

## Food Waste Collection Research to Inform Brighton & Hove City Councils Proposals for a Food Waste Collection Trial

### Introduction

Approximately a third of household waste is food waste and it is estimated that each household spends £520 each year on food that is wasted. The Council is investigating options to introduce a food waste collection service in Brighton and Hove. This desk based research has reviewed available information on food waste collections elsewhere in the country. The findings will be analysed further to help develop options for a food waste collection service.

Collections of food waste are now taking place across many authorities in England. According to WRAP, in 2011 136 authorities in England collected food waste, of these 71 collected food waste separately, whilst 65 collect food mixed with green waste. Three authorities have a mixture of these two collection types.

### Options for collecting food waste

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

### WRAP Trials

Between 2007 and 2009 WRAP provided funding to 21 local authorities in England and Northern Ireland to carry out food waste collections. In all these trials food waste was collected:

- By small dedicated collection vehicles
- On a weekly basis
- In separate containers to both residual and garden waste
- With the provision of kerbside containers and kitchen caddies to residents
- With the provision of liners for either kitchen caddies or kerbside containers (excluding one small area in Surrey)

A summary of their main findings is below.

Housing Type	Residual Collections	Yields (kg/hh/wk)	Participation Rates (%)	Other comments
Low and Medium Density	Mix of weekly & fortnightly	1.5 – 2.17	58 - 74	Higher home composting due to larger gardens
High Density	Weekly except for in one area which had fortnightly.	1.07 – 1.68	44 - 73	A variety of systems were developed by local authorities to enable efficient loading in high-density housing areas often with double parked cars.
Multi-Occupancy	Weekly	0.46 – 0.53	25 - 30	Although door to door services produced

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		(doorstep collection or a communal collection point) 0.29 (bring scheme with containers serving a high number of households)		higher yields they were time consuming and access proved difficult.  The best solution to achieve reasonable yields whilst not being too time consuming was for communal bins to be located with the communal residual bins.
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### Scottish Food Waste Trials (WRAP and Zero Waste Scotland)

Funding was made available by the Scottish Government in 2007 for local authorities to trial food waste collections from households. Six food waste collection trials were conducted in Scotland between 2008 and 2009. Trials took place in Aberdeenshire, East Renfrewshire, Glasgow City, Inverclyde Council and Perth & Kinross.

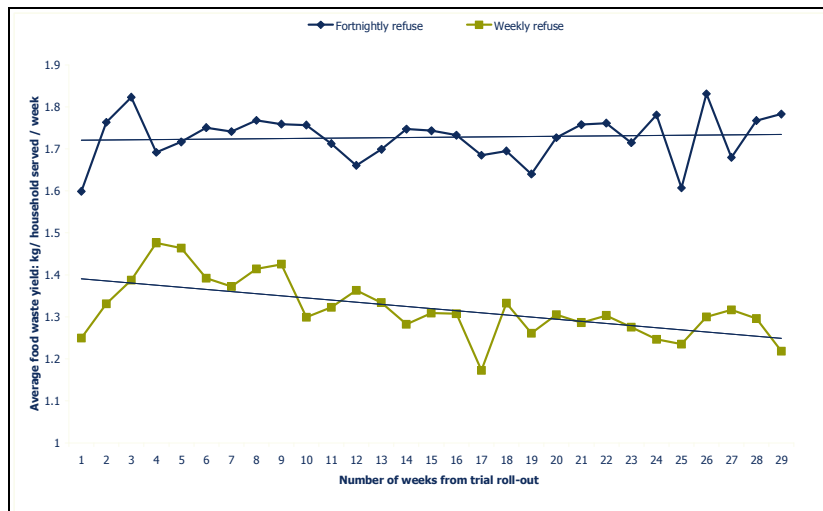
Two of the trials provided a combined food and garden waste collection to main door properties. A summary of the results of the Scottish trials for non-flats is shown in the table below:

Collection method	Average set out rate	Average yield (kg/hh/wk)
Food waste only	45%	1.5
Co-mingled food and garden waste	34%	4.3 (0.8 food)

Unfortunately the capture rate associated with the Scottish food waste trials is not presented in the report, nor is the impact that the collection of food waste had on residual waste arisings.

### Key factors affecting yield of food waste collected

- **Residual waste collection frequency** - With weekly residual waste collections a decrease in participation and yields of food waste were experienced over time in the WRAP trials. With fortnightly residual waste collection, yields and participation rates were generally maintained. This is shown in Figure 1.



**Figure 1: Effect of residual waste collection frequency on food waste collections (source: WRAP)**

- **Yield of food waste per household served** – Yields were shown by the WRAP trials to be generally 20% higher with a fortnightly residual waste collection (although socio-economic factors and service communications must also be taken into account).
- **Residual waste container** - With weekly residual collections yields of separately collected food waste were higher when residual waste was collected in black bags compared with when it was collected in wheeled bins.
- **The size of wheeled bins provided for residual waste** - It is likely that the more limited the capacity of the residual bin, the more likely it is that householders will use their separate container for the collection of food waste. However, this was not studied as part of the WRAP trials.
- **Levels of deprivation** - Trials in more affluent areas tend to achieve higher yields of food waste than less affluent areas.
- **Household size** – The greater the average number of people per household the higher the yield of food waste collected.
- **Lifestyle and cultural factors** – This may affect food purchasing, preparation and consumption habits. However, this was not studied as part of the WRAP trials.
- **Amount and quality of communications** - Authorities carrying out good/frequent communications can expect to achieve higher yields of food waste.
- **Perceived concerns relating to hygiene/vermin/odour** – These may result in residents being less likely to separate their food waste from the residual waste for collection.

### **Collection of food waste with garden waste**

A report was commissioned by WRAP in 2008 to look at the effectiveness of recycling food waste via mixed food and garden waste collections. Six authorities with established organic waste collection services were selected

for monitoring. The impact that the frequency of the food and garden waste collection was as follows:

- For food and garden waste collected weekly an average of 3.86 kg/hh/wk was collected. Where food and garden waste was collected fortnightly an average of 5.86 kg/hh/wk of waste was presented.
- The amount of food in the organic waste bin was much lower where bins were collected fortnightly (0.55 kg/hh/wk) as opposed to weekly (1.00 kg/hh/wk).
- Food waste made up around 25% (by weight) of the waste in the organic waste bin where collections of mixed food and garden waste were weekly. Where collections were fortnightly food waste was on average 9.3%.
- Weekly collections of food and garden waste captured more food waste (31.5%) than fortnightly collections (21.8%).
- For weekly collections the average set out rate was 51%. Where food and garden waste was collected fortnightly the average set out rate was higher at 58%.
- Overall, fortnightly collections of food and garden waste achieved higher participation rates when compared with weekly collections. Weekly collections showed average participation rates around 58% whereas the average participation rate for fortnightly collections was 62%. This could be because people do not have sufficient garden and food waste to justify putting their bin out every week and therefore they may put it out for collection less than weekly.

The impact of the frequency of residual waste collections was shown to be as follows:

- The amount of food remaining in the residual waste was lower where residual waste was collected fortnightly (1.57kg/hh/wk) as opposed to weekly (2.99kg/hh/wk).
- Households with fortnightly residual waste collections produced significantly less residual waste.
- Households with weekly residual waste collection captured less food waste for recycling (14.7%) than those on a fortnightly service (33.7%).

In comparison with food waste only collections the WRAP report found that on average 0.79 kg/hh/wk of food waste is diverted with a co-mingled food and garden waste collection, in comparison with 1.8 kg/hh/wk food waste in a food waste only collection. However, it is not clear whether these results are comparable (i.e. from areas with similar socio-demographic profiles and with similar indices of deprivation).

Waste auditing by ORA on behalf of another waste collection authority found that an average of 9.5 kg/hh/wk of co-mingled food and garden waste was collected (based on 5 areas audited in July/August) This is considerably higher than the figures quoted above but this may be due to a number of factors including the seasonality of garden waste arisings.

Combined collections of food and garden waste typically deliver high proportions of garden waste and may attract additional 'luxury' garden waste from householders if measures are not taken to cap total waste arisings such as introducing fortnightly residual waste collections. Although the collection of garden waste increases the recycling rate it may increase overall costs if total waste arisings are higher.

It is acceptable to charge for garden waste collections but this is not possible if garden waste is combined with food waste.

A co-mingled garden and food waste collection service can be a more expensive option than collecting food on its own in terms of treatment costs per tonne. This is because food waste needs to be processed through treatment facilities that are compliant with the Animal by-Product Regulations such as in-vessel composting (IVC) or anaerobic digestion (AD) which are more complex and expensive treatment systems than open windrow composting which can be used to treat garden waste only. If food waste is mixed with garden waste (which tends to make up the biggest proportion in these collections), the garden waste all needs to be processed at the higher cost. In addition combined schemes may fail to capture as much food as separate food waste collections.

However, if garden waste is not separately collected and is contained within the residual bin, then the local authority will have to pay for its disposal via landfill or incineration at a gate fee per tonne of £73 (post 2000 EfW) to £76 (landfill plus Landfill Tax) in comparison to £43 for IVC or AD according to the WRAP Gate Fees Report 2011.

### **Collection Vehicles**

The choice of vehicle will depend on the anticipated tonnage of food waste to be collected, any additional materials that may be collected with the food waste (e.g. co-mingled with garden waste or cardboard), any additional materials that may be collected on the same vehicle as food waste but in a different compartment (e.g. dry recyclables), geography of the local area, property types, health and safety, existing fleet and collection rounds and the budget available. It is important to design efficient and appropriate rounds. Most food waste collection services tend to be driver plus one operator. This seems efficient in built up areas. There are also other factors to consider when collecting food waste including:

- The collection and unloading of food waste must be compliant with the requirements of the Animal by-Products Regulations
- Food waste can be collected in separate bespoke vehicles or on split back or kerbside loaded vehicles along with dry recycling or residual waste.
- Food waste has a high water content and might not easily be ejected from collection vehicles without high degrees of lift.
- Unloading directly from small vehicles into larger trucks or shipment containers will save time if the transfer stations are nearby and are well managed.

- Food waste has a high bulk density and does not compact well. Also, compacting may lead to the risk of leachate being produced. Standard refuse collection vehicles (RCV's) are not suitable for food waste only collections. Therefore there is a need to invest in specialist vehicles rather than using the existing RCV's.
- Combined food and garden waste can be collected in slightly modified RCVs (e.g. with drip trays) thus avoiding the need for additional specialist vehicles and associated back up vehicles.

### **Containers and Liners**

The majority of the WRAP trials provided residents with kerbside containers (20-25l) and kitchen caddies (5-7l) with all but two areas supplying corn or potato starch liners.

Surveys carried out showed a high level of satisfaction with the containers and yields were higher in areas where liners were provided.

There are several supply methods that can be used by local authorities in the provision of liners:

- Residents accessing free supply of liners delivered by the local authority
  - Blanket distribution
  - Targeted distribution responding to resident requests
- Residents accessing liners through a local supply network
  - Free
  - Charged
- Residents purchasing liners from supermarkets or other retail outlets

It is more convenient for residents in flats in particular to have liners as they can then empty their food waste on the way out without having to return a caddy. However, if this method of disposal is used then liners must be carefully selected to ensure that there is limited risk of the liners splitting on transfer from the household to the disposal point.

The cost to the council of supplying free liners needs to be considered as residents used an average of 2-3 liners per household per week. The most efficient way to replace liners is for crews to do this where they can (it is not practicable in blocks of flats) or for liners to be made available at council buildings, shops etc.

If liners are not used there is a risk that participation rates will be lower, though this will vary from area to area depending on resident's willingness to pay and recycle.

Some local authorities encourage the use of newspapers to wrap food waste within the kitchen caddy. This achieves the same objectives as liners in terms of keeping the caddy clean and minimising the amount of food waste that sticks to the side of the caddy, but is achieved at no cost to the Council.

If liners are provided for residents to use with their kitchen caddy, it is important to consider any impact that they may have on the treatment facility that will manage the food waste. For example, ORA are aware that there have been some concerns arising from the use of starch liners in wet AD systems where they have the potential to cause problems in the pre-treatment process prior to entering the digester tanks, and in the digester tanks themselves where they can cause floating layers which reduce the efficiency of the digestion process and the collection of biogas.

It is also important to consider the quality of the output material from the treatment process. For example, if composters certified under the PAS100 certification scheme allowed compostable bags that are not certified to an appropriate standard to enter their process, then their PAS100 certification could be challenged. This may be a potential issue because local authorities could be keen to use suppliers of non-certified bags for lining kitchen caddies and food bins as their prices are comparatively low.

WRAP are currently carrying out a review of liners and the cost-benefit of using them in relation to the collection of food waste. The results of the study are to be published before the end of the year and would be useful in determining whether the provision of liners is appropriate for the collection of food waste in Brighton and Hove.

### **Communications**

Good communication with residents is essential when considering a food waste collection service. The WRAP trials used a variety of communications including door-to-door canvassing, leaflets (introducing the service, instructions, follow-up), stickers on caddies, posters (in communal blocks), meetings with tenants associations, local events, press releases and website promotion.

It is considered best practice that engagement with residents is carried out early in the process to ensure understanding and gain support. Communication material should be available to all sectors of the community and in different formats on request. Adequate resources within the Council should be made available to communicate effectively with residents, especially at the implementation stage of any new service. It is recommended that a dedicated helpline or call centre be provided to residents affected by changes to their waste collection. Different methods of communication include door-stepping or road shows, promotion of the service to school children via visits to waste management sites and the provision of information on an up-to-date website.

New collection services should be branded in an appropriate manner. The logo can then be used on all communication material associated with the service allowing instant recognition by the public and continuity throughout the service.

It is considered best practice to continue providing feedback to residents throughout the duration of the service in order to provide motivational and operational information.

Surveys showed that less food waste was home composted once food waste collections were introduced. As home composting is the preferred environmental option for dealing with food waste according to the waste hierarchy, and to ensure that waste arisings do not increase, it is essential to communicate with residents about this and to heavily promote home composting when introducing a food collection service. This is especially important in Brighton and Hove given that residents are allowed to dispose of one sack of garden waste as part of their residual waste collection and that their residual waste collection frequency is likely to be reduced to alternate weekly. Encouragement of home composting could result in a decrease in the proportion of garden waste disposed of in the residual waste bin.

**Frequency of Collection, Participation Rates and Set-Out Rates**

The graph below from the WRAP Trials 2008 report shows the relationship between weekly and fortnightly residual waste collections and food waste yield per household served. It shows that areas with fortnightly residual waste collections have higher participation rates and yields for food waste.

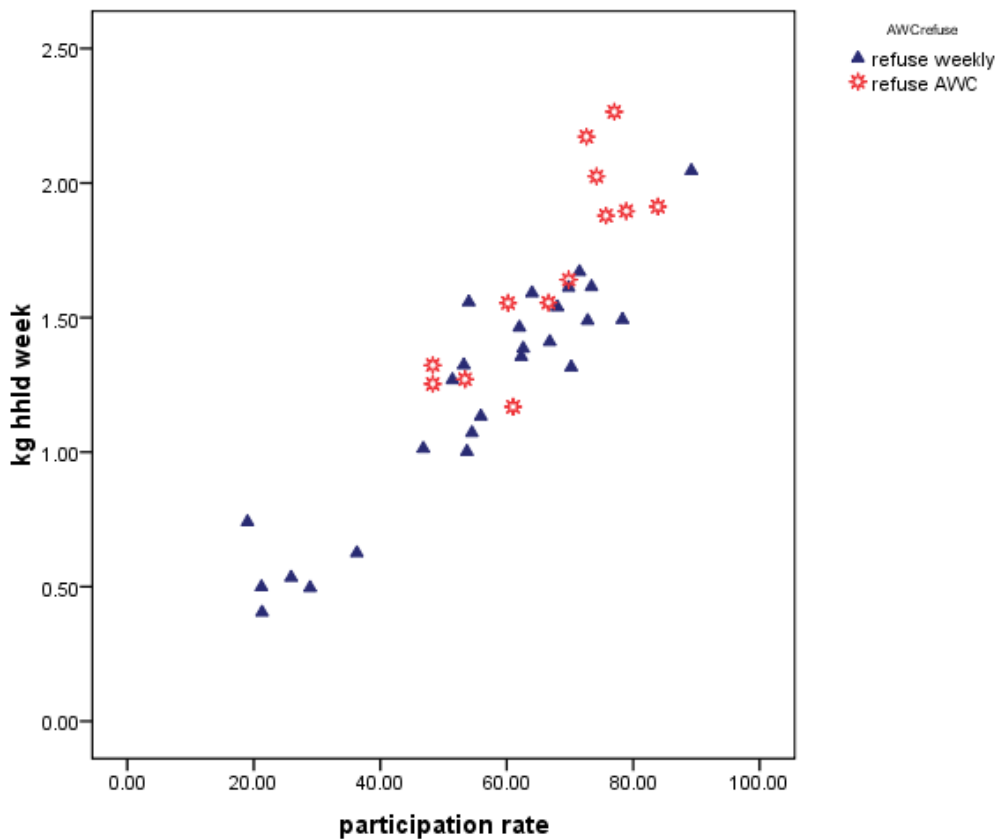


Figure 2: Participation rate and yield (per household served)



Yields of food waste are higher when residual waste is collected fortnightly and food waste is collected weekly as this acts as an incentive for households to use the weekly service.

Participation rates (the percentage of households setting out food waste at least once during a defined monitoring period)) for food waste collections are higher when there are fortnightly refuse collections. There is generally a decrease in participation from when the service is first rolled out and lower participation in multi-occupancy properties.

The set out rate (the percentage of households setting out food waste on a particular week) is found on average to be 15% lower than the participation rate.

In Brighton and Hove fortnightly residual waste collections would only really be possible in wheeled bin areas. Using the WRAP Ready Reckoner participation rates for Brighton and Hove are calculated to be 55%, with set out being 40%.

**Brighton and Hove Expected Yields**

There are two different methods for analysing likely food waste yields in Brighton and Hove.

**1. Network Recycling Waste Audit**

In 2007 Network Recycling carried out a waste compositional analysis on Brighton and Hove residual waste. It found that on average across the whole region 35% of residual waste was made up of food waste (with a further 10% being garden organics).

In 2009/10, 63,795 tonnes of kerbside residual waste was collected. Using the above analysis figures this would mean 22,328 would have been food waste. This equates to approximately 3.43 kg/hh/week of food waste that is available from the residual waste, but this assumes 100% participation and 100% capture. On the same basis the amount of garden waste being disposed of to landfill would be 6,380 tonnes per year. However it should be noted that because of the mixed nature of the housing and gardens in Brighton and Hove the total quantities and proportions of food and garden waste are likely to be highly variable dependent upon the area. It is therefore very important to take account of the specific circumstances and waste composition of the area where the trial will be undertaken.

**2. WRAP ‘Ready Reckoner’**

Using the WRAP ‘Ready Reckoner’ to calculate food yields for Brighton and Hove the results are as follows:

Weekly Food Collection with:	From (kg/hh/wk):	To (kg/hh/wk):
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Fortnightly Refuse	1.14	1.74
Weekly Refuse in Sacks	1.12	1.62
Weekly Refuse in Bins	0.97	1.47
Multi-occupancy	0.4	0.6

Weekly Food Collection with:	Expected Annual Yields in Brighton & Hove (tonnes per annum)		% increase in recycling (NI 192)	
	From:	To:	From:	To:
Fortnightly Refuse + Multi-occupancy	5,129	7,796	4.7%	7.2%
Weekly Refuse in Sacks + Multi-occupancy	5,060	7,386	4.7%	6.8%
Weekly Refuse in Bins + Multi-occupancy	4,548	6,873	4.2%	6.3%

Using the WRAP Ready Reckoner it is estimated that the Council could collect between 4,548 tonnes (assuming the lowest yields and weekly refuse collection in bins) and 7,796 tonnes (assuming the highest yields and fortnightly refuse collections) of food waste per annum.

These calculations suggest that had food waste collections been available for all households to use during 2009/10 the recycling rate in Brighton and Hove would have increased from 27.5% to between 31.6% and 34.6%. These figures do not take in to account increases in dry recycling as a result of moving to alternate weekly residual waste collection.

Separate modelling, specific to Brighton and Hove, has been carried out by the Organic Resource Agency and compared to modelling carried out by Council officers looking specifically at collections from suburban wheeled bin areas. These exercises indicate that the following performance can be expected in the trial area should food waste collection be introduced as part of alternate weekly residual waste collection:

Waste stream	Current Scenario	New collections including food waste and alternate weekly residual waste collection
Food	0%	10.5 - 12.4%
Recycling	31.3%	31.4 - 37.5%
Residual	68.7%	50.1 – 58.1%

### **Bulking up and Treatment**

The most widespread treatment method for food waste is currently in-vessel composting (IVC) systems with anaerobic digestion (AD) generally recognised as being the most environmentally sustainable option.

By collecting food waste separately and then using garden waste from HWRSs it is possible to control the mix of material going into the facility which allows greater control over the composting process and the end product.

Before introducing a food waste collection scheme it is essential that the Council ensure there is somewhere for the waste to be bulked up and processed, and to have sorted logistics of vehicles delivering to the bulking up area. Also, it is important to have some idea of the expected yields, the effect this will have on residual waste collected, and the method for dealing with contamination.

Bulking up would have to take place at a Waste Transfer Station and would need to be in a closed container to address odour issues and compliance with the Animal by-Products Regulations. From here food waste could potentially be transferred to Woodlands which is an IVC facility operated by Veolia. Currently it is licensed to take 1,000 tonnes of food waste per annum so this capacity would need to be increased to manage any food waste collected. It will be especially important for the IVC to have an appropriate reception area, as well as air handling and biofilter/exhaust air treatment systems if treating food wastes. It is also important to ensure that the composting process is capable of handling this high bulk density waste and the associated leachate. Discussions need to be had with Veolia on this option.

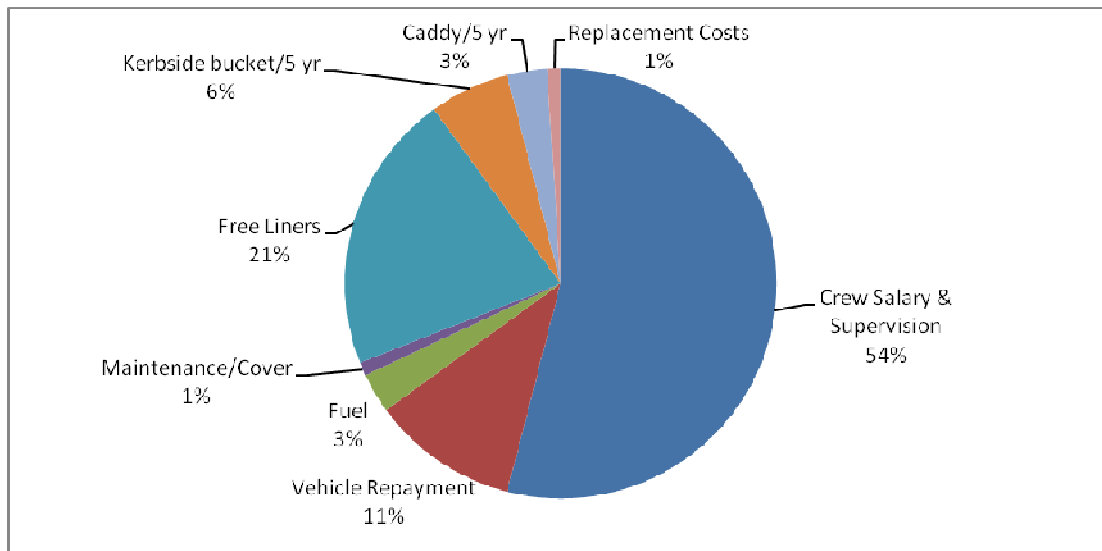
### **Costs**

Costs of offering a food waste collection service will depend on:

- Method of collection (with other materials or separately)
- Productivity levels
- Type of fleet and operative costs
- Containers/liners for residents
- Participation/set out levels
- Communications used

They will vary significantly depending on local circumstances, and therefore a detailed cost analysis needs to be carried out specifically for Brighton and Hove. This work is being done with support from WRAP using their Kerbside Analysis Tool (KAT).

WRAP analysis of other food waste only collections showed that costs of collections are split as per the pie chart in Figure 3.. Although this will vary between authorities it does give an indication of the areas where the main spending occurs.



**Figure 3: Collection cost breakdown**

Liners costs on average £3.50 per participating household per year (or £2.00 per household across the local authority area). Given agricultural commodity and production costs it is likely that the price of liners will increase considerably over the coming years. Currently for Brighton and Hove the cost of providing liners to all households would amount to annual costs in the region of £250,000 p.a. However, this is really the only truly avoidable cost associated with the collection of food waste. Liners could just be provided to blocks of flats, which would bring costs down to approximately £70,000 per annum.

### **Environmental Impact**

WRAP looked at the end-of-life options (but not full Life Cycle Analysis options) for:

- Various types of composting
- Incineration with energy recovery
- Landfill
- Anaerobic digestion

Anaerobic digestion was identified as the preferred option. The results of independent modelling show that environmental benefits are more significant when food is sent to AD rather than IVC.

Following AD; composting and energy recovery are generally comparable in their contribution to climate change potential.

Composting brings benefits as the compost produced can be used as a substitute for products such as peat or fertilisers. However, as composting does not recover energy, it generally does not perform well compared to the other food waste treatment options for depletion of natural resources and energy demand.

WRAP found incineration with energy recovery presents good environmental performance, despite the relatively low heating value. The benefits of incineration are greater if the energy produced substitute's fossil fuel.

The Organic Resource Agency are carrying out a full life cycle analysis of the options for food waste treatment using the Waste and Resources Assessment Tool for the Environment (WRATE) and the results of this modelling will be taken into account when designing the food waste collection and treatment service for Brighton and Hove.

### **Food waste from schools**

A WRAP report estimates that food waste makes up by weight half of all primary school waste and one third of secondary school waste. Although further work would be needed, with such significant quantities from single collections the Council may wish to consider school food waste collections as part of any food collection service that is introduced. For example, primary schools were found to produce 72 grams per pupil per day. Assuming a school of 100 pupils this would mean 36kg per week.

### **Commercial food waste**

The Council could consider integrating the collection of food waste from commercial properties alongside the collection of household food waste in order to optimise the efficiency of collection rounds.

The collection of food waste from small and medium sized enterprises (SME's) by local authorities is becoming more attractive as a result of the change in the definition of 'municipal waste' for the purposes of reporting under the EU Landfill Directive. It is no longer defined as 'the waste collected by, or on behalf of, local authorities'. Instead, the revised definition covers household and other 'similar' wastes produced by businesses. In addition, the Landfill Allowance Trading Scheme (LATS) is now likely to end in 2012/2013.

If the Council were to consider including commercial food waste with their household food waste collections careful consideration would need to be given to the charging mechanism to be applied in order to ensure that fair payment was received for such services.

ORA are aware that WRAP may be providing funding for local authorities wishing to collect food waste from SME's towards the end of 2011 and this may be a means of developing this service if appropriate.

### **Initial conclusions and recommendations for Brighton and Hove**

If the Council were to go ahead with food waste collections it would be recommended to introduce fortnightly residual waste collections in wheeled bin areas. In the communal bin areas collection would be more difficult and may result in lower yields of food waste collected.

As there is currently no local AD facility, separately collected organic waste is likely to be transferred to Woodlands which has an IVC facility.

The current residual and recycling waste services provided in Brighton and Hove are shown in the following table.

Waste stream	Collection frequency	Container	Collection vehicle
Residual	Weekly	140l wheeled bin	Compaction vehicle
Recycling	Fortnightly	Black boxes	Kerbside vehicle
Food	None	None	None

Giving consideration to the current waste and recycling services as shown above a number of options have been considered for the collection of food waste and modification of other services in order to optimise recycling rates, maximise diversion from landfill or incineration, and minimise total waste arisings.

The options include:

**Option 1**

Waste stream	Collection frequency
Residual	Fortnightly
Recycling	Weekly
Food	Weekly

This option may result in an increase in dry recycling rates as collection frequency moves from fortnightly to weekly. Dry recycling, food and residual waste are all collected in separate vehicles. This option was modelled as part of the development of the strategy in 2009 and the increase in recycling did not off set the extra costs associated with weekly collection frequency. Brighton and Hove already has a high dry recycling rate and fortnightly residual waste collection would increase that further without the need to change recycling collections to weekly.

**Option 2**

Waste stream	Collection frequency
Residual	Fortnightly
Recycling/ Food	Weekly

This option is similar to Option 1, however food waste and recycling are collected on the same vehicle on a weekly basis. These vehicles would need three compartments; one for food, one for paper, card, cans and plastic bottles, and one for food waste. Research by WRAP has shown that this is often not the most efficient collection method as one compartment is likely to fill up before the two others requiring emptying and therefore losing collection time.

**Option 3**

Waste stream	Collection frequency
Residual	Fortnightly
Recycling	Fortnightly
Food	Weekly

This is the preferred option based on much of the research carried out. In this option

- Food waste is collected weekly on a separate bespoke vehicle
- Residual waste is collected fortnightly as all the evidence shows that this significantly improves the tonnage of food and dry recycling collected
- The reduction in residual waste collection frequency and the increase in recycling and composting contribute to the funding of the new food waste collection service

The total number of collections per household increases from 1.5 per week (weekly refuse/ fortnightly recycling) to 2 collections per week (weekly food/ fortnightly refuse/ fortnightly recycling).

### Next Steps

The next stage of work is to develop detailed proposals for a food waste collection trial based on the preferred Option 3.

### Further Reading

1. WRAP – Food Waste Collection Guidance – July 2009
2. WRAP – Evaluation of the WRAP Separate Food Waste Collection Trials – June 2009
3. WRAP – Food Waste Collection Trials – weekly collections of food waste operating alongside alternate weekly collections of refuse
4. WRAP – Food Waste Collection Trials – weekly collections of food waste in low and medium density housing areas
5. WRAP – Food Waste Collection Trials – collections of weekly food waste in high density housing areas
6. WRAP Food Waste Collection Trials – food waste collections from multi-occupancy dwellings
7. WRAP – Food Waste Collection Trials – Communications
8. WRAP – Food Waste Collection Trials – use of liners for kerbside containers and kitchen caddies
9. WRAP – Performance analysis of mixed food and garden waste collection schemes
10. WRAP – Environmental benefits of recycling – 2010 update
11. WRAP - Household Food and Drink Waste in the UK
12. WRAP – Food Waste in Schools
13. Beyond Waste – Revised LCA Results
14. Eunomia Research and Consulting – Food Waste Collection: Update to WRAP Biowaste Cost Benefit Study
15. LGA media release – 9<sup>th</sup> April 2011
16. Network Recycling - Household Waste Compositional Analysis Project – Comparative Report – July 2007
17. Defra – Introductory Guide to Options for the Diversion of Biodegradable Municipal Waste from Landfill
18. Enhancing Participation in Kitchen Waste Collections – Defra Waste & Resources Evidence Programme (WR0209)

19. Zero Waste Scotland – ‘ Scottish Food Waste Collection Trial – Performance and Evaluation’
20. Welsh Local Government Association and MEL – ‘Evaluation of Food Waste Collections - Final Report’, April 2011
21. ORA Ltd – ‘Implementation of best practice for the kerbside collection of biodegradable municipal waste - Tonbridge and Malling Borough Council: A Case Study in Best Practice’, December 2005
22. ORA Ltd – ‘Pilot food waste collection trials in Milton Keynes 2005-2006’, January 2007
23. Eunomia – ‘Anaerobic Digestion Market Outlook – Overcoming Constraints to Deliver New Infrastructure’, July 2011