extremely difficult to build up a service in a cost effective manner without an existing customer database. Getting trade waste services happening in the area should be part of an overall trade waste strategy.

3. Lack of trade waste customer lists / infrastructure

A further downside of attempting to develop commercial food waste collections in the absence of other trade waste services is that there will be no relationship with existing customers through which the commercial food waste service could be marketed. Having an existing customer base would allow for more targeted marketing and reduce the need for, and time spent, cold-calling. Without this marketing costs will be higher. These issues are discussed further in Section 9.0 (Marketing approaches and resources). Furthermore, logistics knowledge concerning accessibility to premises, collection times and routes will be unknown.

4. No trade refuse service: summary

In summary, if trade waste services are not currently operated then developing a food waste collection service is likely to be costly (from the perspective of marketing) and may be difficult to present to customers in a manner which is attractive to them (because the options for offering reductions in refuse collection and disposal charges are not so obviously available).

These issues could be partly overcome by developing an integrated trade waste service where refuse collections, as well as separate food waste (and dry recycling) collections are offered to customers. However, this simultaneous development would not make it any easier to develop the trade waste service, and would still be expected to incur significant upfront marketing costs. Furthermore, such an approach would appear to be very costly indeed if the authority was not already collecting food waste from households for reasons discussed in Section 12.0, whilst also being especially costly in the start-up phase (and hence, risky in terms of the ability of the service to cover all associated costs).

Generally, and recognising the current policy environment, an approach which offers an integrated service would allow an authority to more effectively manage any risks associated with its landfill allowances (as currently configured). Indeed, an interesting approach might be to offer trade waste services on the basis that the service cannot be taken up unless the company concerned opts to take up all aspects of the service (as currently happens in Cardiff).

5. Operational trade residual and recycling service

An authority which currently offers trade recycling collection services may have a marketing advantage if, as seems likely, those who use trade waste recycling services are more likely to take up food waste collections. Such a list of customers would seem to be a suitable place to start in marketing the food waste collection service.

6. Operational trade residual service, but no recycling service

Without the recycling service provision an authority will not have a list of trade recycling customers. Given that these customers would seem to be more likely to take up food waste collections, it is likely that recruitment will be somewhat more challenging where no such service is in place, and, potentially, more expensive as a result. It should be noted that for individual customers, the possibility for making savings on a 'refuse only' collection are likely to be greater where both dry recyclables and food waste services are offered as part of an integrated package. This is because there is an increased likelihood that both the volume and the weight of the remaining refuse are significantly reduced.

7. Separate household food round using suitable collection vehicles?

In Section 12.0, the costs of different approaches to food waste collections are discussed. There, it is suggested that, especially in the period during which trade waste services for food waste collection are in development, the collection costs are likely to be significantly lower in cases where the collection of business food waste takes place as part of the household food round.⁸ The feasibility of this option depends also on the vehicles being used and the number of customers expected on each round. If an authority is not providing a household food waste service but is considering doing so, then the opportunity of offering a service to local businesses should be considered at the same time as it may influence the design of the overall service and the configuration of the rounds.

8. No separate household food round. Access to tipping and treatment?

For an authority not providing a household food waste service it may be possible to roll-out a trade waste service if it has access to a suitable tipping point and treatment facility. It is important under these circumstances that the treatment facility is available at a reasonable cost, because it is likely that set-up costs will be relatively high. As highlighted in Section 12.0, a key difference between business collections and those from households is that treatment costs are a high proportion of the costs of the service. In these circumstances, authorities should also consider offering the service to schools (to improve round densities and the efficiency of logistics, reducing the average costs to customers).

9. No access to treatment or local tipping point

If an authority does not offer household food waste collections, *and* it has no access to a local treatment plant, or suitable tipping point, then the authority is not well-placed to roll-out a food waste collection service to businesses. In this case the only option would be to direct deliver food waste to a more distant treatment plant (if one is available), but valuable collection time would be lost by travelling to the treatment facility, thereby making it difficult to provide a efficient and cost effective service.

10. No separate household food round, but with access to tipping and treatment

If the authority does not provide a food waste collection service for households, but has access to a suitable tipping point and treatment capacity, then the only available approach would be to roll-out a dedicated round to collect food waste from businesses. This approach would most likely require a significant amount of market research to give comfort that the round density is likely to be high enough to make the service cost effective in the medium term, and hence financially attractive to the customer.

11. Trade and / or household food waste collection services contracted out?

This must be considered at an early stage because it will influence how the authority will approach the development of the provision of a business food waste collection service.

12. Contractor involved

Where a contractor is responsible for service delivery, the contract should be checked to understand what a change in the service might imply. In particular, if a change is planned mid-contract then the original Official Journal of the European Union (OJEU) Contract Notice as well as the Terms and Conditions of contract will need to be checked to see if they allow for the specification to be varied.

Collection contractors increasingly may be interested in providing food waste collection services to businesses, particularly alongside services to households. In this case, if the collection of food waste is to take place

⁸ As at July 2010, 21% of UK authorities offer a separate household food waste collection service: England: 19%, Wales: 68%, Scotland: 16% and Northern Ireland: 8%.

alongside the collection of household waste, it will be important to agree some, typically formula-based, mechanism with the District Auditor to allow for the calculation of household food waste quantities independently of the commercial food waste collected. Alternatively, commercial customers could have bins weighed where the vehicles are suitably equipped.

13. Do savings related to the avoided cost of refuse (collection and) disposal accrue to the provider?

In principle, as highlighted in Section 12.0, local authorities should seek to recover all costs through charges levied on business customers. The level of charge, however, will be affected by whether or not the authority 'sees the financial benefit' from avoided disposal. If they do not, then there is no option for passing on avoided disposal costs. All unitary authorities who are offering trade waste collection services should benefit from the avoided costs of disposal. In England, for WCAs, the effects upon the authority depend upon the current arrangements with the WDA, and these are known to vary. For example, some WDAs have put in place high charges for disposal of commercial waste in the wake of the landfill allowances scheme.

There are some WDAs that are tied into contracts whereby minimum residual waste tonnages effectively apply. There may be some cases where additional reductions in residual waste quantities, through the provision of a business food waste collection, might lead to a case where the marginal avoided cost of disposal falls to zero. In such cases, the benefit associated with an authority collecting food waste might be negligible unless the authority can renegotiate existing residual waste contracts.

14. & 15. No savings are made related to the avoided cost of disposal

It is possible that by pursuing negotiations, either with the WDA (in the case of the WCA) or the contractor (in the case of a WDA / unitary authority), this situation could change. If this is unsuccessful then the costs of adding business food waste to the current service will be higher than would otherwise be the case and passing these costs onto the customer will result in a more expensive service. This in turn is likely to impact negatively on service uptake (tending to reduce efficiency of service provision, so increasing costs).

16. Savings related to the avoided cost of disposal are made.

This is the best situation to be in to ensure the successful introduction of food waste collections. The avoided costs of disposal can be passed through to customers, making the service offering more attractive, and increasing the likelihood of higher uptake.

4.2 Authorities well-placed to implement schools food waste collections

The flow diagram in Figure 2 leads an authority through a series of questions in order to help define how well suited their current service is to rolling-out school food waste collections. The following numbered descriptions, which correspond with the numbers shown in the flow diagram (Figure 2), provide further explanation.

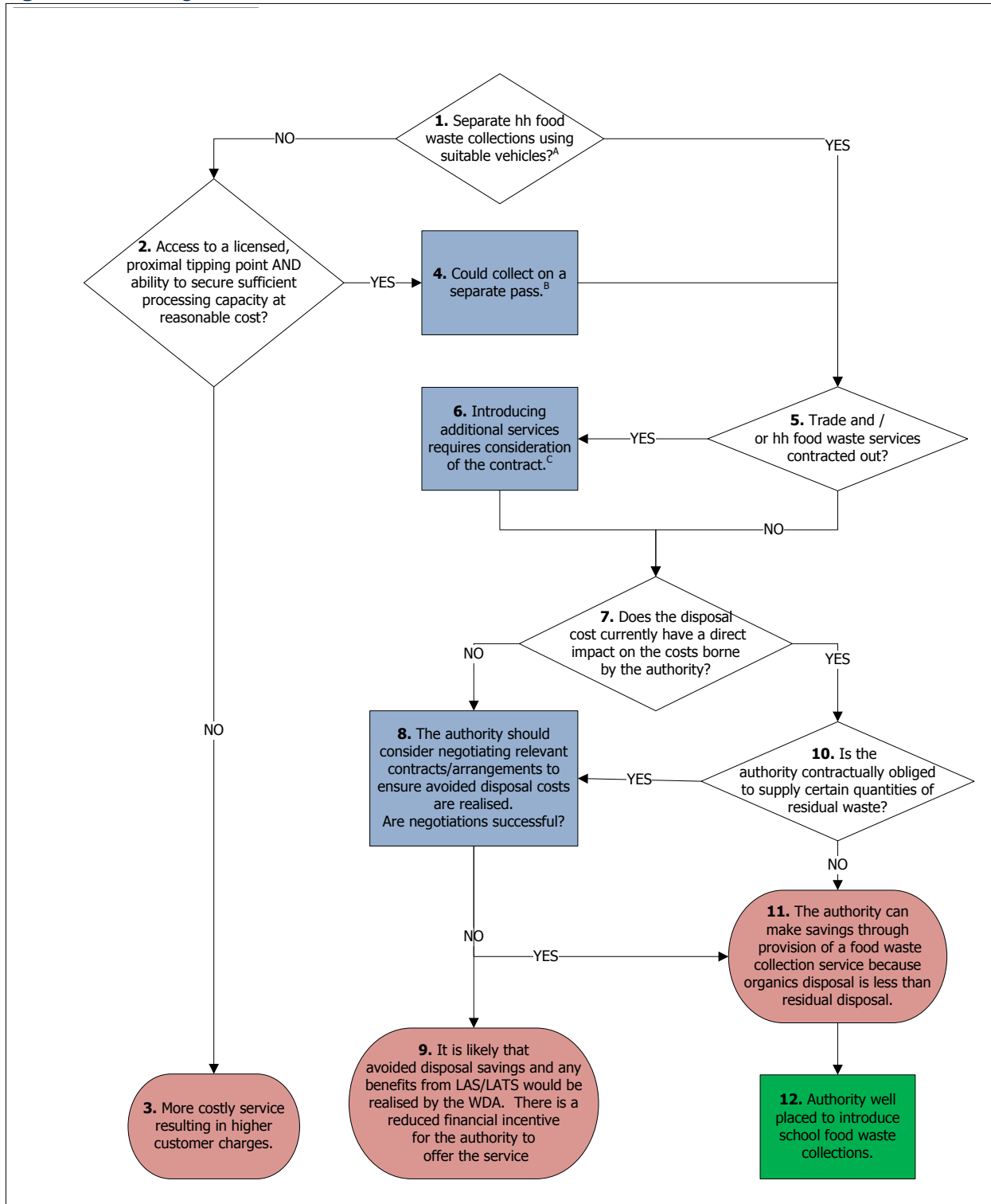
1. Separate household food round using suitable collection vehicles

The most cost effective option would appear to be to collect schools food waste as part of the household food round (see Section 12.0), but this will depend on the collection vehicles being used.

2. No separate household food round. Access to tipping and treatment

For an authority not currently running a household food waste service it may be possible to roll-out a schools waste collection if they can access a suitable tipping point and treatment facility. Again, it is important that the treatment facility is available at a reasonable cost, because it is likely that set-up costs will be relatively high. It is also important that the collection and haulage costs are low.

Figure 2: Flow diagram: school food waste collection



^A Collecting schools food waste on the existing rounds will in most circumstances offer the most cost effective collection method. This will depend on vehicles, containers (e.g. if the household food collection is carried out on vehicles without lifting devices these vehicles will not be capable of collecting from schools) and capacity.

^B It may be possible to develop a collection service collecting schools food waste on a separate pass.

^C As a Schedule 2 organisation the household waste collection contract will cover schools however negotiation will be required.

3. No access to tipping and treatment

Without access to a suitable tipping point, and treatment facility, an authority is poorly placed to roll-out a food waste collection to schools. If the journey-time to the facility is significant, and if the collection vehicles have no option other than to deliver direct (without bulking for onward transfer), then this will increase the resources expended in collecting the food waste. If the authority does decide to do so, it is likely that the service will be expensive for schools and as a result the uptake of the service may suffer.

4. No separate household food round. Access to tipping and treatment

If the authority does not operate a household food collection service but does have access to a suitable tipping point and cost-effective treatment capacity, the potential exists for rolling-out a dedicated round to collect food waste from schools. This solution ought to be based upon appropriate research to ensure that the likely number of participating schools and the resulting round density would be high enough to make the service cost-effective (both to the authority and the customer). For schools, this is particularly important as under the law as it currently stands, schools should not be being charged for disposal (so the potential for the customer to make savings associated with avoided refuse disposal would be reduced). In these circumstances, authorities should definitely consider offering the service to businesses as well (to improve round densities and the efficiency of logistics, reducing the average costs to customers).

5. Trade and / or household food waste collection services contracted out?

This must be considered at an early stage because it will influence how the authority approaches the development of the provision of a schools food waste collection.

6. Contractor involved

Schools are Schedule 2 waste producers and therefore are often covered by the existing household waste collection contract. Where a contractor is responsible for service delivery, the current contract should be checked to understand what a change in the service might imply. It will be important, for example, to check that – if any service change is to mid-contract – the OJEU Contract Notice and Terms and Conditions of contract allow, in their scope and change mechanisms, for the specification to be varied in line with the changes being sought.

7. Does the disposal cost currently have a direct impact on the costs borne by the authority?

It is in the authority's favour to be in a position where avoided disposal costs can be realised. All unitary authorities who are offering trade waste collection services will benefit from the avoided costs of disposal. For WCAs in England, the effects upon the authority depend upon the current arrangements with the WDA, and these are known to vary. In principle, under the existing regulations, WDAs are the party with most to gain from the roll out of food waste collections to schools since, as the costs of residual waste disposal rise, so the costs incurred by the WDA should fall if less is sent for disposal.

8. & 9. The authority does not make savings related to the avoided cost of disposal

It is possible that by pursuing negotiations with the WDA, and / or contractor this situation could change. If discussions with the WDA are unsuccessful then rolling out this service would be challenging because the landfill allowance benefits would be realised by the WDA. If discussions with the contractor are unsuccessful then surpassing the issues of required minimum quantities of residual waste will be problematic.

The costs of adding schools food waste collection to the current service will be relatively high and in passing these costs onto the customer will result in an expensive service which in turn is likely to limit uptake.

10. The authority does make savings related to the avoided cost of disposal. Is the authority contractually obliged to supply certain quantities of residual waste?

If this is the case then introduction of a service to divert waste from the residual waste stream may result in the tonnages collected reducing residual waste quantities below contractually agreed minimum tonnages. This may lead to a situation where the marginal benefits of avoided disposal fall to zero unless contracts can be sensibly renegotiated.

11. The authority is not contractually obliged to supply certain quantities of residual waste

In a situation where an authority does benefit from avoided disposal, and is not restricted by minimum residual tonnages, savings on refuse treatment / disposal can be made through provision of a food waste collection service. As the landfill tax escalator continues to drive up the price of landfill disposal, the financial benefits of avoided disposal will increase.

4.3 Chapter summary

Flow diagrams (Figure 1 and Figure 2), informed by authorities' experiences to-date, have been developed to assist authorities in understanding how well-placed they are to roll-out food waste collections to businesses and / or schools.

Authorities that appear to be better placed to provide services to businesses and / or schools would:

- **run a household food waste collection;**
- **provide a trade waste collections service; and**
- **be able to see a direct financial benefit from reduced expenditure on refuse treatment / disposal.**

This does not mean that authorities which do not 'tick all three boxes' should not consider collecting food waste from businesses. It may be more challenging to do so, however. Of the authorities currently collecting food waste from businesses all but one provide a refuse collection service (and in some cases other services).

For authorities looking to roll-out food waste collections to schools the importance of also operating a trade waste service is much reduced, with those offering a service to households being well placed. Of the authorities known to be collecting food waste from schools **all** currently provide a household food waste collection service.

A summary of authorities providing a food waste collection is given in Appendix H.

5.0 Estimating the quantity of food waste for collection

When planning a service roll-out, those responsible will need to understand potential food waste arisings and the proportion that can be expected to be collected. Work published by WRAP, and work underway is helping to improve the quality of data on food waste produced by businesses and schools. This section examines the available data with a view to helping authorities estimate the likely quantities that could be collected in their areas.

5.1 Available data

In order to understand the quantity of food waste which might be collected, data on the following are required:

- **Waste composition:** for an understanding of the proportion of the waste stream that is food waste;
- **Food waste arisings:** for an understanding of the quantities of food waste produced – this is usually derived from the waste composition data, and the total quantity of waste generated; and
- **Food waste yields:** for an understanding of the quantity of waste that may be collected by the scheme (and which may be estimated through understanding the likely proportion of the food waste arisings that may be captured by a given collection scheme).

This is useful information to help inform resource requirements at the planning stage of a new service.

Table 1 presents the information sources that were identified, and which informed the estimates in this section.

Table 1: Information sources

Information Sources	
<i>Schools</i>	<i>Businesses</i>
<p>Telephone survey of local authorities, social enterprises and private companies in order to compile a comprehensive list of food waste collections from businesses / schools across the UK. This survey was undertaken to inform this study. Further details about the survey and the resulting case studies are to be found in Appendix I.</p>	
<p>WRAP (2008) Nature and scale of waste produced by schools in England</p>	<p>Defra (2010) Recycling Activities in SMEs: a survey</p>
<p>WRAP (Forthcoming) Food waste in schools</p>	<p>WRAP (forthcoming) Mixed Waste Produced by the Hospitality Sector. This study focuses on four key branches of the hospitality sector notably hotels, restaurants, pubs and fast food / quick service restaurants. Contact WRAP for details.</p>
	<p>WRAP (2007 / 08) SME recycling trials including the following food waste collection case studies:</p> <ul style="list-style-type: none"> ○ Bexley Council ○ CESH I ○ ECT Recycling ○ Urban Mines

5.2 Potential influences upon food waste arisings

Factors affecting food waste arisings include the following:

- Numbers of relevant businesses. Local authorities generally will have good knowledge of the number of relevant premises in their area, and their spatial distribution. This, along with average quantities generated / captured per week (below) should form the basis for understanding the total quantity available;
- Number, type (primary or secondary) and size (number of pupils) of schools in the area;
- Predominant business type: the assumption is made that local authorities will wish to target the hospitality sector in particular, for example restaurants and cafes;
- The extent to which food preparation takes place on site (business / school) or meals are bought in ready-made. Authorities can check with environmental health and trading standards for businesses that serve and / or prepare food on site
- School policies on lunchtimes, e.g. whether or not children are allowed to leave the school premises at lunchtime (more food waste will be created on the school premises if children must stay) and school policies on healthy eating (e.g. fruit peelings);
- The success of the food establishment in terms of numbers of covers;
- Impact of food waste reduction and behaviour change initiatives e.g. WRAP's Love Food Hate Waste.

5.3 Potential influences upon food waste capture

Factors affecting the total quantity of food waste which is likely to be collected by a given authority include: those related to the number of businesses using the service, and those related to the quantity of food captured at each business.

- Number of businesses using the service:
 - Marketing effort on the part of the authority (see Section 9.0);
 - Local competition, i.e. who else in the area is offering a food waste collection service;
 - The competitiveness of the service offering (the level of charge for the specific / overall service) (see Section 13.0).
- Quantity of food waste captured per business:
 - The quantity of food waste generated (see Section 5.2);
 - The quality and convenience of the service being offered (see Sections 5.0, 7.0 and 8.0);
 - The commitment of key staff to ensuring that the system is properly used; and
 - The structure of the charge (i.e. the extent to which an incentive exists to use the service).

5.4 Food waste in businesses

5.4.1 Waste composition

To the extent that the composition of commercial waste can be said to be known with any certainty, paper and cardboard tends to contribute the largest proportion by weight, followed by food waste.⁹ However, for the hospitality sector the largest fraction appears to be food waste – on average 41% by weight. The proportion is slightly higher for restaurants and quick service restaurants at 44% and 50% respectively¹⁰.

⁹ LA BREW Centre (2008) *Highlights of local authority trade waste and recycling reports 2007 / 08*.

¹⁰ WRAP (forthcoming) *Mixed Waste Produced by the Hospitality Sector*.

5.4.2 Food waste yields

Information on typical quantities of food waste collected was sourced from the telephone survey of local authorities, social enterprises and private companies and the WRAP SME recycling trials (2007 / 08). As shown in Table 2, the average quantity of food waste collected from businesses, based on available data, is **77kg / business / week**. Further details are shown in Appendix A.

Table 2: Summary of business food waste yields

Information source	Average food waste (kg / business / week)	Range of food waste (kg / business / week)
WRAP trials 2007 / 08	72	50 – 110
Telephone survey	81	58 - 96
AVERAGE, ALL FIGURES	77.0	

There are limitations with providing average figures for quantities collected due to the wide range of business types and large variation in the amounts of food waste they generate. For example, CORE (Case Study 6) collects on average 673kg / business / week, this is much higher than the average as their customers include small (industrial) food producers. Data from these types of business were excluded in calculating the estimates above on the grounds that it is unlikely that many authorities will be collecting from such organisations.¹¹

Data on likely food waste yields is important information for officers planning a food waste collection service. Businesses themselves are very unlikely to have this information so these averages provide some basis for service planning in the absence of better, locally relevant information. These estimates will inform decisions regarding containment (see Section 5.0), service planning (see Section 11.0) and the appropriate charging structure (see Section 13.0). However, other sources of information should be sought and authorities should review their plans and their charging structures as new information (particularly that gained from running services) becomes available.

For example...

In the Province of Vorarlberg, Austria, a food waste collection service has been in place for approximately 25 years. Such a long-running service has enabled the development of the following benchmarks of food waste produced:

Restaurants: 40kg / seat / year

Canteens: 0.2kg / portion served

¹¹ Clearly, such customers have a disproportionate effect on the level of resource required (and the costs of serving them). Local authorities need to consider, therefore, how such businesses are included in the collection, not least since they may request higher frequency collections than is required for other customers.

5.4.3 Food waste capture rate

From the limited information available, it seems that the capture *rate* for food waste from businesses can be high at around **85%**.¹² It is worth noting that as well as capture rates being affected by a range of factors already highlighted, 'early users' of a service may be 'better users' of a scheme than later ones (who may be those who need more persuading). Whether such a high capture rate can be sustained over time as user numbers increase is a question we are not yet in a position to answer.

The figures highlighted here provide a starting point for service planning. As new services are introduced authorities are advised to establish their own systems for capturing data on an ongoing basis and to use the information obtained to inform future service planning.

5.5 Food waste in schools

5.5.1 Waste composition

WRAP (2008)¹³ found that in primary schools food waste constitutes 46% of all waste and in secondary schools 31% of all waste. A more recent study has looked at the breakdown of food wastes generated by schools, how the food waste has been produced and how it might be reduced¹⁴.

5.5.2 Food waste arisings

The 2008 report presents data for schools with and without production kitchens (i.e. those which prepare food on site and those which do not) and these are replicated in Table 3. The average arisings across all school types is **116.5kg / school / week**. However, there is a clear difference between primary and secondary schools. Primary school pupils produce more food waste per head than secondary school pupils, but overall due to greater total pupil numbers, secondary schools produce more food waste, on average, than primary schools.

Table 3: Schools food waste arisings

School type	Kitchen type	Kg / pupil / week	Kg / school / week ¹⁵
Primary	Production	0.58	137
	Non-production	0.18	43
Secondary	Production	0.17	166
	Non-production	0.13	127
AVERAGE		0.27	116.5

¹² Capture rate = (quantity of a particular targeted material collected for recycling / composting) / (quantity of that targeted material collected for recycling / composting + quantity of targeted material collected for disposal) x100 (from Chapter 7: Monitoring capture rates of WRAP (revised 2010) Improving the Performance of Waste Diversion Schemes: A Good Practice Guide to Monitoring and Evaluation).

¹³ WRAP (2008) Nature and scale of waste produced in schools in England, Available: http://www.ukyouthparliament.org.uk/recycling/pdf/Nature_and_Scale_of_Waste_produced_by_schools.pdf

¹⁴ WRAP (Forthcoming) Food Waste in Schools.

¹⁵ National Statistics & Department for Children, Schools and Families (2007) Schools and Pupils in England, January 2007 (Final), Available: http://www.dcsf.gov.uk/rsgateway/DB/SFR/s000744/UPDATEDSFR30_2007.pdf. Data shows total number of primary and secondary schools and total number of primary and secondary school pupils from which average figures for number of pupils / school were derived.

5.5.3 Food waste yields

Current experience indicates that authorities (or their contractors) are most likely to collect food waste from schools as part of their household rounds. As a result, quantities collected are not easily estimated (and would only be accurately recorded if on vehicle weighing is used). The only available data was gathered through the survey work carried out to inform this work and is presented in Table 4. Due to the lack of information, an average has not been calculated.

Table 4: Schools food waste yields from survey work

Information source	Average food waste collected (kg / school / week)
Bexley Council	81

5.5.4 Food waste capture rate

Given the right data, it is possible to estimate the overall capture rate of food waste from schools with a food waste collection. In the case of Bexley, the majority of schools are primary and produce meals on site. Therefore, considering the average yield per school (from Table 3 – 137kg/wk) the capture rate is approximately 60%. As with businesses the rate suggests that, even though the scheme was in its infancy, the capture of food was fairly high and that schools have the potential to participate to high levels.

In terms of variation between primary and secondary schools, anecdotal evidence from case studies suggests that capture rates in primary schools are likely to be higher than in secondary schools. This is likely to be because teachers spend more time overseeing primary school children and can encourage food waste separation.

5.6 Chapter summary

- The data regarding waste quantities, waste composition, the quantity of food waste collected and capture rates for food waste are not of a high quality at present.
- The average figures provided for food waste arisings and captures for business, and for arisings in schools, are thought to be the best available, but are subject to some variability. They should be considered as 'broadly indicative'.
- The capture rate for business food waste collections would appear, on the limited evidence available, to have the potential to be quite high.
- Anecdotal evidence suggests that capture rates in primary schools are likely to be higher than in secondary schools.
- Local authorities are encouraged to put in place their own processes for capturing data and use the information collected to inform ongoing service development.

6.0 Containment and receptacles

This section uses data on average yields to estimate typical food waste volumes, and then uses this information to inform consideration of containment options. Implications for odour, hygiene and contamination are considered whilst key health and safety issues are also highlighted.

6.1 Average yields

How much containment capacity is required on average?

It is important that a local authority is as well-informed as it can be with regard to the likely amounts of food waste arising from the businesses and schools to whom it intends to offer a food waste collection service. This is for two main reasons:

- first, it allows modelling work to be undertaken prior to the service roll-out; and
- second, it enables a 'sense-check' to be made of any food waste estimates provided by the customer.

Regarding the second point, a number of local authorities reported that the over-estimation by customers of the quantity of food waste they produce has caused issues with containment. These local authorities suggest that audits be carried out on different days of the week and at different times of the year to allow more accurate estimates to be made of the amount of food waste being produced.

As highlighted in Section 5.0, the quantity of food waste collected is likely to vary between customers and is dependant on the type and size of business / school. It is therefore important to understand the nature of the establishment that is to be served, and to establish the containment needs of each customer on a case by case basis.

Food waste is one of the more dense materials in the waste stream. Therefore, the containment capacity provided (volume) does not need to be overly large since weight, and manual handling issues, are likely to become a barrier at relatively low volumes.

Section 5.0 showed that the average yield of food waste collected from a business is 77kg / week, while the best estimate of yield from a secondary school is 81kg / week. In terms of capacity this means that **on average** businesses would require containment volume of 154 litres per week and schools 162 litres per week.¹⁶ It is worth highlighting that the capture of food waste from schools is considered to be particularly variable depending upon where, within the school, the food waste bins are placed.

The amount of food waste generated has obvious implications for the number and size of containers supplied to the customer. These averages can be used to **guide** the provision of adequate containment capacity. Evidently, there are likely to be businesses and schools with requirements above, and below, these average figures. In particular, outside the hospitality sector required containment volumes may be quite small.

¹⁶ Based on a conservative estimate for the bulk density of food waste of 0.5 tonnes per cubic metre

6.2 Health and safety issues

Due to the high density of food waste, care should be taken when deciding on the size of containers to issue to customers. This is often overlooked resulting in bins that are too heavy for operatives or customers to move and too heavy for bin-lifting equipment on vehicles. For example, a 240 litre wheeled bin of food waste could weigh more than 100kg when close to being filled. Such a mass of material in one wheeled container potentially has serious implications for the safe manual handling of the container (by waste collection operative or customer). A manual handling risk assessment must be carried out for each collection site before collections commence to enable suitable control measures to be implemented. Further details may be found in Appendix C.

For example...

During the WRAP food waste collection trial Bexley found that the 240l wheeled bins issued to some (not all) of their trial customers were too heavy; as a result 140l bins are now available.

Learn from experience...

The telephone survey identified two situations where changes had to be made as a direct result of using containers which were too large, and therefore too heavy, when filled with food waste:

- One company initially used 1100l bins but changed to 240l bins because the wheels broke on the 1100l bins due to the weight of the contents; and
- One local authority reduced the size of the bins issued from 240l to 140l because the lift on the collection vehicle was too weak to lift the 240l bins.

In addition, a trial scheme using compostable collection boxes for food waste was unsuccessful as the boxes were both inappropriate in terms of a collection method and in terms of buy-in from pupils and canteen staff.

Although a range of container sizes are being used by organisations running food waste collections¹⁷ **it is advised that containers of 140l or less are provided. 140l bins, if completely full, will be very heavy and will pose a serious problem for both operatives and kitchen staff. Hence, for the average customer, it may be worth considering either more than one 140l bin for a weekly collection, or alternatively, if the service can accommodate it, more frequent collections. Only where more than one operative is available to handle containers should larger containers be considered.**

6.3 Using internal containers - caddies

Of the service providers interviewed, almost half supply customers with a smaller container(s), in which to store food waste prior to depositing it in a larger container for collection. These are referred as "internal" containers since they are usually used inside premises, with the waste subsequently being conveyed to a larger external container.

¹⁷ 120l, 140l, 180l, 240l, 360l, 500l, 660l, 1100l, 25l & 35l caddies, 25l box & 60l sack have all been cited as containers currently being used by organisations surveyed.

Figure 3: Smaller “internal” containers being used in a restaurant kitchen



Smaller “internal” containers are particularly useful where there is limited space, such as in food preparation areas, or where larger wheeled containers are inappropriate, e.g. in a school canteen, classroom or playground, and where primary school children, in particular, would have difficulty in using the larger bins due to their height.

Some councils choose to supply the same containers as used for the household collection service as internal containers – either the kitchen caddy (5 -10l capacity) or the kerbside container (20-25l capacity). This can have benefits in terms of recognition by the employee and encourage similar behaviours at home and at work.

For example...

Bristol Council provides schools with 25l caddies and 5l caddies for use in the classroom, the contents are then transferred to 140l wheeled bins for containment prior to collection.

Bexley Council provides smaller business customers with 50l caddies and 60l starch liners for use in food preparation and plate scrapping areas.

The same benefits can be achieved if schools are supplied with the same type of container as used on the household service. Consistency across the services makes messages and instructions on how to separate food waste easier to convey and understand. In addition there are potential financial benefits to be gained when procuring containers if a standard model is adopted as far as possible.

In kitchens and food preparation areas where larger volumes of food waste are produced, larger capacity containers (up to 50l) may be more appropriate (since small ones would need to be emptied very frequently). If there are several food preparation stations then several collection points may be necessary (e.g. one container per station) so as to make it as easy as possible for kitchen staff to separate the food waste. The larger containers can be easier to use than the small ones as they have wider apertures and can be located at floor level but below counter height so that bending down is reduced / eliminated.

Larger containers (e.g. 50l) may present potential issues in terms of their safe handling. A 50l container nearing capacity may weigh as much as 25kg. **For this reason it is advised that internal containers with a capacity of no greater than 35l be used.** For smaller premises such as offices and schools, household food waste containers (~20-25l) or kitchen caddies (5-10l) may be more suitable. However, it is advised that a site audit and risk assessment is carried out for each prospective customer to ensure the most appropriate containers (size and number) are provided for their needs.

6.3.1 Use of liners

Liners are considered by many organisations running food waste collection services to be a key factor influencing the uptake of, and continued participation by customers, in the service, as well as helping to improve the capture of wetter food waste. Liners help keep containers clean and reassure customers that the service is hygienic.

Approximately 80% of the organisations interviewed either provided liners as part of their service to customers (i.e. at no additional charge) or sold them at 'cost' price. Encouraging the use of liners was found to help reduce contamination as customers were not tempted to use plastic bin liners as a substitute. Organisations also stated that the size of the liner in relation to the size of container is important as some "over hang" is beneficial in preventing the liner from slipping down into the container. The liner must fit the container as this also helps to combat potential odour and hygiene issues.

For example...

Bexley Council supplies starch liners to customers on a case-by-case basis having first established the needs of individual customers via a site visit. Liner wastage is reduced through tailoring the number of liners supplied to the needs of each customer.

In Uttlesford, after a period of free liner provision, schools are now required to purchase liners and details of suppliers are provided on the council website. Schools are investigating the possibility of buying liners in bulk to reduce costs.

Bristol Council provides an initial supply of liners free of charge to schools, with subsequent liners supplied through the school caterers following negotiations between the catering company and the council.

However, some organisations who supply liners free of charge feel that some customers do not value the liners. In one case it was reported that customers were not separating individual liners from the roll supplied, resulting in one liner being used with several "redundant" liners still being attached (causing, considerable wastage).

Generally it seems evident from the majority of organisations interviewed that liners are considered to be beneficial in terms of customer satisfaction with the service, perception of the service in terms of cleanliness and ease of use, and in reducing contamination from using unacceptable alternatives.

If liners are not provided as part of the service, then service providers should consider making the liners available at a cost (possibly at a discounted price to encourage uptake) or signposting their customers to low cost outlets.

6.3.2 Odour and hygiene issues

There were few reports from the survey of problems relating to odour and hygiene. Where issues were reported, liners were considered to be the main solution (as described above in Section 6.3.1).

Bin cleansing services are not common because liners are generally used, and usually sufficient to keep containers clean. Only two companies were identified as providing a bin cleansing service, at an additional cost to the customer of around £5 / 240l bin. Additionally, three service providers interviewed replace containers with clean ones at each collection; all three of these use small vans for collections. However, this approach is likely to add to the cost of providing the collection service and may compromise the attractiveness of the service.

Interestingly, as part of the WRAP SME Programme Feasibility Trial, Urban Mines asked non-participant businesses why they chose not to participate in the food waste collection service. A reason given by some of the companies was the need to maintain strict hygiene requirements within their premises. There was concern that storing food waste in a crowded kitchen, albeit on a temporary basis, might compromise these standards.

Issues of cleanliness and hygiene are considered by customers to be important. However, evidence from the WRAP household food waste collection trials and anecdotal evidence from companies contacted as part of this project indicates that given the right containment solution, service users tend not to have problems. The issues of cleanliness and hygiene should be addressed at the outset and the measures taken in respect of the service design, and those which service users can take themselves, should be well-communicated when marketing the service (see Section 9.0).

Local authorities are advised to carry a stock of suitably sized internal containers so that a tailored solution can be provided for each customer. The offer of a waste audit will help determine that the appropriate mix and size of containers is provided. This will help to ensure that the service is accepted by those using it thereby maximising the capture of food waste and reducing the likelihood of contamination.

In a kitchen / food preparation area 35l containers with 40l liners (to allow for some overhang to avoid the liner splitting or slipping down inside the container) should provide adequate capacity. These would also be appropriate for use in a school canteen by the plate scraping area. In a situation where less food waste is likely to be produced, for example, in a classroom, smaller size containers, e.g. 25l caddy with a 30l liner would be more appropriate.

6.4 Ensuring low contamination of the collected material

Experience suggests that local authorities are unlikely to have issues with the quality of food waste collected if the issue is given appropriate consideration at an early stage. Authorities should establish with the destination treatment plant any input quality standards that need to be met. Materials that are considered contaminants include plastics and metals. They cannot be removed easily and will not breakdown during treatment. Stainless steel, for example, can be magnetic (it frequently is not) but not usually to any great strength so generally cannot be removed by conventional approaches (e.g. overband magnets).

Businesses

Contamination of the food waste stream was not found to be an issue with businesses, with the main exception being customers whose first language was not English, or their employees did not have English as their first language. Contamination can be mitigated in the following ways:

- effective face-to-face communication;
- providing clear instructions with good images and illustrations (including posters and stickers for the bins / bin areas) on how to use the service including what wastes can / cannot be put in the food waste containers;
- providing internal containers to be located a key waste production points;
- staff training;
- identifying 'staff champions' to explain the system to colleagues; and
- lockable external containers.

Schools

No issues of contamination in primary school collections have been raised. It is thought that this is due to their being fewer children in primary schools than secondary schools and 'food waste monitors' are often used to supervise children at break times and the use of the containers (see Section 9.2.2).

In secondary schools, where the children are older, more responsibility is placed with pupils to separate their own food waste. Lack of co-operation of just a few pupils can cause contamination issues. Effective solutions are limited and where this has been a problem it has tended to have led to the removal of the bin (as exemplified in the boxes below).

For example...

Bristol Council found contamination to be highest in food waste bins which had been placed away from the canteen beside a residual bin. As a result food waste bins were removed from the playground.

For example...

Bexley and Cardiff Councils both found metal cutlery the food waste bins in the canteens. As a result the bins from the canteen plate scraping areas were removed. Food waste is now only collected from the classrooms and kitchens.

Research did not highlight any examples of contamination notices being issued; rather issues of contamination are addressed directly with the customer as necessary.

6.5 Chapter summary

- The provision of adequate and appropriate containment is crucial. It is advised that as appropriate a waste audit and risk assessment be carried out for individual customers.
- Particular attention should be given to the manual handling of containers and it is advised that containers of no more than 140l in volume should be offered, with multiple containers being issued in preference to a single large container.
- It is advised that internal containers be offered in situations where the customer has multiple food waste production points.
- Consideration should be given to the provision of liners as they are useful in maintaining a clean and hygienic service. However, if supplied free, care should be taken to ensure that they are used appropriately.
- If the local authority is providing a household food waste collection service, the containers issued to householders may be appropriate as internal containers – either kitchen caddies or kerbside caddies, in cases where food waste production is relatively small such as in a school classroom or office. However, in a kitchen / food preparation area or in a school canteen by the plate scraping area 50l caddies (with 60l liners) are likely to be more appropriate. A stock of internal containers should be carried to enable provision to be made in a timely manner.
- Contamination has not been highlighted as a key issue, other than in some cases in secondary schools. However, services should be monitored regularly to ensure that contamination does not become an issue. Secondary schools and businesses where staff do not have English as their first language are likely to be more prone to issues of contamination than other customers, so additional measures may be necessary to ensure minimal contamination.
- It may be necessary to remove food waste containers from some areas if the problem of contamination is persistent (and to accept that lower quantities of food waste which does not cause problems for treatment is preferable to slightly higher captures of material which gives rise to major problems at treatment facilities).

7.0 Container placement, storage and presentation for collection

Container placement, storage and presentation are likely to be key considerations for businesses, particularly as many can lack storage space. This section highlights potential container placement, storage and presentation issues, and outlines approaches to help address them.

7.1 Internal container placement

Space for a large food waste container must be made in the bin storage area (which could be either inside or outside), but this alone is unlikely to ensure high diversion of food waste. Additional containers (either a caddy or larger bin depending on the quantity of food waste being produced) are likely to be necessary in the food production area and possibly also in the food consumption area to help promote easy separation of the food waste at source.

As suggested in Section 6.3, to ensure high capture rates, it is important that the collection system is designed to be as convenient for the user as possible by providing containers (and liners) of a suitable size for use internally in areas where food waste is expected to arise.

For small businesses especially, bin placement at the point of food production can be problematic due to space limitations. This is one of the reasons why an initial site visit to all new customers is advised in order to assess individual situations and develop tailored solutions for customers on a case-by-case basis, as for example is done in Cardiff (see Appendix I).

7.2 External container storage

For small businesses especially, external container storage can be problematic. This is an issue that an initial site visit would be expected to address. If lack of space is a genuine issue, this may result in the business requiring containers of a smaller size and possibly a higher frequency of collection (see Section 8.0).

7.3 Container presentation for collection

The storage of waste containers and the presentation of waste containers for collection are dealt with under Section 47 of the EPA 1990. In order for businesses to place bins on the highway (this includes pavements) for collection, permission must be granted by the Highways Authority which is usually the County Council in two tier areas in England, and the unitary authority elsewhere.

It is advisable that officers from both the waste and highways departments work together where there are space constraints for the storage of waste containers to ensure that the requirements of both departments and the customer can be accommodated. Early morning collections and / or smaller containers collected more frequently may alleviate problems. Frequency and timing of collections is discussed in detail in Section 8.0.

7.4 Chapter summary

- To ensure high capture rates the collection system should be designed to be as convenient for the user as possible by ensuring that internal containers of a suitable size are provided for use at the point of food waste production.
- Placing both internal containers and external containers can be difficult where space is constrained. Typically solutions will need to be tailored to the needs and circumstances of individual customers.
- Waste officers and highways officers should liaise to ensure that no conflicts arise between departments over the placement of containers for collection.

8.0 Frequency and timing of collection

This section provides advice on collection frequency and timing. Choice of collection day, or days, and the timing of collections are important considerations for customers and need to be addressed when designing services.

8.1 Collection frequency

As for household collections, getting the collection frequency right is important for several reasons:

- increased frequency can be a proxy for 'volume'. In situations where storage space is a constraint, more frequent collections may mean a smaller container can be used without restricting the amount of waste that can be put out for collection in a given period; and
- increased frequency can help avoid potential nuisance. The specific circumstances of some customers or the specific nature of some wastes (their potentially odorous nature) might make more frequent collections desirable.

Authorities should consider what flexibility they have to offer collections at varying frequencies (to accommodate particular customer needs), as there will be cost implications that will need to be considered. Clearly, if all customers in a given zone receive collections on the same frequency, round planning is much simpler.

On the household food waste collection round...

For an authority offering a food waste collection service in conjunction with a household service, then collection frequency will most likely be the same as that for household food waste (typically, weekly). In principle, it may be possible to offer more frequent collections for some businesses where this is requested, however the logistics of this would have to be assessed on a case-by-case basis.

On a dedicated (separate pass) round...

In principle, deploying a dedicated resource (a separate round for business / schools) should provide for greater flexibility in service planning and may mean that service providers can offer a wider range of collection frequencies. Local authorities, social enterprises and private sector companies running 'dedicated services' were found to offer collections on a frequency ranging from daily to fortnightly. However, for reasons discussed in Section 12.0, this is likely to be more costly in the short-to medium term whilst the service develops and the customer base increases.

8.2 Time / day of collection

For businesses

With regards to the timing of collections, for many businesses avoiding peak traffic or cross-over with peak customer times are key.

Businesses generally are sensitive about food waste being stored on their premises for too long; therefore it is advisable to find out at what point in the week food waste generation is likely to peak (see Section 11.0 for further details). Depending upon the business, food waste may build up over the weekend, and therefore a collection following the weekend would be required. Alternatively, a business predominantly doing trade from Monday to Friday may prefer a collection towards the end of the week to avoid food waste being stored over the weekend. For example, Focsa provided a food waste collection service weekly on a Saturday morning; however some customers expressed a view that collections would be more convenient on a Monday or Tuesday as this would stop larger amounts of food waste being stored for longer periods since Saturday afternoon, evening and Sunday were times of peak food waste production for these customers.

For schools

Where access to the school is required to collect the waste, it is not advisable to schedule collections to coincide with either the beginning or the end of the school day or during break times. These are the busiest times in terms of both traffic and children being out of the classroom, and therefore health and safety risks are greater. It will be necessary to liaise with the caretaker/site manager in order to make arrangements for gaining access to schools and to become familiar with security procedures in place.

In addition, it is likely that most schools will not require collections during holiday periods unless the school is open for activities such as "Summer School" during those times. In any case, liaison with individual schools will most probably be needed to ensure that collections are undertaken only as and when they are required throughout the school year.

8.3 Chapter summary

- If collecting from businesses / schools on household food waste collection rounds, experience suggests that the frequency of collection is likely to be in-line with the household collection.
- There is no evidence to suggest that this is a problem for customers (though equally, there is no compelling evidence that it might not be).
- Operating a dedicated round(s) is likely to provide greater flexibility, but this flexibility is likely to entail additional cost.
- Timing of collections must be considered when designing the round to account for peak traffic times, reducing food waste storage time to a minimum, etc.
- At schools, additional health and safety considerations exist and, ideally, collections should not occur at times when large numbers of children are of the classrooms. School security procedures also need to be considered.

9.0 Marketing services - approaches and resources

Marketing is a key component to a successful food waste collection service. Investing resources in recruiting businesses, communications and ongoing support is crucial but should be proportionate (in terms of the scope of the collection rounds, and the potential to recover these costs from customers). Further information, which could be used in marketing materials, on the environmental and social benefits of food waste collections are provided in Appendix D.

9.1 Potential customers

It is generally advisable, in the first instance, to channel marketing efforts into a targeted selection of businesses rather than adopt a blanket approach. This will depend to some extent on the existing customer base but could include:

- Existing trade customers for either refuse and / or recycling services - promotional material about new services can be sent with invoices or individual customers can be approached directly;
- Premises / businesses that are licensed to store and prepare food on site (information can be obtained from Environmental Health and Trading Standards).

Where existing trade waste customers only make use of residual waste services, but where dry recycling services are already (or are about to become) available, the food waste collection could be marketed as part of a package services (and to new entrants once existing customers have been targeted).

Blanket marketing to all food waste producers using telesales, leaflets, posters and information packs can be expensive and should be avoided as far as possible. Evidence from the earlier WRAP SME trials showed that these approaches are unlikely to be effective in terms of resultant uptake and had showing very low success rates. Although some such methods are not necessarily costly (e.g. leafleting) the low take up means that the cost per converted business is high. Blanket marketing might be expected to be more effective where the service effectively sells itself because of the low charges being offered. It is not advisable, however, that authorities offer a service at prices below cost recovery levels.¹⁸

Whilst resource-intensive, face-to-face visits can be effective in recruiting customers. The previous WRAP SME trials found that the vast majority of businesses could only be recruited in this way. Where, for example, a list of existing trade waste customers is available it is advisable to telephone to make

For example...

One company from our survey highlighted the additional benefit of being able to assess the logistics of collection (e.g. vehicle accessibility, density of the round) when developing the service. So, it is useful to train sales reps to be able to consider how the logistics of the collection will work.

an appointment with the appropriate individual first (e.g. business manager).

Face-to-face visits also information to be collected that is relevant to provision of the service.

For example...

Urban Mines directed their marketing efforts at clusters of SMEs located in close proximity to the treatment plant to enable a 'milk round' to be built up.

Other, more passive approaches, such as relying on information available on the authority's website, are not advisable as a sole means of marketing the service. Only the more 'environmentally-conscious' organisations are likely to investigate actively the available options for separate food waste collections, and even these may find that websites provide limited information. In general, a

¹⁸ Note that it might be acceptable to offer one aspect of a service offering at 'below cost' as long as the overall service is operated in a way such that total costs are recovered.

local authority should employ more proactive techniques to promote their services and encourage uptake. Service information however should also be available on the authority's website.

9.2 Marketing methods

9.2.1 Businesses

Recruitment

To build up a customer base, a proactive marketing strategy is needed which communicates information about the service in a clear and concise manner. As indicated above a number of approaches can be adopted:

- leaflets, which could be included in general information packs for businesses;
- case studies to show how others have used the service;
- attendance at local meetings (e.g. Chambers of Commerce);
- telesales; and
- face to face visits.

The level of resource required increases moving down this list. The more direct approaches are likely to be more appropriate for targeted customer groups, or for existing customers, or once other methods have 'opened the door' for further discussion. However, once existing customers or contacts are exhausted blanket marketing approaches (to food waste producing businesses) may be appropriate, for example:

- Mail shot (with a customer reply form);
- Bin stickers;
- Attendance at trade shows / events; and
- Advertises in the local or specialist business press.

Outcomes from marketing efforts deployed during WRAP's SME food waste collection trials are shown in Table 5. This highlights low conversion rates for direct mail and telesales, and higher conversion rates for telephone and cold visits, with best results being for pre-arranged visits to targeted premises.

Table 5 Food waste trials: conversion rates for different methods

Method	Bexley	ECT (existing)	ECT (new)	ECT (overall)	Urban Mines
Direct mail	2%				1%
Telesales only					2%
Cold visit					33%
Telephone and cold visits		12%	12%	13%	
Warm or pre-arranged visits	27%	29%	46%	49%	26%
Total recruited	61			90	28

Source: WRAP (2008) Evaluation of recycling feasibility trials to develop recycling services for SMEs

Communications

Once a customer is recruited, it is good practice to provide a pack of information on the service and how to take part. It could include posters and / or bin stickers to show what food waste can and can't be recycled. It should

also explain what happens to the food waste once it has been collected and how it

For example...

Both Bexley Council and CORE have adopted this approach and feel that it is a good investment as it helps to reduce the likelihood of contamination.

is treated. This will help employees to separate their food waste properly, thereby reducing the risk of contamination and maximising the diversion of food waste.

Figure 4: Cardiff's food waste poster

There is a range of

generic communications materials and templates available for download from Recycle Now¹⁹.



Training of employees is an important aspect of a successful food waste collection service – it can address how to separate food waste, what can / can't be recycled, the location of internal and external containers, how to empty internal containers, etc. It can mean that contamination is reduced and kept at low levels. Whilst none of the surveyed schemes operated a contamination policy the avoidance of non-food stuffs is likely to become an important pressure over time as services expand and input standards at treatment facilities need to be met. Authorities should only invest time in providing training where it is clearly needed, such as when triggered by increasing levels of contamination as detected by the collection operatives, or following complaints from the treatment facility or indeed where it is requested directly by the customer. Training should be concise; one session should last no longer than 30 minutes, so as to sustain interest, and not intrude too much into the working day. Employees should also be encouraged to offer up suggestions on how services can be improved or made easier to use.

For example...

Cardiff Council has found the use of visual aids to be successful. They have produced posters with pictures to show what can, and can not be placed in the food waste bin.

Our survey highlighted the potential problems associated with language, particularly within the hospitality sector. Many instructions to users are produced in text and not translated resulting in confusion over what can and can't be placed in food waste bins. If an authority is faced with similar issues, pictures and other visual aids can be used during training sessions and pictures / iconography on bin stickers / posters. It is important to ensure that mechanisms exist, through which the information is relayed to all employees likely to be producing food waste.

People who are bilingual can act as 'ambassadors' for the service and can disseminate information to colleagues who share their first language. These lines of communication must be regular to account for staff turnover and loss of messaging. Verbal communications alone is unlikely to substitute completely for visual means of communicating the key messages.

¹⁹ Available at www.recyclenowpartners.org.uk

9.2.2 Schools²⁰

Recruitment

On the basis of the assumption that the intention is to target all schools, information in the form of letters and emails can be sent directly to all schools within the local authority boundary. However, it can be beneficial to ascertain the appropriate addressee (e.g. head teacher, bursar, and caretaker) so that the information reaches the person who is most likely to be in the position of being able to make a decision.

Communications

Once a school has signed up to the service, additional materials will need to be provided to the school on how to use the service. As with businesses, this is likely to include bin stickers, posters at internal collection points, signage for external collection points and staff training may need to be provided (e.g. kitchen staff).

Assemblies (or tutor groups) can be an effective means of explaining the new system to school children.

Typically these are delivered by school staff but the authority can provide materials to assist (check out the free resources available from Recycle Now²¹). To help cement these key messages, it is important that the containers are in place and the system is ready to 'go' so that the children can immediately put into practice what they have learnt, and so that staff can also engage with the service.

For example...

The implementation of Bristol City Council's food waste collection for a few schools suffered slightly because the system was not set up straight away after the initial presentation and so ready for use when the information was fresh in not the children's minds.

To help reduce contamination, a useful strategy is to designate one or more food waste monitors in each school. The monitor would oversee the children putting their plate scrapings into the bins to make sure that no plastics, cutlery or other contaminants entered the food waste bin. This can be an effective technique, with pupils gaining a greater sense of responsibility for, and ownership of, the system.

Opportunities for integrating the introduction of a food waste collection with curricular objectives should not be overlooked. These may relate to matters of climate change, or resource use, and can provide a point of departure for lively classroom discussions.

Schemes will also need the support of those staff dealing directly with the food waste (e.g. catering staff, midday supervisors and caretakers) and they will need to fully understand how the scheme will operate. It is advisable that staff from the authority work with key staff members to identify suitable locations for containers and agree the scheme logistics. Our survey highlighted that some staff may be discouraged by the sheer quantities of food waste involved, particularly in large schools, accentuating the need for collaboration when designing the system, so that individuals can be reassured that the scheme will operate efficiently. Authority staff should ascertain who will be responsible for the containers, so that they are properly maintained and internal containers regularly emptied. They should ask to be kept informed of how the system is operating (including successes), and of any issues arising.

²⁰ WRAP (Forthcoming) *Food waste in schools, for more information about schools food waste systems*

²¹ Local authorities should refer to the 'Download Area' of the Recycle Now partners website, www.recyclenowpartners.org.uk. Food waste iconography and container images are available, and specific communications material for businesses and schools will be available Autumn 2010.

9.3 Marketing messages

9.3.1 Key messages for different customer groups

There is likely to be considerable variation in the willingness of businesses to pay more for a food waste collection service. Some companies are likely to be strongly motivated by environmental concerns, or reputational gains through improved environmental credentials, and may demonstrate a fairly high willingness to pay for the service. Others will be more sensitive to the costs of the service, and will be less likely to take up the service if additional costs are incurred.

For example...

Anecdotal evidence from the survey of LAs, social enterprises and private companies collecting food waste indicates that some restaurants and food retailers would use services if available, and have demonstrated this through paying additional charges for the food waste collection service.

It may be the case that an authority is able to segment its target market between those less likely to be price sensitive (and more environmentally aware) and those likely to be most price sensitive. If this is the case, it makes sense to target the former group first due to the lower effort and cost of recruitment involved and the ability to use these businesses in promotional literature. For similar reasons, if a local authority is offering a food waste collection service independently of a trade refuse service, then because this service is likely to imply additional costs for the user, any efforts which facilitate targeting of customers whose willingness to pay for the service is likely to be greater might be especially worthwhile.

For example...

In Cardiff the provision of a food waste collection service presents an opportunity for the Council's trade waste customers to reduce their costs. By reducing their residual waste, through utilising the food waste collection service, a customer's overall charges can decrease. The savings achievable are cited in marketing material as the predominant reason for uptake of the Council's food waste collection service.

However, potential Urban Mines' customers were disincentivised because of the perception of the additional expense of the 'add-on' food collection service being offered. In this case customers were unable to offset the additional cost of a food waste collection with a reduction refuse collection costs as the services were provided by different companies.

Otherwise, a marketing strategy might, in the first instance, focus on any savings that customers may make by switching to the separate food waste collection.

9.3.2 Addressing concerns

Concerns about food waste collections can dissuade potential customers. Even where financial savings can be realised, businesses may not wish to separate food waste due to extra effort involved in separating it for collection. Some of the key perceived barriers to the uptake of separate food waste collections by businesses cited by existing service providers are odour; hygiene and lack of space to separate food waste (i.e. need for more containers).²² Local authorities need to inform potential customers of the measures that can help to mitigate these concerns – for example, that liners will be supplied to improve hygiene and reduce the risk of odour, or small internal containers will be supplied to make separate easier near areas of food preparation.

²² Telephone survey to local authorities, social enterprises and private companies collecting food waste from businesses and schools.

9.4 Timing and resources

9.4.1 Links with household services

If an authority is introducing a household food waste collection service, there may be benefits to be gained from concurrent roll out of the service to schools and businesses. If a local authority demonstrates a wider commitment to food waste recycling, it is likely to have more of an impact on individuals and businesses within its area. Several local authorities consulted as part of this research recommended this approach.

- **Schools** - children will benefit from consistency in the approach to dealing with food waste both at home and at school. Also, the key messages about food waste learnt at school may filter back to domestic households.
- **Businesses** - If business owners and front line staff are used to separating out their food waste at home, they are more likely to adopt these practices in the workplace, and vice versa. Concerns pertaining to cleanliness and odour are also likely to be overcome if individuals have prior experience of using food waste systems, as long as they are well designed.

For example...

Uttlesford District Council invited schools to participate in the food waste collection service at the same time as the household service was being rolled out across the district.

In terms of service recognition there are benefits to be gained if the authority adopts similar images and iconography on its promotional and instructional materials for residents, businesses and schools.

9.4.2 Resource requirements

Staff time required for the marketing of the service will vary depending on the marketing approach adopted and the proposed scale of the service. When determining the extent of the resources required the following points should be considered:

- Cost of initial recruitment (over and above existing marketing resources) and ongoing communication to ensure effective participation (high capture and low contamination);
- Customer longevity and turnover;
- Write down period (i.e. the period of time over which marketing costs are recovered through customer charges); and
- Average annual revenue per customer (consistent with an attractive service offering).

If an authority already offers services to businesses (and schools), it is likely that there will be members of staff whose role it is to promote these services. In this case, rather than creating a new post, existing staff resources could be re-directed to promoting the new service. If, however, the authority has no trade customers a new post may be necessary.

The proportion of an officer's time devoted to marketing a food waste collection service will reduce over time – with marketing costs higher at the beginning of the service. After obtaining the initial leads, of the order 0.5 day per customer will be required to visit the site, discuss the service and the collection logistics and signing up the business. In some cases time will also be required to devise an internal collection system for the building and to train staff.

Estimates of the costs of intensive marketing, including the costs of providing resource efficiency advice and ensuring that contact is made with the key decision maker for maximum take-up levels, have been provided by the former LA BREW Centre. For two authorities, these were £33 per business and £50 per business.

In the WRAP SME trials, much higher figures were incurred, especially where there was little prior experience of offering waste services to businesses. Although these were trials, they highlighted the potentially high cost of recruitment if little relevant information is available, and where the service on offer effectively is (as with all these trials other than the Bexley case) an 'add-on' service (i.e. no counterpart savings available on refuse collections) and hence, an 'add-on' cost.

Table 6: Average marketing costs per business recruited under WRAP SME trials (where information is available)

Method	ECT	Urban Mines
Average marketing and sales cost per business recruited	£114.60	£963

These figures in Table 6 highlight the fact that it is possible for authorities to spend resources on marketing which will be difficult, if not impossible, to recover through charges levied upon service users. It also highlights the uncertainty, and lack of available information surrounding these costs.

A high recruitment cost is not desirable. The key, as discussed below, is to ensure that all costs can be recovered under reasonable assumptions regarding customer recruitment, and the period for which customers are expected to remain on the service. Costs associated with ongoing marketing to retain customers are much lower than costs associated with customer recruitment. Although no examples of ongoing marketing were highlighted in the case studies, for example, sending out a leaflet with the invoice, this should be considered. Marketing costs are considered in more detail in Section 12.0.

9.5 Chapter summary

- Local authorities should be strategic in their approach and proactive when targeting business customers;
- The more strategic and the more targeted the approach, then the more appropriate it will be to undertake face-to-face visits, the conversion rate for which may be quite high with sufficient preparation.
- Some businesses are likely to be more motivated by concern for the environment than others, and they may be willing to pay more than those for whom cost is the principle issue. In terms of promoting the service adjusting messages to suit different businesses can be advantageous.
- Local authorities should provide appropriate information and materials to businesses and schools and offer to run staff training sessions so that employees and school children are informed on how to separate their food waste and minimise potential contamination.
- Where household food waste services are also being considered, local authorities should consider a concurrent roll-out of the service to businesses and schools.

10.0 Treatment of collected food waste

This section looks at issues related to the treatment of the food waste and how these impact on collection arrangements, in particular the location of the facility and the type of facility.

10.1 Location of facility

The location of the treatment facility can be important in determining the time available for collection crews to actually collect food waste (further discussed in Section 11.0 below). The longer it takes to transfer collected food waste to the treatment plant / transfer point, the less time there is available for the collection itself. As rounds including businesses and schools increase in density, and because the quantities collected per business or per school at each pick-up may be high (see Section 5.0), vehicles may fill relatively quickly. If a lengthy journey to the treatment plant / transfer point (a journey of more than 30 minutes one-way) is required, the efficiency of the collections will be compromised (and transfer costs will increase).

Local authorities need, therefore, to consider the transfer and haulage of the collected material, and plan for the efficient handling of the material.

For example...

Cardiff Council uses a waste transfer station located in the city for bulking. Food waste is then transported to an in-vessel composting facility located in Derbyshire (which is approximately 150 miles away). An anaerobic digester in Cardiff is in the planning stage.

Food waste collected from schools in Bristol is tipped at one of the authority's waste transfer stations (in Avonmouth only 10 miles from the city centre) before being transferred for treatment at New Earth Solution's composting facility in Sharpness (approximately 30 miles away).

Food waste collected in Bexley is tipped at the council's waste transfer station at Thames Rd prior to transfer to an in-vessel composting facility at Bury St Edmunds in Suffolk (approximately 90 miles away).

Food waste from Uttlesford is tipped at a transfer station owned by Braintree Council which is 1hr 15mins away. It is then transferred to a compost facility operated by County Mulch approximately 70 miles from the transfer station.

CORE makes use of Shanks' waste transfer station in West Lothian for bulking and uses two composting facilities, one at Glenfarg (around 1 hour away) and one in West Calder (around 20 minutes away).

The service run by Allmead in Bristol makes use of the composting facility at Sharpness Docks in South Gloucestershire (approximately 30 miles away).

The telephone survey to authorities, social enterprises and private companies suggested that all services made use of facilities which were within around 50 miles of the round end – although some of the examples highlighted in the box above show a much larger range of distances. It is anticipated that as more food waste treatment plants are developed, travel distances to facilities will reduce.

10.2 Type of facility

The majority of services currently collecting food waste from businesses are delivering it to in-vessel composting plants although it is expected that, over time, anaerobic digestion plants will become more widespread.

Authorities need to be confident that the treatment plant to which they (or their contractors) send the collected food waste are adequately equipped to handle food waste. For example:

- The likely high moisture content of the collected food waste, and the relative absence of structural material;
- The fact that containment methods used may include liners; and
- The nature of the impurities arising may include, for example, cutlery and other 'kitchen wastes'.

Outside of the contractual issues, business and schools food waste collections are likely to mean that:

- Composting facilities will need to ensure they have adequate bulking / structural materials to mix with the collected food waste. This may be unproblematic if an existing household collection targets both food and garden waste, in which case, the garden waste fraction is likely to dominate. Similarly, if authorities seek to collect card along with food waste, the card fraction can become so significant that moisture levels are reduced to those below which the process functions adequately (at least, not without addition of moisture). The telephone survey highlighted one example where the authority used to collect food co-mingled with card but reverted to collecting food waste only since the quantity of card was becoming excessive.
- Authorities will need to ensure that the treatment facility under consideration has the appropriate permits under the Environmental Permitting Programme (EPP) in order to effectively manage the food waste and is ABPR approved. Food wastes are highly putrescible and are likely to cause odours and nuisance if not handled appropriately, or if treated at facilities with inadequate processes for odour management. It is therefore important to ensure the facility is well-equipped to handle such material.
- Treatment process will need to be capable of handling liners. Most processes can comfortably deal with compostable liners (provided liners are certified to BS EN 13432 standard). Many digesters employ de-packaging equipment that can deal with such bags, though the liners may degrade fully only in a post-digestion maturation phase which is currently not typical in the UK. For composting facilities, the liners tend to biodegrade in the intensive phase.
- Operators should be made aware of the most likely contaminants of the food waste so that they can prepare for these being present in the collected material. Likely contaminants are plastic bags, items of cutlery and other waste items typically found in kitchens. Approaches which may be adopted to minimise these problems are described in Section 6.4.

10.3 Waste inputs

Many facilities will have been designed with an input specification (i.e. a specification regarding the nature and composition of waste) in mind. It is quite typical for these specifications to be included in contract documentation with authorities, with operators having the right to turn away materials lying outside the agreed specification.

It is quite possible that in some circumstances, the inclusion of business / schools waste on a collection round will lead to an input waste stream which falls outside the agreed specification. This might be the case if, for example, inputs are specified in terms of mixed food and garden waste with upper limits set on the proportion of food in the mix. It will be important for authorities to ensure, therefore, that where they have a contractual agreement with a treatment facility, the input waste still lies within any agreed specification once food waste from schools / businesses is added to the mix of materials being collected.

10.4 Gate Fees

Authorities that collected food and garden waste mixed together may find that gate fees for food waste only are different to those for mixed food and garden waste. Aerobic composting facilities will need structural material to enable them to accept food waste, and such material typically attracts a lower gate fee than food waste. To the extent that gate fees are not contractually agreed, gate fees for the different types of material might vary. This is made clear in the most recent survey of gate fees at in-vessel composting facilities published by WRAP.²³

10.5 Chapter summary

- Distance to treatment plants is an important consideration when setting up the service. One of the WRAP SME food waste trials was discontinued, effectively because of the long transport distances involved in taking waste to the treatment plant.
- The authority should be aware of the potential impacts of adding more food waste to an existing collection and discuss their proposed service changes with the treatment plant operator. In extreme situations, the increased proportion of food waste may result in the waste material no longer meeting agreed contract specifications, or becoming difficult for a given facility to handle.
- There may be a difference in gate fees charged for food waste only compared to those for mixed food and garden waste.

²³ WRAP (2010) *Gate Fees Report 2010: Comparing the cost of alternative waste treatment options*, Available: http://www.wrap.org.uk/downloads/2010_Gate_Fees_Report.c241f5cb.9523.pdf

11.0 Designing a service - resourcing the service

This section deals with methods that will help determine the level of resources required to deliver a collection service. Further details are contained in Appendix E.

11.1 Predicting uptake and yield

Estimating potential uptake (the number of customers) and yield (the amount of food waste collected per customer) is fundamental to estimating the resource needs and overall service costs. It is important to note that whilst we now have considerable knowledge of the uptake of food waste services and the associated yield in household collections, the same is not true of collections from businesses and schools. For the time being there is uncertainty regarding these important assumptions and therefore the risk of incorrectly estimating resources and costs are relatively high for the early phases of any new scheme. Periodic review will be important, so the service needs to be flexible so that it can be adapted based on experiences gained.

As discussed in previous sections, customer uptake and customer retention are likely to be influenced by a number of factors, including:

- the number of food waste producing establishments on existing customer lists;
- the number of food waste producing establishments in the local authority area;
- whether service take-up is considered economically advantageous (in the broad sense) to the establishments;
- the nature of the relevant building stock and the degree to which establishments have sufficient space to separate wastes on site;
- the marketing approach adopted;
- the quality of containment and the approach to facilitating separation within the establishment;
- the quality of the approach to dealing with hygiene issues and perceptions thereof;
- cultural factors and socio-economic variables influencing familiarity with recycling and environmental issues;
- the ability of the service to meet specific customer requirements (including, for example, frequency); and
- the presence of competition for the provision of waste services and food waste services.

To consider the potential uptake of food waste services it will be important that an authority considers their relative position in respect of the factors listed here. The authority should seek to follow a process of looking through existing customer lists and classifying potential customers according to whether or not they are likely to take up the scheme. Existing trade refuse and recycling lists will be useful to identify potential customers and if these are not available then lists of licensed food premises from environmental health or licensing departments may be of use.

11.2 Collection options

If authorities are currently operating a service that collects food waste from households then there may be the opportunity to consider collecting food waste from businesses / schools on the same rounds. A variety of collection methods are used to collect food waste from households and certain methodologies may be better suited to the collection of food waste from businesses and schools than others.

Two key concepts must be considered when addressing how much collection resource will be required to undertake a collection:

- vehicle capacity; and
- time available for collections.

Collection rounds will be limited each day by the amount of time that the crew are contracted to work. Within this period, the crew will spend time on different activities including loading the vehicle, driving to the tipping point, tipping, and returning from the tip.

If additional collections are made on a round then the crew will need to spend additional time collecting from these locations and the additional material will contribute to filling up the vehicle (using vehicle capacity). The significance, in cost terms, of the additional collection time spent by operatives, or the additional vehicle capacity occupied by the collected waste, is determined by whether operative time or vehicle capacity becomes the limiting factor in the collection of additional material.

If there is sufficient availability, in terms of both time and vehicle capacity, to collect business / schools food waste on the household round, consideration of the costs involved suggests this will almost always be a lower cost option than collecting the food waste on a separate, dedicated round.

11.2.1 Practical issues related to collecting on the household round

A wide variety of approaches to household food waste collection are currently employed. Table 7 illustrates some of the more common configurations used and outlines some likely pros and cons were these configurations to be employed to collect business / schools food waste.

Understanding whether it is practical to collect businesses' and schools' waste on the household round is, in reality, relatively complex. In considering whether household rounds could be used, it is important to be confident that there is sufficient capacity (both in terms of volume and weight) on the existing rounds, and that time to undertake these collections is available. These aspects are dealt with further in Section 12.0.

It is worth noting that it is unlikely that the uptake of commercial food waste services will produce an even spread of customers or food waste yield across the existing collection rounds, and in many cases, the majority of business customers may be concentrated in areas covered by a small number of the household rounds. This is important because by giving additional work to these rounds, it may be necessary to redesign the rounds to re-balance the work load.


If the impact of including businesses / schools becomes so great, then this may result in it being impractical to collect on the household round and a separate pass may be more appropriate. In some authorities currently collecting food waste from households there may not be any existing food waste round coverage in the commercial centres, where there are few residential properties, and those that are located in this area may be predominately flats. Specific collection times to call or even to avoid may need to be respected for certain schools and high street areas. Unfortunately, these may result in collection times that are inconvenient to schedule within the household rounds.

These aspects of household rounds become more important if one considers the average food waste collection yields for businesses and schools highlighted in Section 6. These quantities are typically of the order 50 times the average quantity collected from households so that vehicle capacity is used up disproportionately by food waste from schools and businesses.

In considering the round capacities it is worth taking into account how much uncertainty currently exists in understanding how household food waste collections will evolve over the medium term, and how many customers may result from the new business / schools service (and hence, what the contribution to the overall quantity of food waste collected on the round may be).

Table 7: Examples of household collection methods

Collection vehicle	Potential advantages for collecting from small businesses / schools on rounds	Potential disadvantages for collecting from small businesses / schools on rounds
<p>RCV / Rotopress collecting mixed garden waste and food waste</p>  	<p>Likelihood of spare capacity is relatively high.</p> <p>Loading time will be relatively quick for wheeled bins compared to the other vehicles.</p>	<p>Capacity limitations may arise on a seasonal basis.</p> <p>Many services will be operated on a fortnightly basis which is unlikely to be suitable for the vast majority of businesses and Schools (conversely, a weekly collection of this nature for all households is expensive).</p> <p>Driver and additional loaders maybe under utilised whilst schools / business collections happen (since there may be a low density of collections).</p> <p>Food waste likely to have a high moisture content which could increase the risk of leakage from the vehicle chamber.</p>
<p>RCV with food waste Pod</p> 	<p>In some cases the food pod may not be fully utilised on the household round and capacity to add a small number of collections may exist.</p>	<p>A pod vehicle and crew (often a driver and three loaders) is an expensive resource.</p> <p>The contents of 28 x 140 litre bins can be held in a 4m³ pod. Once household food has been collected, there is unlikely to be capacity on the vehicle for more than a few business / schools customers per day.</p> <p>The bin lift cycle is not particularly quick when compared to an RCV.</p> <p>Driver and additional loaders may be under-utilised whilst schools / business collections happen.</p>
<p>Twin Pack RCV with a compacting compartment used for food waste</p> 	<p>In many cases the food chamber of the vehicle may not be fully utilised, so this capacity could be used. However, this is likely to result in only a small number of additional collections.</p> <p>Loading time will be relatively quick for wheeled bins.</p>	<p>A twin back RCV vehicle and crew is an expensive resource.</p> <p>Only 30 to 40 x 140 litre bins can be fitted into a 5m³ compacting chamber. Once household material has been collected there is unlikely to be capacity on the vehicle for more than a few business / schools customers per day.</p> <p>Driver and additional loaders maybe under utilised whilst schools / business collections happen.</p>

Collection vehicle	Potential advantages for collecting from small businesses / schools on rounds	Potential disadvantages for collecting from small businesses / schools on rounds
		Food waste likely to have a high moisture content which could increase the risk of leakage from the RCV chamber.
Small (7.5tonne 5cubic metre) tipping vehicles 	In many cases the food chamber of the vehicle may not be fully utilised, so this capacity could be used. However, this is likely to result in only a small number of additional collections.	Once household food has been collected there is unlikely to be capacity on the vehicle for many customers per day, perhaps 10 to 15 businesses or schools if existing rounds are achieving 2 tonnes per day. The bin lift cycle is not particularly quick compared to an RCV.
Stillage vehicle 	It may be possible to collect a small number of additional containers from small businesses and/or schools. Might be more appropriate for use in delivering combined services to premises producing only small quantities of food waste (or, with careful round planning, to premises requiring more frequent collections). May be suitable for collections at higher frequencies	A lack of bin lifting equipment will exclude the option of efficiently collecting from the majority of businesses and schools. Some small scale collections could be possible where small containers are used (20 - 35l).

The frequency of household food waste only collections is typically once a week and collections of mixed food and garden waste tend to be on a fortnightly basis. Practically, unless special arrangements are made to collect from businesses / schools on a more frequent basis, this limits the collection from businesses / schools to the same frequency if collected on household rounds. A weekly collection, let alone a fortnightly one, may not be frequent enough for some producers with limited bin storage capacity (see Section 5.0). A disadvantage of basing collections on household rounds is, therefore, that without making special arrangements (e.g. for some crews to collect from business premises through 'mopping up' after completion of household collections) some space-constrained potential customers may not feel that the service can deliver to their requirements.

If an authority thinks it may be possible to collect business / schools food waste on the existing household pass there are further practical issues that will need to be considered. Food waste from schools and businesses will need accounting for as separate tonnage in the authorities' WasteDataFlow reporting. Because the material will be co-collected with household food waste a methodology is needed to adequately account for the amount of business / schools food waste collected. Two main options exist:-

- count the number of business / schools containers lifted on a collection round and then use a "ready reckoner" system to translate the number of containers to an estimated weight of material; or
- fit and use on-board weighing equipment (this is likely to be expensive if only used for the new service).

Whatever method is used it will need to be acceptable to auditors and in two-tier authorities, the waste disposal authority.

For example...

Bristol Council has rolled out schools collections where the material is collected on the household rounds that utilise large RCVs. The schools collection has been added without requiring additional collection infrastructure / resource.

Bexley Council collects commercial food waste on their household rounds using Rotopress RCVs. Bexley accounts for the commercial food using a ready reckoner system that converts the known number of bin lifts on a round to an estimated weight.

One authority surveyed commented that there was very limited capacity on the household round, meaning that only 1 or 2 business customers could be serviced on each round.

Cardiff Council commented that merging the household rounds with commercial collections would be more efficient in terms of round efficiencies. However, they chose to operate a dedicated business waste round three days / week as this makes it easier to account for the business waste material.

11.2.2 Practical issues related to collecting on a separate pass

Setting up collections on a separate pass might be more straightforward and simple to implement but because a dedicated resource is being used, then it is also likely to result in higher collection costs than would be incurred through collecting on the household rounds. This is particularly true in the early days of development of the service, where resources are likely to be spread across smaller numbers of customers. It is certainly helpful in these situations if the authority already has in place a trade waste collection service so that the costs of set-up do not fall wholly upon the dedicated food waste collection service.

The two main issues that need to be addressed in designing dedicated rounds are:

- the need to achieve – preferably as soon as possible - a reasonable density of collections when compared with the time and distance taken to drive between depots, collections and tips; and
- the need to sufficiently utilise the resources allocated to the collections; in particular, capital resources.

Achieving efficient round density may be challenging with business / schools food waste, particularly in rural authorities and in the earlier phases of a collection scheme.

It is important to emphasise that in existing schemes surveyed, the number of customers serviced is relatively low, which results in a level of work that would not sufficiently utilise the collection vehicle or the crew for the entire week (or in some cases, even for whole days within the week). Indeed, some operators only run the service because they are operating other services which themselves do not fully utilise the vehicles. Clearly, where round numbers are low, the overall efficiency of the service is dependent upon there being other work for the collection vehicle and crew to undertake. The need to find other work for the collection resource is likely to be an important factor in the choice of collection vehicle and ensuring that the vehicle design is flexible for alternative uses.

To achieve an eight tonne payload would require, on average, around 100 customers where the collection is on a weekly basis, and few of the schemes currently operating have recruited such numbers of businesses on a round. The approach is likely to be well suited to businesses demanding more frequent (than weekly) collections.

Relatively large capacity Toploader vehicles or compacting RCVs (with the compaction pressure turned down or if possible the compression plate positioned at the front of the vehicle) are likely to be the vehicle of choice as these are relatively flexible and easy to use on other services. However, these suffer from the drawback that they are usually relatively large, potentially exacerbating the problem of under utilisation of the asset in early phases of the scheme. Use of smaller vehicles might be appropriate if the tipping destination is proximate to the collection rounds.

It will also be important to ensure that the selected vehicle is adequately sealed to ensure that any liquid from the food waste is not leaked from the vehicle to comply with the requirements of the ABPR 2003. For further details on food waste collection vehicles see Section 3 of WRAP's Food Waste Collection Guidance.²⁴

In some aspects a separate pass has some distinct advantages over combining with household rounds:

- It is relatively easy to schedule collections that are more frequent than weekly.
- The unit cost (i.e. per hour of operation) of the collection vehicle and the crew will probably be lower (compared to the household round) as a lower cost vehicle may be used, and more importantly, crewing numbers can be lower than on household rounds.
- However, whilst it may be easier to schedule more frequent collections, this is likely to affect the cost of service provision if it entails additional journey times to service small numbers of customers requiring additional collections.

Where services are operated on a dedicated round basis, these will benefit from the inclusion of customers who are more of the nature of small industrial entities, producing larger quantities of food waste. This will improve the utilisation of resources, though evidently, for more major producers, it makes less sense to collect large quantities of food waste through repeated bin-lifts.

For example ...

ALLMEAD co-collects business food waste with cardboard. The round only takes 1.5 hours so the rest of the day the driver and vehicle are collecting other recyclables and residual waste (construction type materials). The collection frequency for a customer can be up to 2 collections per week.

Cardiff Council operates an RCV for three days a week to collect from 97 businesses and 14 schools. The collection frequency for a customer can be up to 3 collections per week.

CORE operates an 18 tonne Toploader seven days per week collecting from over 50 customers per day. The collection frequency for a customer can vary from 2 to 7 collections per week. Some of the customers on this service are not from the hospitality sector but are small industrial food producers generating significant quantities of waste.

²⁴ WRAP (2009) *Food Waste Collection Guidance*, Available:

http://www.wrap.org.uk/downloads/food_waste_collection_guidance_-_amended_Mar_2010.7a89dcd7.7749.pdf

11.2.3 Practical issues related to collections on a shared residual / recycling pass

At the time of writing there does not appear to be any food waste collection from businesses where material is co-collected on the same vehicle with other recycled materials, or with residual wastes, by having separate vehicle compartments for food waste and other materials / refuse. It is possible that this type of collection could offer some operational efficiencies but it is also likely to be very tricky to ensure that these types of collections are properly configured.

Commercial collection rounds encompass many different types of businesses and the relative yields of recyclables, food waste and residual wastes will vary considerably between these businesses (and probably over existing rounds). This is problematic if the intention is to collect materials in vehicles with fixed compartment sizes and this may lead to overall payload utilisation being quite low (for example, if one compartment fills up much faster than the other(s)).

If payload utilisation is relatively low, it will be important to have a quick route to the tipping location and in all circumstances, it will be important that the tipping locations for each segregated stream are in close proximity to each other. The tipping point should be licensed to store the food waste.

Finally, collecting materials other than food waste on the same pass forces the frequency of collection to be the same across the different streams. This reduces possibilities to offer higher frequency food waste collections to customers without incurring unnecessary additional costs.

Given the considerable level of uncertainty regarding the potential yields of different separated materials from dedicated business rounds, it would not seem especially prudent to roll out new services on vehicles designed for co-collection on a single pass basis with fixed compartments. Rather, it is suggested that where new services are rolled out separately from the household collection, that they are operated on a dedicated pass basis. Once services have matured, a clearer view on the suitability of co-collection could be established.

11.2.4 Evolution of services if collecting on household rounds

The collection service both for households and businesses / schools is unlikely to be static because numbers of customers and quantities of waste collected are likely to change over time. However, following a bedding-in period, then in the absence of further service changes, the household quantities are likely to be more predictable than those collected from business customers (and to a slightly lesser extent, schools).

There are far more variables that are outside the control of the local authority in the case of collections from businesses (and, to a lesser extent, schools, where local authorities can directly influence take-up) than in the case of collections from households. At the outset it will not be possible to be certain how many customers will make use of the food waste collection service.²⁵ Since this is crucial to determining what resources will be needed to run the service, it will be sensible in the start-up phase to make the most effective use of existing resources / assets. The information gathered will be very important in understanding the relative merits of operating a dedicated service.

²⁵ Although local authorities might not know exactly what household participation rates will be, they will become known for a given service configuration and incentive structure after initial periods. All households in the area covered will be offered the service even if they then choose not to participate – this is quite different to the situation with businesses.

It is advisable that prior to start-up, authorities investigate:

- The extent of and potential for taking advantage of, spare capacity on existing household food collection services. This includes consideration of where the likely business / schools customers are, and on which rounds any spare capacity is to be found;
- The issue of seasonality should be considered where the household round collects both food and garden waste as the amount of spare capacity is likely to change throughout the year. In such situations, it could be advantageous to consider starting up collections when the spare capacity is beginning to materialise (to maximise the period over which the spare capacity can be utilised). In taking this approach, good data on yields and uptake should be gathered over the roll out period to inform what level of capacity will be required if the new food waste service has been adopted by a sufficient number of business and / or school customers;
- Whether there are any vehicles in the current fleet which are under utilised (this could be due to vehicles operating on only a small number of days per week, because they are 'spares', only operating during only a fraction of day, and / or utilise collection crews and vehicles out of normal working hours).

This approach can minimise the extent to which new resources need to be committed to the service, and reduces under-utilisation in the start-up phase, thereby keeping costs down in the period when the customer base is developing.

An example of how collections may evolve is detailed below:-

Start up phase

In the initial phases of the project a small number of businesses and schools are quickly recruited to the service. The existing food only collection is using six small (7.5 tonne GVW) tipping vehicles. The distribution of businesses and schools is relatively evenly distributed between rounds; however nine of the customers are located in two town centres which are not currently covered by the existing household rounds. The initial work to determine the most efficient collection structure made clear that it was still best to incorporate the town centre collections onto the household service. This was achieved by adding the town centre collections to some of the lighter rounds that were operating in the vicinity. Timing of this collection was considered to ensure where possible that businesses could receive their collections at a time convenient to them, which was commonly at the end or beginning of the day.

Evolving phase

After the service has been running for a year continued marketing has raised the number of customers to a level where it has put pressure on the household service in both time availability and vehicle capacities. Consequently, for the service to evolve additional resource will be required. The distribution of new businesses and schools is more focussed on the two town centres with a substantially higher number of pickups and higher resulting yields occurring in these areas. After carefully auditing available resources the authority determines that household refuse restricted access rounds are covering streets that could be serviced by larger vehicles. These narrow streets are added to existing refuse rounds and the restricted access service rounds are re-designed freeing up a day per week of this resource. This solution would not be feasible in all authorities but other options in differing circumstances, such as paying overtime or adding the businesses to the narrow access round, could also be considered. The small 18 tonne RCV is well suited to collecting food waste and is utilised on town centre food waste collections on a day per week. A number of multi-occupancy buildings (flats) are also supplied with communal bin services and these are combined into the city centre business / schools service.

It will be important for the local authority to plan for the development of the service on the basis of it *becoming* more successful over time. The growth of services may result in different collection solutions evolving. A solution to deal with the initial start up phase of the business / schools service may lead subsequently to a different

solution as the service evolves and more customers are recruited. It is not possible to be prescriptive on how this process may unfold as it will depend on the individual authority circumstances, in particular:-

- the number of businesses / schools joining the service;
- the quantity of material captured;
- the spatial distribution of businesses and schools in relation to household rounds;
- the extent of spare capacity on existing household rounds (where these exist);
- the availability to the authority of 'spare' assets (notably, vehicles / 'vehicle-days'); and
- the size of the collection vehicles and the availability of payload and time capacity on rounds where businesses and schools are collected from.

11.3 Chapter summary

- Estimating the potential number of customers that will take up the service and the potential yield of food waste is important in determining the resources required and the service costs. There will be uncertainty and therefore an element of risk in producing these estimates;
- Where possible uptake and yield estimates should be determined by segmenting business types;
- Authorities already collecting household food waste maybe well placed to integrate business / schools collections with the service. However, of the different household collection services that exist some will be more likely to cope with the significantly higher food waste yields that will be captured from businesses and schools than others;
- Estimating the resources required to collect food waste from business / schools on a household pass requires an accurate assessment of existing capacity for collecting household waste, in particular time available for collections and vehicle payload;
- If considering collecting on the household round it is important to estimate the distribution of potential customers in relation to the existing household rounds. It is possible that the distribution of businesses / schools, and their collection frequency requirements, will result in an uneven additional amount of work on existing rounds and in certain areas which may not have coverage. In these circumstances resource requirements should be considered on a round-by-round basis;
- Collecting from businesses / schools using a separate dedicated pass is, in most circumstances, likely to be more expensive but potentially easier and quicker to implement, and more flexible in the long term. Resources required to collect on this basis are, for most authorities, unlikely to be equivalent to a whole vehicle and crew per week. Therefore it is important to consider whether existing resources can be utilised (or equivalently, how any new resources could be effectively utilised when not employed on business / schools food collections);
- Collections are unlikely to remain static over time and there may be a case for commencing collections using one approach in the short-term (e.g. small numbers of collections on each of the household rounds) and at a later stage changing to a different collection system, as new customers join the scheme, or as certainty regarding scheme performance improves. In the separate pass case, the ideal situation is one where the vehicle used can be (or already is) utilised in other operations.

12.0 Costing the service

This section draws out key themes relating to collection costs and collection efficiency. It references worked examples of service costs provided in Appendix F.

12.1 Basic principles

Having considered the resources that *are likely to be required* to deliver the service, the next step is to estimate the costs of delivering the service. Table 8 lists the key cost items that will need to be considered.

Table 8: Cost items - checklist

Cost item	Should include	Tick
Collection vehicle provision	Hire charges, capital repayment costs, maintenance costs, fuel costs, insurance, road fund allowance, allowance for accident repairs, sign writing, allowance for "spare vehicle" cover for routine maintenance and breakdowns.	
Collection crews (labour)	The cost of drivers and loaders, including on costs, pension costs and holiday cover.	
Supervision & management	The cost of supervision and management, including on costs, pension costs and holiday cover.	
Depot overheads	A reasonable share of the costs of the collection depot, potentially allocated according to the number of vehicles based at the facility (or a proportion of this if the vehicle(s) is also used on other services).	
Container costs	The cost of purchasing all containers and liners. A method of spreading these costs over a number of years should be determined. It maybe appropriate to include storage costs for the period before they can be issued to customers.	
Food waste bulking and transport costs	If food waste cannot be directly tipped at a treatment facility then there will be costs associated with bulking and onward transport of this waste.	
Food waste treatment costs	The gate fee charged by the treatment facility times the quantity of food waste (tonnes) to be treated	
Marketing and promotional costs	The costs of recruiting customers and providing any direct support to customers on managing their waste.	
Service administration	The cost of maintaining customers lists, billing customers, processing payments, dealing with service requests etc.	
Miscellaneous	Could include items such as PPE for the workforce, bin cleansing etc. – if not included elsewhere	
Additional charges	Core re-charges (for in-house services) or contractors overheads and profit margins	

Where services are contracted out most of these cost items will be covered by a unit service charge (or through a payment mechanism that incorporates a number of variables). However, it is still advised that this checklist is followed to ensure that all relevant costs have been accounted for.

In situations where collections from businesses / schools are possible on both an existing household pass and a separate pass it is advised that both options are costed in order that they can be fully compared. This should also give an indication as to how costs might change if, as discussed in Section 11.0, the service evolves from one based around existing household collections to one based (wholly or partially) on a separate pass for businesses / schools.

12.2 Marketing and promotional costs

It was noted in Section 9.0 that estimates of marketing costs range from as low as £30 per customer, to more than £2,000 per customer and that to some degree the level of costs incurred depend on an authority's starting point. Authorities should be prepared for a higher marketing cost per customer where they are 'starting from scratch' i.e. where they offer no other trade waste services. Those who already operate services to businesses should incur lower marketing costs.

There is no agreed average cost for recruiting an additional customer to a service. However, as a guide, the total marketing cost is likely to be of the order **£150 per recruited customer** based on the following:

- £80 per customer to cover promotional materials, cold-calling and setting-up visits with potential customers;
- £70 per customer to cover follow-up visits to potential customers, some of which will and will not take up the service, to provide further information on the service and to advise on set-up, type and use of containers (internal and external), use of liners, etc. and then to deal with any subsequent set-up enquiries. (Cost based on £30,000 per annum for the cost of employment of a trade waste officer and 3.5 hours per customer visit).

Whilst £150 per recruited customer might not be the lowest cost achievable, it is likely to be at the more favourable end of the range of marketing costs per recruited customer. If for example, the separate collection of food waste was to become mandatory as currently being considered in part of the UK, the demand for services will rise and as a result the average cost of recruiting a new customer could be expected to drop.

12.3 Costed examples of services (Appendix F)

A number of services profiles have been costed and these are detailed in Appendix F. The costs are considered to be realistic averages based on the following:

- For separate pass collections (i.e. business / schools waste only) it is assumed that an 18 tonne Toploader is used and 63 collections are made per day;
- For collections on a household round it is assumed that a 26 tonne RCV with a driver and two loaders is used. A range of bins (per customer) are assumed.

A sample of the unit costs from the worked examples is outlined in Table 9. Note that the key cost components are shown, and their contribution to the total cost, for situations where there is already a trade waste service in place, and for the case where no such service exists. The only difference relates to the cost of marketing which is higher in the latter case.

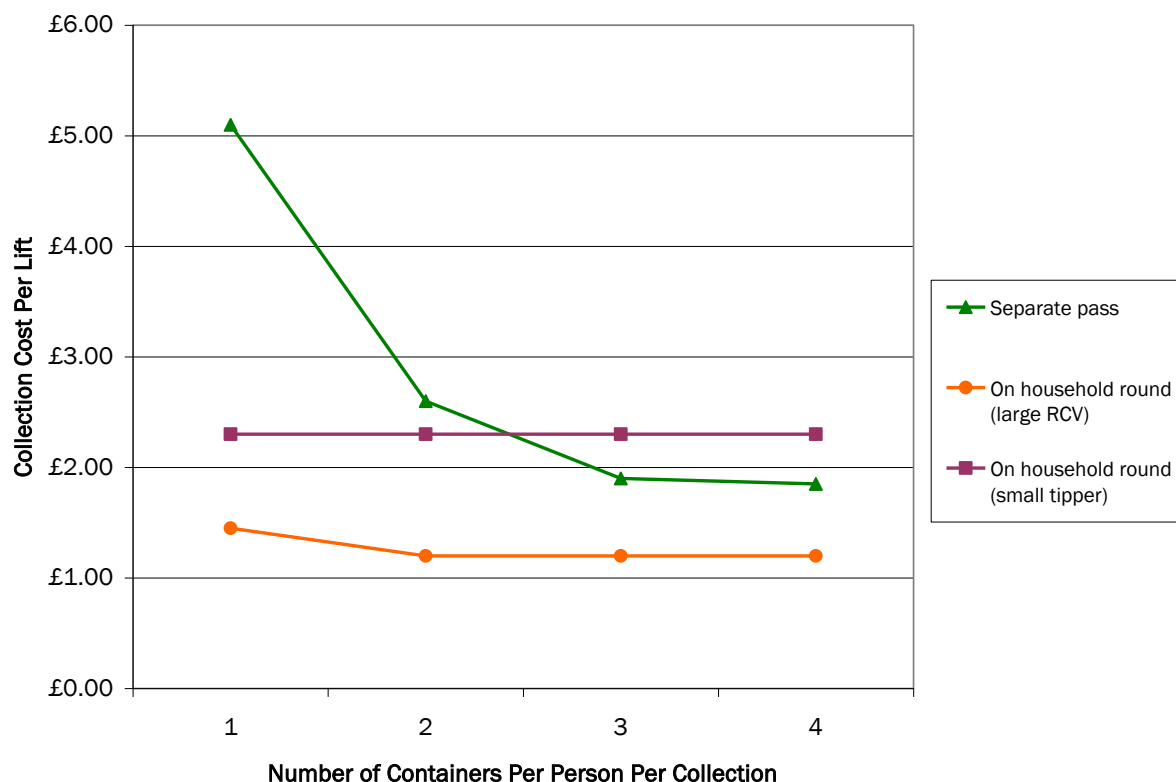
It is important to note that the **actual costs of any service will be dependent on the specific local circumstances** and could be significantly different to those illustrated in this section.

Table 9: Example: total food waste collection costs to a customer receiving a weekly collection of 2 wheeled bins

Cost item	Authority with trade waste collection				Authority without a trade waste collection			
	Cost per lift on...		Cost per lift on...		Cost per lift on...		Cost per lift on...	
	Separate pass	Hhd round	Separate pass as % of total cost	Hhd round as % of total cost	Separate pass	Hhd round	Separate pass as % of total cost	Hhd round as % of total cost
Collection vehicle	£2.64	£0.81	43%	19%	£2.64	£0.81	37%	15%
Collection labour								
Supervision, management and depot overheads	£0.19		3%	4%	£0.19		3%	4%
Containers	£0.13		2%	3%	£0.13		2%	2%
Lines	£0.18		7%	10%	£0.18		6%	9%
Food waste bulking and transport	£0		0%	0%	£0		0%	0%
Food waste treatment	£2.31		38%	54%	£2.31		33%	44%
Marketing and promotions	£0.24		4%	6%	£1.20		17%	23%
Service administration	£0.16		3%	4%	£0.16		2%	3%
Miscellaneous	£0.02		0.3%	0.5%	£0.02		0.3%	0.4%
Total	£5.87	£4.04	100%	100%	£6.83	£5.00	100%	100%
Total in Including core recharge / contractor profit (12%)	£6.57	£4.52			£7.64	£5.60		

The results from the worked examples in Appendix F for customers with different numbers of bins are shown in Figure 5, where an additional option is included which examines the same household and business / schools collection but utilising a small 7.5 tonne tipping vehicle.

Figure 5: Association between collection cost per lift (for vehicle and labour costs only) and number of containers per customer per collection, varying by vehicle and round type



12.3.1 Time restricted vs. volume / payload restricted

It is notable from Figure 5 that use of the small household vehicle results in higher unit costs per lift than use of the larger RCV on a household round. The larger vehicle is primarily restricted by the time available for collections in a day, whereas the smaller vehicle is primarily payload restricted as the spare capacity available for business / schools waste is small.

Similar calculations could be made for vehicle configurations where food waste is co- collected on the same vehicle with other wastes / recyclables, such as in the case of pod or split back vehicles. However, these calculations are more complex as both time requirements and volume / payload calculations must be considered for all the streams to determine the limiting factors.

12.3.2 Key observations and considerations

The following important themes can be drawn from the costs estimates produced in the worked example (details in Appendix F):-

- The cost of collection (vehicle and crew) accounts for nearly half of all costs in the separate pass, however it is only a quarter of the costs if business waste is added to household rounds.
- The cost of collection is over three times as much for a separate pass, compared to adding to an existing household round.
- Treatment costs account for a significant proportion of the overall costs; approximately 40% for a separate pass and 60% for collecting on household rounds. This is very different to the cost structure of household food waste collections where collection costs significantly outweigh the treatment costs.
- Marketing and promotional costs are likely to account for approximately 5% of the overall costs. As commented upon previously these costs are likely to be significantly higher in the case of a local authority

marketing its service in the absence of an existing trade waste collection with the result that costs will increase from 4-6% of total to 17%-23% of total.

- Where the number of collections are restricted by the time available for collections (e.g. a large toploader) and not vehicle capacity (e.g. small tipper on a separate pass) the collection cost per container falls as customers utilise more containers (this is illustrated by the plot for the separate pass in Figure 5).
- Increasing collection frequencies on the separate pass will effectively reduce the number of containers per visit and therefore increase costs. It is therefore important to consider how the service can be offered in such a way that the collection frequency is less, but without reducing the convenience of the service to customers. The appropriate frequency of collection should be considered alongside issues related to storage space for bins, type of business, etc. **Although more than weekly collections may enable certain customers to separate their wastes (e.g. those with limited space), the case studies of weekly collections have not cited frequency of collection as a strong barrier to participation.**
- If there is sufficient capacity, collecting on the household round is more cost effective than collecting on a separate pass. As discussed above, in some cases, this may only be feasible in the short-term and alternative arrangements will need to be considered when customer numbers increase.
- As the collection area becomes more rural the cost gap between the two approaches can be expected to increase with separate pass systems resulting in significantly increased costs and household systems less so. For collections in urban centres there will be less difference in costs.
- For those used to operating household food waste services it may seem surprising that use of a larger vehicle can result in lower collection costs than a smaller vehicle. However, as the limiting factor for a smaller vehicle (e.g. smaller tipper) is payload / volume and not time the larger RCV (which has substantially more payload capacity) is cheaper to operate in all cases except where one bin per customer is collected.
- Co-collecting household and business food waste utilising smaller capacity vehicles is also less expensive than undertaking a dedicated pass. However, the payload of the specially designed smaller vehicles can become a restricting factor where customers have more than 2 bins on average.
- If there is sufficient capacity on a small household collection vehicle then it is possible to collect food waste from small food waste producing businesses / schools at a collection cost that is lower than the costs for a separate pass. As with the large vehicle scenario, the collection costs are defined by the vehicle's capacity, not the collection time.
- The location of business customers relative to the household rounds will be important in determining whether practically they can be added to household rounds. Further information on this can be found in Appendix F.
- The order and magnitude of the cost implications associated with issues discussed in this section will vary from authority to authority in particular because the time required to pick up containers from individual business customers is likely to vary considerably.

As the services (to households and business / schools) will evolve over time as more people take part local authorities are advised to consider collecting schools / business food waste on household rounds where it can be determined with certainty that capacity will be available. This applies in all circumstances except dense urban areas / city centres. In situations where capacity is uncertain then it is probably safer to approach collections on a separate pass basis, seeking where possible to make use of existing resources. Once collections have developed and certainty has increased regarding the performance and uptake of the service an authority could consider amalgamating collections to achieve the collection efficiencies that are likely to exist. This will be especially true in cases where there are large numbers of business customers / schools (so that the business / schools system begins to drive the nature of the choice).

The cost estimates provided are based on fully costing the resources employed in delivering the service. However, in many situations (especially during the early stages of a new service) the marginal costs²⁶ may be lower than those determined by the methods suggested here. In the early stages of introducing a service to business / schools discounting the full collection cost to a figure that at least accounts for the marginal cost could be considered. However, care should be taken to ensure that all costs are recovered over the medium term.

The decision on whether to include business / schools waste on household rounds will depend on a number of authority specific circumstances and this document illustrates a process whereby an authority can consider their own circumstances and come to a view whether or not this is feasible. Some comments on the different options are offered in Table 10.

Table 10: Options for co-collecting business / schools and household food waste

Large RCV	Food Pod on RCV or Kerbsider / Small Tipper	Stillage vehicle
<p>Vehicle appropriate if:</p> <ul style="list-style-type: none"> ■ there is sufficient existing capacity on the household rounds; and ■ Schools / business collections not likely to be only one or two rounds. <p>If this is the case then amalgamation of the two services is likely to be an efficient and cost effective solution.</p> <p>This primarily is because the existing resources are under utilised.</p>	<p>Vehicle appropriate if:</p> <ul style="list-style-type: none"> ■ relatively small numbers of business / schools collections are spread out over a number of household collection rounds. <p>Vehicle not suitable if:</p> <ul style="list-style-type: none"> ■ a reasonable proportion of the business / schools require more than two container lifts per week. If so a separate pass may be more appropriate. <p>If the business / schools service evolves on a separate pass basis, it is possible that when household collection vehicles are replaced, the new vehicles could be specified with sufficient capacity to accommodate both collections.</p>	<p>Vehicle appropriate if:</p> <ul style="list-style-type: none"> ■ small numbers of customers with low yields of food waste (e.g. small offices / small primary schools). <p>It may be possible, albeit in the short-term only and if capacity exists, for the service to accommodate a higher frequency of visits to customers with smaller containers.</p> <p>Opportunities may exist to utilise vehicles used to collect waste from properties provided with communal bins e.g. estates / flats.</p>

In general, when selecting vehicles (for co-collection or separate pass) the following should be considered:

- the likely capacity required given the expected customer base;
- the potential for the vehicle to do other work, and to do so efficiently;
- if the vehicle can access the majority of roads where customers are located; and
- that the service will evolve over time as more customers are recruited.

²⁶By marginal cost, we mean the costs associated with adding one additional customer to the service.

12.4 Chapter summary

- It is important to cost all the resources required to deliver the service – a checklist of cost items is provided.
- Collection costs are an important element of the total costs of the service, and will vary depending on the collection methodology employed.
- Generally, if capacity allows, it will be cheaper to collect business / schools waste on the household round than on a dedicated one (separate pass).
- Cost differentials between the two approaches appear to narrow as the average number of containers to be picked up per customer increases.

13.0 Pricing the service

This section addresses how an authority might go about determining charges for a food waste collection service. It is underpinned by two key principles:

- that the costs of delivering the service to businesses are fully recovered²⁷; and
- that the charges to businesses should be 'reasonable' as required by law (see Appendix G).

Outside of these constraints there is considerable scope for local authorities to configure the structure of their charges in such a manner as they see fit. Local authorities might also like to consider structuring their charges in such a way as to incentivise the behavioural change which the service seeks to deliver. In this case it could be desirable for the charge for food waste collection to be lower than that for refuse collection to give businesses / schools a greater incentive to separate their food waste and to separate as much as possible.

13.1 Recovering Costs

Local authorities should ensure that all costs of the operation of the service are recovered from businesses. For schools, the situation is somewhat different at present, as under the current legislation, schools are not charged for disposal.

There appears to be no reason for local authorities to be so cautious in their charging that they fail to recover costs in full including any fixed costs of capital (see Appendix F). Indeed, if costs are less than completely recovered, the local authority's operation subsidises the costs of business waste collection with taxpayers' money. In order not to operate services at a loss, the authority should ensure that charges are set at a level at which full cost recovery can be achieved.

Some private contractors may choose to offer services to customers on a 'loss-leader' basis, with a view to altering charging structures thereafter. Whilst accepting that this might be a practice against which local authorities need to compete, local authorities are not advised to adopt this approach.

13.2 Costs for collection and treatment of food waste

Section 12.0 (see also Appendix F) estimated the resources used in the collection and treatment of waste. These are indicative costs and are based upon assumptions set out in Appendix F. Table 11 summarises the costs as follows:

- costs are shown for collections on the household round and where the collection takes place on a separate pass;
- for each, costs per bin lift are shown for the situation where the customer sets out an average of one bin per collection, and for the situation where there are two bins per collection;
- with treatment costs set at low and high values (reflecting lower (£45/t) and higher gate fees (£65/t);
- with marketing costs set at lower and higher levels (reflecting the ease with which recruitment might be achieved, and broadly representing the situations where the authority does, and does not, already operate a trade waste collection service); and
- all costs (including marketing costs) are recovered over a four year period.

The final rows in Table 11 show high and low values for the annual cost per premise under different scenarios.

²⁷This statement should be qualified with the rider 'other than to the extent that they are required to by law'. The existing law in respect of Schedule 2 waste requires that disposal is not charged for at Schedule 2 properties.

Table 11: Summary of costs

	Co-collected with household food waste				Collected on dedicated round			
	Low £2	High £3	Low £2	High £3	Low £2	High £3	Low £2	High £3
Cost of picking up one 140l bin (1 bin collected at each property) = [1]	£1.45				£5.05			
Cost of picking up one 140l bin (2 bins collected at each property) = [2]	£1.10				£2.13			
Cost of treating food waste content of one 140l bin = [3]	Low £2	High £3	Low £2	High £3	Low £2	High £3	Low £2	High £3
	Existing trade waste round		No existing trade waste round		Existing trade waste round		No existing trade waste round	
Marketing cost per customer, existing trade waste service	£100				£100			
Marketing cost per customer, no existing trade waste service			£400				£400	
Implied requirement for cost recovery (4 years) = [4]	£27.23		£108.90		£27.23		£108.90	
ANNUAL COSTS PER BUSINESS								
Estimated annual cost, 1 bin per property = 52 * ([1] + [3]) + [4]	Low	£206.63	£288.30		£393.83		£475.50	
	High	£258.63	£340.30		£445.83		£527.50	
Estimated annual cost, 2 bin per property = 52 * ([2] + [3]) + [4]	Low	£349.63	£431.30		£456.75		£538.42	
	High	£453.63	£535.30		£560.75		£642.42	

Table 11 suggests that, for a given situation, the key factors which cause variation in the annual costs to the customer are likely to be:

1. **Whether or not one or two bins are collected.** This affects collection costs. It affects the per customer costs more in the case where the collection is carried out on the household round, but it affects the treatment cost per customer to a greater extent;
2. **What the marketing costs actually are.** Local authorities will not know this at the point of service commencement. They need to track this cost closely since it can become a significant proportion of the per customer cost, particularly in relation to those customers who set out less waste, and also where the authority's marketing spend has to be higher because of the absence of an existing customer base; and
3. **Treatment costs.** The difference between low and high annual costs relate to the lower and higher end costs (i.e. gate fees) of treating the collected food waste. In a given situation, the costs of treatment will be known. Consequently, this ought not to be a major source of uncertainty for a given scheme.

Table 12 shows the proportion of costs accounted for by key service elements where 2 x 140l bins are collected at each customer. This helps make some of the above points more explicit. Perhaps most noteworthy is the fact that the treatment costs are a high proportion of the total cost. This is an important point, and highlights a key distinction between household food collections and those for businesses and schools. For households, the quantity collected is low at each pick-up. Consequently, on a per household basis, the costs of collection dominate those for treatment. In the case of businesses and schools the quantity collected at each pick up is much higher, and as a result the cost of treatment tends to be a higher proportion of the total cost, of the order of half the cost of providing the service.

This also has important implications for the pricing of the service. Because the cost of treatment will be known, there is no reason why these costs should not be estimated with a reasonable level of accuracy.

Table 12: Proportion of costs accounted for by key service elements, collection of 2 bins per customer

	Co-collected with household food waste		Collected on dedicated round	
	Existing trade waste round	No existing trade waste round	Existing trade waste round	No existing trade waste round
Proportion of costs, 2 bins per property, low				
<i>Collecting 2 bins</i>	33%	27%	48%	41%
<i>Treating waste within 2 bins</i>	59%	48%	46%	39%
<i>Marketing cost</i>	8%	25%	6%	20%
Proportion of costs, 2 bins per property, high				
<i>Collecting 2 bins</i>	25%	21%	40%	34%
<i>Treating waste within 2 bins</i>	69%	58%	56%	49%
<i>Marketing cost</i>	6%	20%	5%	17%

The less straightforward matters relate to the costs of collection and marketing. Because these are less well known, they present more of a challenge to the pricing of the service. Authorities should seek to strike the right balance between ensuring a competitively priced service and achieving full cost recovery. Authorities should track the actual costs incurred and the success of their marketing and use this data to refine their costs estimates over time.

13.3 Approaches to charging structures

The approach adopted by the local authority will depend upon the circumstances under which it offers food waste collections. The following cases are considered:

- Food waste is collected from businesses and no other waste services are offered.
- Food waste is collected from businesses and refuse collection is offered - charges based on costs being recovered for each service separately.
- Food waste is collected from businesses and refuse collection is offered – charges structured so as to incentivise uptake of the food waste collection service.

13.3.1 Food waste collection to businesses, no other waste services offered

If the authority offers no refuse collection then the costs of the food waste service are likely to have to be recovered in full, and by the service.

Typically in the UK commercial collections are charged on a volume or per lift basis. Authorities may wish to consider weight-based elements to their charge structures. This ought to improve the basis on which charges are determined since weight will generally be the basis for the cost of treatment (£/t), whilst there might also be some incentive for waste prevention imparted by the charge. It is important, however, to maintain a frequency / per pick up based element to the charging system to ensure the cost recovery of the fixed assets (see also 13.4).

13.3.2 Food waste collected from business, refuse collection offered, charges determined for each service separately

With this approach, the local authority essentially takes the decision that the costs of each service will be recovered in full, treating each service – refuse, dry recyclables and food waste – as if it is being operated independently. This is the approach adopted, for example, by Bexley Council.

The authority needs to have an understanding of the breakdown of costs for each service. For example, it should estimate a medium-term average cost of either a lift of a given sized container, or of the collection of a sack of a specified size (with containment appropriate to the waste stream), for refuse, dry recyclables and food waste. This should include the cost of treating / disposing of each waste stream. In order to do this, the authority will need to make realistic estimates as to how the system is expected to look at some future point, and to have to relevant data.

This option provides a relatively risk averse approach generating revenue to support service costs. Given careful planning, there ought to be little or no danger of the authority 'losing money' over the medium- to long- term assuming the projected numbers of customers are broadly correct and that some margin for error is included to ensure costs are recovered.

There are some issues which may be useful for the authority to consider, and which may give additional 'room for manoeuvre' to improve prospects for uptake (and high captures). It is useful to see what happens to each of the different components of the service when food waste collections are introduced. The effects relate to the way in which food waste collections affect the costs of refuse disposal costs.

1. **Existing collection – trade refuse only – customer takes up food waste collection:**

In this case, it can reasonably be assumed that the bulk density of the refuse will fall (most significantly for businesses where food waste constitutes a high proportion of the waste). This means that the actual costs for disposing of the waste in a given refuse container are also likely to fall, perhaps significantly, especially if the same collection frequency is maintained.

2. **Existing collection – trade refuse and dry recyclables – customer takes up food waste collection:**

In this case, the composition of the dry recyclables being collected will play a role in determining the volume of refuse, and potential net change in bulk density of refuse when the food waste is collected.

3. **Existing collection – trade refuse only – customer takes up food waste collection and dry recyclables:**

A relatively high bulk density material (food) is being removed from the residual waste stream at the same time as a number of lower bulk density materials (the dry recyclables). The overall weight and volume of refuse should decline sharply. The extent of change in weight and volume will depend upon the ratio of dry recyclables to food waste for the business concerned. This offers the potential for lower frequency refuse collections, or if frequency is unchanged, it may reduce the requirement for refuse containers. If neither frequency nor containment changes (in which case, volume in refuse containment would probably be used inefficiently, though perhaps not in the case of sack based collections), then the weight of collected refuse would still decline.




In each of the cases it seems possible, perhaps likely, that the collection of food waste can reduce the disposal costs associated with each pick up of a given container of trade refuse because of the varying effects on reducing weight of food waste to treat and the bulk density of the other targeted materials. From this perspective, authorities might wish to consider a weight based element to their charging for refuse so as to help adopters of food waste collections to keep overall waste management costs down.

Where schools are concerned, it is worth noting that if authorities cannot charge for disposal, then adopting this approach may lead to a situation where the refuse aspect of the service remains the cheapest component.

13.3.3 Food waste collected from businesses, refuse also collected, charging structure used to incentivise take-up of food waste service

With this approach the local authority may take the view that it is not necessary for costs to be recovered for each service individually but that costs need to be recovered for the services as a whole. This gives rise to the possibility for levying charges in such a way that they constitute an incentive to recycle more and use the food waste collection more intensively. An example of this approach is given below. The costs are indicative and should not be considered as the basis from which an authority should launch its service.

In the example, actual costs might be as follows:

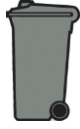


Cost per 240l bin of refuse:	£8 per pick up	
Cost per 140l bin of food waste:	£5 per pick up	
Cost per sack of recyclables:	£3.00 per 60l sack	

Instead of charging in such a way as to recover costs for each part of the service, the authority could seek to anticipate 'typical' shifts in quantities being set out as refuse, recyclables and food and structure the charge so as to incentivise greater recycling. The aim here is to incentivise users to intensify use of the recycling and food waste collections, and reduce use of refuse collections whilst at the same time, making the service more attractive to them by reducing the costs of adopting the new service.

Three scenarios are considered to illustrate the potential overall costs incurred by a business through an incentive based charging structure.




Table 13 shows that before food waste collections are introduced, the customer is using 3 x240l bins for refuse and 2 sacks for recycling. The total cost per customer is £30.00 for a total of 840 litres of capacity per week.

Table 13: Cost of service before food waste collections (£ / customer / week)

Container	Cost per container	Volume (l)	Bulk density	Typical Weight (kg)	Cost per litre	Usage before	Volume before (l)	Cost before
	£8.00	240	0.25	45	£0.03	3	720	£24.00
	£5.00	140	0.4	42	£0.04	0	0	£0.00
	£3.00	60	0.15	7	£0.05	2	120	£6.00
Total							840	£30.00

In Table 14 the situation shown is that where the food waste collection service is adopted. If the charge is in line with the actual costs of delivering the service, the customer pays an 'additional' amount and the overall service cost is £35.00 for 980 litres of capacity.

Table 14: Cost of service to customer with food waste collections

Container	Usage after	Volume After	Cost per container	Cost after
	3	240	£8.00	£24.00
	1	140	£5.00	£5.00
	2	120	£3.00	£6.00
980				£35.00

In Table 15, we show the situation where the charge structure is altered and the charge for refuse is increased, with the charges for dry recyclables and food waste collections reduced. The new incentive-based charging structure is as follows:

Charge per 240l bin of refuse: £13 per pick up



Charge per 140l bin of food waste: £4 per pick up

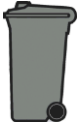




Charge per sack of recyclables:

£2.50 per 60l sack



Table 15: Cost of service to customer with food waste collection, accounting for effect of incentives

Container	Usage after	Volume After	Incentive Charge	Cost After (With Incentive Charge)	Cost After (With Cost-recovery Charge)
	1	240	£13.00	£13.00	£8.00
	2	280	£4.00	£8.00	£10.00
	4	240	£2.50	£10.00	£12.00
		760		£31.00	£30.00

Here, the mix of containers changes with an additional food waste container and two additional recycling sacks used. This change, along with the revised charging structure (which helps drive the change), enables the reduction of refuse collections from three bins per week to one per week. The charge structure (see the costs 'with incentive charge' in the penultimate column), however, still covers the cost of the service and indeed collects slightly more revenue than under the situation where each service 'pays for itself' (see the final column for how costs would be 'with cost recovery charge').

What this approach achieves is to effectively incentivise the use of the service in such a way that costs to those customers who use the service well are reduced. Here, the customer pays the same as they would have before the food waste collection was introduced, but less than would have been the case if the charge did not induce a significant change in behaviour.

All businesses are different in terms of the composition of their waste, the quantities of waste they produce, and the refuse and recycling services they already have in place. The potential for reductions in refuse collection and disposal costs by optimising their containers will therefore vary. For very small businesses that produce low quantities of refuse it is possible that there may be insufficient savings to be achieved in the refuse service to offset the cost of a new food collection. Where changes in containment are most difficult, and if refuse is collected in bins, a weight based element to refuse charging may at least offer some potential for savings to be made as the more dense food waste is moved from refuse to the separately collected stream.

However, the differential in charges for food waste and refuse should not be so great that there are incentives to place refuse in the food waste container and hence encourage contamination. Operatives should be encouraged to check the contents of the containers for the quality of material (irrespective of charges). If a business repeatedly sets out contaminated loads, this will need to be addressed with the customer directly.

13.4 Additional considerations for incentive based charging

As the amount of waste put out for disposal is directly within the control of the customer, and because it leads to proportionate changes in disposal costs, local authorities could consider a weight based element to their charging structure as well as a charge per pick up. This will require the use of on-vehicle weighing and the use of radio frequency chips for identification of individual customer containers and as such may be a more feasible for separate pass operations.

Another option which could be considered by local authorities is to recover costs by a combination of a flat-rate element and variable charges. The survey of authorities undertaken in this study revealed no authorities doing this, and it does not appear to be common practice with private contractors either. With low numbers of businesses being faced with differential charging mechanisms they may prefer to opt for the simplest charging option. However, the merits from a local authority perspective lie in the fact that the authority may have greater certainty over cost recovery where the overall costs are split between a fixed element, and an incentive-based element, than in the case where the whole of the charge is based upon variable elements.

13.5 Convergence of approaches where the authority offers refuse services

The desire to cover costs and the desire to introduce incentives for separating waste for recycling may well converge in years to come as the costs of treating / disposing of waste rise, and the cost of treating food waste (through AD in particular) fall. Hence, as landfill tax rises, local authorities may find themselves having to do little more than to run an efficient service and cover their costs in order for would-be users to take up the service.

13.6 Chapter summary

This section suggests that:

- Local authorities should look to recover all costs of the services they operate through the charges they levy on businesses;
- The same should apply to schools. Under current law authorities are not able to charge for disposal but the Government is now consulting on changes to these arrangements²⁸.
- The costs of providing a food waste collection service to business and schools are more heavily influenced by the costs of treatment than is the case for food waste services for households;
- The costs of marketing may also be significant and these need to be monitored so that full cost recovery can be achieved;
- Several options exist for configuring charges. The soundest approach is to seek to recover costs from each element of the service as though they are operating independently. This might not, however, provide much incentive for customers to alter their behaviour. Incentive-based charges could be set, with rates for refuse at levels higher than is required for cost recovery for that element of the service in order to set charges for food waste collections at below full cost recovery levels. In such cases, the intention must still be to recover all costs, but to do so across the service as a whole;
- As the landfill tax rises, these two approaches are likely to converge. In other words, as disposal costs rise, then cost recovery across each service element is likely to provide a direct incentive to change behaviour as long as food waste treatment is available at a reasonable (in line with current market) rate.
- Other options which could be considered within charging structures include:
 - Weight-based element (which might, for example, see refuse disposal charges fall as the bulk density of refuse changes with the use of food waste collections); and

²⁸ See: *A consultation on proposals to replace or amend the Controlled Waste Regulations (1992) relating to certain non-domestic properties was launched by Defra and the Welsh Assembly Government on 8 November 2010.*
<http://www2.defra.gov.uk/news/2010/11/08/waste-consultation/>

- A combination of a flat rate element to allow for recovery of the more 'fixed' elements in the cost of service provision, combined with a variable (volume or weight-based) element to capture the genuinely variable element of costs.

14.0 Summary of key issues

This document has sought to provide information and advice to local authorities (and their contractors) considering collecting food waste from schools and businesses. The key points are summarised in this section.

14.1 Looking forward

- There is expected to be an increased interest in, and demand for, food waste collections from businesses and schools.
- Both the landfill tax and the landfill allowance schemes are important incentives towards the provision of food waste collection services by local authorities.
- For businesses, a key driver is likely to be rising landfill tax (as long as the service can be provided in a way which offers savings on refuse disposal).
- For schools, there are no strong policy drivers at present, though local authorities may have their own policies which drive the uptake of such schemes.
- Evidence suggests that businesses, in particular large businesses, are willing to recycle their food waste – but there is a lack of service provision, and there may be some barriers to overcome. Similar inadequacies in service provision are apparent for schools, albeit to a slightly lesser extent.

14.2 Legislation and key responsibilities

- Collection authorities have responsibilities to both businesses and schools with regards to waste collection under the EPA1990.
- Collection authorities have a duty to arrange for the collection of waste from businesses when requested to do so and also have a duty to recover the cost of providing the service, including the costs of both collection and disposal.
- Waste from schools falls under Schedule 2 of the Controlled Waste Regulations and is considered to be household waste; as such a collection authority has a duty under the EPA 1990 to collect schools waste.
- The authorities best-placed for rolling out food waste collections to businesses and / or schools are those which:
 - currently run a household food waste collection service;
 - currently offer a trade waste service; and
 - will see a direct financial benefit from reduced expenditure on refuse treatment / disposal.
- This does not mean that authorities which do not 'tick all three boxes' should not consider rolling out food waste collections to schools / businesses.

14.3 Food waste quantities and captures

- The data regarding waste quantities, waste composition, the quantity of food waste generated, and expected capture rates associated with food waste are not of a high quality at present.
- The average figures presented for food waste arisings and captures in businesses, and for arisings in schools, are thought to be the best available, but are still subject to some variability. They should be considered as 'broadly indicative'.
- The capture rate achieved by food waste collections for businesses would appear, on the limited evidence available, to have the potential to be quite high.
- Where schools are concerned, anecdotal evidence suggests that capture rates in primary schools are likely to be higher than in secondary schools.
- Due to uncertainties associated with the averages developed, they should be used as the basis for indicative planning, and that local authorities seek to develop their own data capture protocols as far as possible so as to inform ongoing development of the service.

14.4 Containment and receptacles

- The provision of adequate and appropriate containment is crucial. A waste audit and risk assessment should be carried out on a case-by-case basis.
- Particular attention should be given to the manual handling of containers. Containers should be no more than 140l in volume with multiple containers being issued in preference to a single large container.
- Internal containers should be offered in situations where the customer has multiple food waste production points.
- Consideration should be given to the provision of liners as they are useful in maintaining a clean and hygienic service. However, if supplied free, care should be taken to ensure that they are used appropriately.
- If the local authority is providing a household food waste collection, the containers issued to householders may be appropriate as internal containers – either kitchen caddies or kerbside containers, in cases where food waste production is relatively small, such as in a classroom or office. However, in a kitchen / food production area larger containers (~35l) are likely to be more appropriate. These would also be suitable in a school canteen by the plate scraping area. A stock of suitable sized containers should be carried to enable provision to be made in a timely manner.
- Contamination has not been highlighted as a key issue other than in some cases in secondary schools. However, services should be monitored regularly to ensure that contamination does not become an issue.
- It may be necessary to remove food waste containers from some areas if the problem of contamination is persistent (and to accept the fact that lower captures of material which does not cause problems for treatment is preferable to slightly higher captures of material which gives rise to major problems at treatment facilities).
- To ensure high capture rates the collection system should be designed to be as convenient for the user as possible by ensuring that internal containers of a suitable size are provided for use at the point of food production.
- Storage of both internal and external containers can be problematic where space is constrained. A tailored solution should be developed for each business on a case-by-case basis.
- Waste officers and highways officers should liaise to ensure that no conflicts arise between departments over the placement of containers for collection.

14.5 Frequency and timing of collection

- If rolling out business / schools food waste collection on the household round, empirical evidence suggests that the frequency of collection is likely to be in-line with the household collection.
- There is no evidence to suggest that this is a problem for customers (though equally, there is no compelling evidence that it might not be).
- Provision of the service on the dedicated round is likely to provide greater versatility, but this versatility is likely to entail additional cost.
- Timing of collection must be considered when designing the round to account for issues such as peak traffic times, and reducing food waste storage time to a minimum, especially when storage is a problem (e.g. because of volume constraints).

14.6 Marketing approaches and resources

- Local authorities should be strategic and proactive when targeting businesses.
- The more strategic and the more targeted the approach, then the more appropriate it will be to deploy approaches such as face-to-face visits, the conversion rates for which may be quite high with sufficient preparation.

- Some businesses are likely to be more motivated by environmental messages than others, and they may be willing to pay more than those for whom cost is the principle issue. It may be possible to target these different businesses with different messages to encourage participation.
- Local authorities should provide appropriate communications and training sessions to minimise potential contamination.
- Local authorities should consider a concurrent roll-out with the household food waste service where household services are also being considered.
- Local authorities should give consideration to the marketing resources with a view to allowing for the recovery of these within the charges levied on users (see Section 13.0).

14.7 Issues regarding treatment of collected food

- Distance to treatment is considered to be a very important consideration when setting up the service. One of the WRAP SME food waste trials was effectively discontinued because of the long transport distances involved in taking waste to the treatment plant.
- The authority should be aware of the potential impacts of adding more food waste to the collection because of the knock-on effects for the operator of the facility. In extreme situations, the increased proportion of food waste may result in the waste material no longer reflecting agreed contract specifications, or becoming difficult for a given facility to handle.
- Authorities should not necessarily expect that charges for food waste only will be the same, at composting facilities, as those for mixed food and garden waste.

14.8 Designing a service - resourcing the service

- Estimating the potential number of customers that will take up the service and the potential yield of food waste will be important to determine the resources required and the service costs. There will be uncertainty and therefore an element of risk in producing these estimates.
- Estimating the resources required for business / schools collections when incorporated on the household pass will require accurate assessment of existing service capacity with regard to available time and payload yields.
- If considering collecting on the household round it will be important to estimate the distribution of potential customers in relation to the existing household rounds. It is possible that the distribution of businesses / schools will result in an uneven additional amount of work on existing rounds and in certain areas which may not have coverage. In these circumstances resource requirements should be considered on a round-by-round basis.
- Collecting from businesses / schools using a separate dedicated pass is, in most circumstances, likely to be more expensive but potentially easier and quicker to implement, and more flexible. Resources required to collect on this basis are, for most authorities, unlikely to be equivalent to a whole vehicle and crew per week. Therefore it is important to consider whether existing resources can be utilised (or equivalently, how any new resources could be effectively utilised when not employed on business / schools food collections).
- Collections are unlikely to remain static over time and there may be a case for commencing collections using one approach (e.g. a small number of customers on each of the household rounds) and at a later stage as new customers are recruited, or as certainty regarding scheme performance improves adopt a different approach. For a separate pass operation, the ideal situation is one where the vehicle can be (or already is) utilised in other operations.

14.9 Charging for the service

- Local authorities should look to recover all costs of the system they operate through the charges they levy on businesses.
- The same should apply to schools, but the current law prevents authorities from charging for disposal. This is problematic from the perspective of both cost recovery, and the generation of incentives for schools to adopt more sustainable waste management practices.
- There is a suggestion that, at present, some local authorities are not levying charges which would appear necessary for full cost recovery.
- The costs of the food waste service for businesses and schools are far more heavily influenced by the costs of treatment than is the case on food waste services for households.
- The costs of marketing may also be significant and these need to be monitored so that full cost recovery can be achieved.
- Several options exist for configuring charges. The safest approach is to seek to recover costs from each element of the service as though they were operating independently. This might not, however, give much incentive for customers to alter their behaviour. Incentive charges could be set, with rates for refuse collection and disposal at levels higher than is required for cost recovery from that element of the service. In such cases, the aim must still be to recover costs, but to do so across the service as a whole.
- As the landfill tax rises, these two approaches are likely to converge. In other words, as disposal costs rise, then cost recovery across each service element is likely to impart an incentive to change behaviour as long as biowaste treatment is available at a reasonable (in line with current market) rate.
- Other elements which could be considered within charging structures include:
 - Weight-based elements (which might, for example, see refuse disposal charges fall as the bulk density changes following the use of food waste collections); and
 - A combination of flat rate elements to allow for recovery of the more 'fixed' elements in the cost of service provision, combined with variable (volume and weight-based) elements to capture the genuinely variable element of costs.

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