Pilot food waste collection trials in Milton Keynes 2005 - 2006

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Executive summary

The Organic Resource Agency Ltd (ORA) were commissioned by Milton Keynes Council (MKC) to provide project management for a pilot trial of kerbside collections of food waste from domestic properties within the borough of Milton Keynes. The pilot trial ran for 13 months from the end of September 2005 until the end of October 2006. It involved monitoring waste arisings from approximately 1,500 households split into three areas:

- **Trial Area 1 in Newport Pagnell** received separate weekly collections of food waste in 25 litre, lidded bins and residents were provided with a smaller caddy for use in the kitchen. These were completely separate from the fortnightly, chargeable, opt-in collections of garden waste in 240 or 140 litre wheeled bins already available to residents who chose to subscribe to the scheme. Residual waste was collected weekly in black sacks and dry recyclables were collected weekly in blue boxes (for glass) and pink sacks (for paper, cardboard, cans, plastic bottles and aluminium foil).
- **Trial Area 2 in Bradwell Common** received weekly collections of food *and* garden waste, co-mingled in a 140 litre lidded, wheeled bin and residents were provided with a smaller caddy for use in the kitchen. Within the trial area this collection replaced the fortnightly. opt-in, chargeable collections of garden waste already available to residents, and was free of charge. Residual waste was collected weekly in black sacks and dry recyclables were collected weekly in blue boxes and pink sacks.
- **Trial Area 3 in Furzton** was used as a 'control' area for comparison. No changes to the standard weekly refuse and recycling collection, nor to the chargeable, fortnightly, opt-in garden waste collections were made and no communication materials were sent out except those that went out to the whole of Milton Keynes which were not related specifically to the food waste trials. Residual waste was collected weekly in black sacks and dry recyclables were collected weekly in blue boxes and pink sacks.

The trial monitored waste compositional analysis data, tonnage data on all the different waste and recyclable streams collected, set out monitoring (from which participation rate could be calculated) and feedback from stakeholders.
Modelling was also carried out to evaluate potential collection and treatment costs and performance in terms of recycling rates and LATS obligations.

Key findings

Tonnage of food and garden waste collected

According to the tonnage data collected throughout the trials, both trial areas where food waste was collected resulted in a greater tonnage of organic waste being collected in comparison to the control area of Furzton. However, there was relatively little difference in the amount of organic waste collected per household where food and garden waste were collected separately in Trial Area 1 (Newport Pagnell) compared against where they were collected co-mingled in the same container in Trial Area 2 (Bradwell Common). This is surprising given that residents in Bradwell Common were provided with a free weekly collection of food *and* garden waste to replace the chargeable fortnightly collection of garden waste. In this situation some might expect this to yield a greater tonnage than where the garden waste scheme remains both fortnightly and chargeable (as in Trial Area 1). The reasons for this are unclear but it is possible that the socio-economic characteristics of Bradwell Common (including a possibly smaller garden size in general) may have an impact on the amount of garden waste collected.

Tonnage of residual and total waste collected

The average arisings of residual waste put out per household per week in Newport Pagnell have decreased slightly since the collection of food waste was implemented whereas there has been a small increase in Bradwell Common. In the control area of Furzton residual waste arisings per household per week have also decreased.

The average arisings of total waste set out per household per week appear to have increased in both of the trial areas provided with food waste collections from an average of 17.0 to 17.7 kg/hh/wk in Newport Pagnell and from 13.9 to 16.8 kg/hh/wk in Bradwell Common. Total waste arisings have decreased in the control area of

Furzton from 18.3 to 14.7 kg/hh/wk. The increase in total waste arisings is perhaps to be expected in Bradwell Common where residents have been provided with a free, weekly collection of garden waste when previously they would have paid for a fortnightly collection of garden waste. However, an increase in total waste arisings per household per week is also seen in Newport Pagnell where food waste is collected separately and the chargeable fortnightly garden waste collection remained unchanged. These results differ from those from the waste audits carried out which indicate that in Furzton and in Bradwell Common total waste arisings have decreased. However, in Newport Pagnell total waste arisings have increased.

Set out and participation rate

- The participation rate in the separate collection of food waste in Newport Pagnell and co-mingled collection of food and garden waste in Bradwell Common was similar in the early stages of the trial. However, since April 2006 and through the summer months the participation rate was shown to be slightly higher in Bradwell Common than in Newport Pagnell.
- The average monthly participation rate over the duration of the trial was 54% in Newport Pagnell and 60% in Bradwell Common.
- Participation in the garden waste scheme started at a higher rate in Newport Pagnell than in Furzton in the early stages of the trial, but since April 2006 participation has been higher in Furzton (except in June 2006).
- There is little difference between the participation rates for dry recyclable collections in each trial area although the participation rate for blue boxes in Bradwell Common does appear to be lower than in the other trial areas.
- In Newport Pagnell, for the majority of the trial period, most of the residents participating in the trial set out their food waste container less frequently than every two weeks. This would suggest that residents are either: storing their food waste between collections; using the residual waste bin to dispose of food waste on the alternate weeks; or home composting a proportion of their food waste. Residents may use the residual bin for the disposal of food waste where it is the easiest option. For instance they may dispose of a jar and its contents of food in the residual bin, rather than making the effort to separate the packaging and food

waste. Alternatively the residents may not generate sufficient food waste to justify the weekly set out of the food waste bin.

- In Bradwell Common for the majority of the trial most participants set out the food and garden waste bin only once in the month.
- In both areas a decline in the number of households setting out weekly is seen and in Bradwell Common this decline is slightly greater than in Newport Pagnell.

Waste compositional analysis

Two waste audits were carried out, one before the trials in July 2005 and one during the trials in July 2006. When considering the waste audit findings it is important to bear in mind that the data and conclusions are drawn from two 'snapshot' monitoring dates. The use of the waste analysis data as a predictor of waste composition at other times of year and between years should therefore be done with caution.

- Based on the two summer audits done, the proportion of food waste in the residual waste has decreased. It has decreased by 30% in Newport Pagnell and 50% in Bradwell Common. This may be influenced by the higher average overall participation rate observed in Bradwell Common. In the control area of Furzton it decreased by 8%.
- Based on the audit data there has been an increase in the amount of organic waste collected in Newport Pagnell and Bradwell Common since the implementation of the trial food waste collections. An increase is also observed in the control area of Furzton which would suggest that more residents are participating in the garden waste collections in Milton Keynes as a whole, or that the capture rate has improved. This could be as a result of communication regarding the service.
- In Furzton the proportion of garden waste in the residual waste decreased from 8.1% in 2005 to 1.7% in 2006. In Newport Pagnell the decrease is smaller from 6.5% in 2005 to 5.6% in 2006. This might be expected given that there has been no change to the garden waste collections. However, in Bradwell Common the proportion of garden waste in the residual waste has increased from 1.1% to 5.4%. This is perhaps the most surprising result given that the residents have gone from a chargeable fortnightly garden waste collection service to a free weekly collection of garden waste in wheeled bins from all households.

- The majority of the food waste being source segregated and collected in the trial areas would originally have been disposed of in the residual waste. This is not the case for garden waste as the decrease of garden waste in the residual bin is not sufficient to account for the amount of garden waste being source segregated for collection. The garden waste being put out for source segregated collection may previously have been disposed of to community recycling centres (CRCs), to home composting, or may be additional waste that was not previously in the waste stream and has been drawn into the collections.
- The collection rate for dry recyclables in 2006 is higher in each of the trial areas than in 2005. The % increase is much greater in the two areas provided with food waste collection than in the control area. The increase in the collection rate for dry recyclables is likely to be related to some degree to greater promotion of the service by MKC in 2006.
- The results demonstrate that in Furzton and in Bradwell Common total waste arisings have decreased by 2.8% and 6.6% respectively. However, in Newport Pagnell where food waste is collected separately, total waste arisings have increased by 16.3%. It should be noted that total waste arisings in Newport Pagnell are still significantly lower than in the other areas despite this increase. There results differ from those shown by the tonnage monitoring carried our throughout the duration of the trial where total waste arisings per household appear to have increased in both of the trial areas provided with food waste collections but decreased in the control area of Furzton.

Cost Modelling

The costs to roll-out the collection of food waste using both methods (separate or co-mingled with garden waste) are calculated as an overall total and as a reduced total taking account of savings in costs for processing residual waste, and costs and revenue associated with the current chargeable garden waste collection. Costs are calculated for 2006-2007. The impact of savings in the purchase of LATS allowances or revenue generated from the sale of allowances is not included here.

- The collection of food waste in either scenario would give higher overall annual costs than the current collection systems for garden waste.

- Implementation of Scenario 1 (separate food waste collections as trialled in Newport Pagnell) gives the greatest increase in annual costs to between £2.6 (waste treated in Milton Keynes) and £3.0 million per year (waste treated outside Milton Keynes). The cost per household for organic waste collection would increase from £13 (current garden waste collection) to between £28 over the year (if waste was treated in Milton Keynes) and £32 over the year (if waste was treated outside Milton Keynes). The cost per tonne of organic waste collected is also increased from the current rate of £156 to between £176 (if waste was treated in Milton Keynes) and £201 (if waste was treated outside Milton Keynes).
- Implementation of Scenario 2 (co-mingled collections of food waste as trialled in Bradwell Common) would result in an increase in annual costs to between £1.9 (waste treated in Milton Keynes) and £2.0 million per year (waste treated outside Milton Keynes). The cost per household for organic waste collection would increase from £13 (current garden waste collection) to between £23 over the year (if waste was treated in Milton Keynes) and £25 over the year (if waste was treated outside Milton Keynes). The cost per tonne of organic waste collected would decrease from the current rate of £156 to £152 (if waste was treated in Milton Keynes) but would increase to £163 if waste was treated outside Milton Keynes.

BVPI Performance

- The greatest increase in BVPI recycling and composting performance will be achieved through the implementation of Scenario 1. This will give an increase of around 10 percentage points to 43.9%.
- Implementation of Scenario 2 will also give rise to an increase in performance of just over 6 percentage points to 40.3%.

LATS Obligations

The price at which allowances are traded is fixed at £50 per allowance or per tonne in all years except target years when they are £100 per allowance[1]. Modelling of the impact that the collection of food waste can have on LATS obligations was carried out for the next ten year period up until 2016-2017 inclusive.

[1] As suggested by and agreed with MKC.

- Implementation of food waste collection using either collection method will result in greater savings on the purchase of LATS allowances and generation of revenue from the sale of allowances in comparison to the do-nothing scenario.
- Separate food waste collection gives rise to the greatest savings in purchase of LATS allowances of £7M when compared with the do-nothing scenario. In comparison, co-mingled collections of food and garden waste would result in savings of £5M on the purchase of LATS allowances.

A cost-benefit analysis was undertaken where savings in the purchase of LATS allowances, revenue generated from trading LATS allowances and savings in the treatment of residual waste were offset against the increased costs for collection and processing.

- The collection of food waste in either scenario would generate significantly higher costs than the 'do-nothing' current scenario, even when savings in the purchase of LATS allowances and trading of allowances associated with diversion of BMW are taken into account.
- The option giving the lowest additional cost of £5M is the co-mingled collection of food and garden waste with treatment at a 'theoretical' in-vessel composting facility within Milton Keynes at Old Wolverton in Scenario 2b (used for cost modelling purposes and proposed by MKC).
- Co-mingled collection of food and garden waste results in lower additional costs than separate food and garden waste collections because the waste collection costs are lower.
- It is important to note that the modelling is based on the results of the trials and a number of key assumptions which, if varied, could give significantly different results.
- If MKC change the frequency of residual waste collection to alternate weekly and utilise the same RCVs for the collection of residual waste and organic waste or dry recyclables (collected fortnightly), significant savings could be made which might result in the collection of food waste becoming cost-effective. MKC should ensure that sufficient residual waste capacity is available to residents if they reduce the residual waste collection frequency to fortnightly. Alternate weekly collection of residual waste may also have a positive impact on the participation and capture rate

associated with the collection of dry recyclables and organic waste and so increase the performance of these collections.

- Reducing the collection frequency for co-mingled food and garden waste from weekly to fortnightly would result in a reduction in the service cost and may make the collection of co-mingled food and garden waste in Scenario 2 cost-beneficial.

Resident feedback and results of focus groups

Feedback from residents was received via phone, personal caller and occasional e-mail. In addition, feedback was supplied by Cory regarding the number and nature of 'crew' tickets that were issued to residents explaining why their food or food and garden waste bins were not collected.

Over the course of the trial 59 queries were received from Newport Pagnell and 69 from Bradwell Common. Most queries were received in the initial stages of the trial presumably because it was a new service that residents needed to get used to. The issue most frequently reported by residents in Newport Pagnell was missed collection of their food waste bins (42%) followed by a range of non-specific queries (37%). In Bradwell Common non-specific queries were most common (36%) followed by missed collections (22%).

It did not appear that distribution of either the Christmas or summer newsletter (in December 2005 and August 2006) had much impact on the number of queries received.

When questioned whether a fortnightly collection frequency for residual waste would be sufficient, all of the residents in Newport Pagnell focus group stated that fortnightly collection would not be sufficient, whilst the majority of the residents in Bradwell Common felt that the residual waste could be collected every fortnight.

Crew Tickets

The majority of the tickets issued by the crews when collecting food waste were the result of contamination (i.e. the food waste bins contained materials that were not permitted according to the bin stickers). Perhaps the most obvious point to make

about the crew tickets is the difference in numbers issued between trial areas (715 in Bradwell Common compared with 5 in Newport Pagnell). It would be easy to draw a conclusion that the separate food waste collection scheme posed fewer challenges and issues for residents compared to the co-mingled collections but this is likely to be too simplistic, especially considering the novel waste stream, containers, and behaviours required of the separate food waste collections. It is considered more likely that the type and size of bin used for co-mingled food and garden waste collection in Bradwell Common was a key factor because residents were more used to disposing of general waste in wheeled bins thus leading to a greater risk of contamination. However it is impossible to determine the reasons for this difference precisely and other factors such as socio-demographic differences will also play a part.

Collection logistics

The collection contractor was questioned about their view of the collection methods employed.

- No major problems were reported with the bins.
- In terms of contaminated bins, they felt that more could have been done to address repeat offenders earlier in the trial.
- They stated that the transport distance from the collection rounds to the in-vessel composting facility currently used in High Wycombe was too long.

Conclusions

1) According to the waste data collected over the duration of the trials there was relatively little difference in the amount of organic waste collected per household where food and garden waste were collected separately compared to where they were collected co-mingled in the same container.
2) According to the waste data collected over the duration of the trials the average total waste per household per week has increased in both of the trial areas provided with food waste collections but has decreased in the control area of Furzton. The increase in total waste arisings is perhaps to be expected in Bradwell Common where residents have been provided with a free, weekly collection of garden waste when previously they would have paid for a fortnightly collection of garden waste. However, an increase in total waste

arisings per household per week is also seen in Newport Pagnell where food waste is collected separately and the chargeable fortnightly garden waste collection remained unchanged.

3) Participation in the separate collection of food waste in Newport Pagnell and the mixed collection of food and garden waste in Bradwell Common was broadly similar in the early stages of the trial but since April 2006 the participation rate was slightly higher in Bradwell Common (co-mingled collection) giving an annual average of 60% compared to Newport Pagnell (separate collection) with an annual average of 54%.
4) According to the waste audits:
    a. The capture rate of food waste (i.e. the amount of waste separated for separate collection relative to the total available per household) was higher where it is collected co-mingled with garden waste than where it was collected separately according to the results of the trial waste audits. However this is based on data derived from two summer audits and therefore may be different at other times of year.
    b. The amount of food waste in the residual waste has decreased in both trial areas. The largest decrease is of 50% in Bradwell Common with a reduction of 30% being seen in Newport Pagnell. In the control area it has decreased by only 8%.
    c. There is no contamination of the food waste only bin in Newport Pagnell and minimal contamination in the food and garden waste bin in Bradwell Common at 0.2% (by weight) of non-combustible materials
5) Based on cost modelling of the trial collection methods assuming a borough wide roll-out, separate food waste collection gives the greatest increase in annual costs to between £2.6 and £3.0 million per year. Implementation of co-mingled food and garden waste collections would result in an increase in annual costs to between £1.9 and £2.0 million per year.
6) Based on a modelling exercise, the greatest increase in BVPI performance will be achieved through the implementation of separate food waste collection. This will give an increase of around 10 percentage points to 43.9%. Implementation of co-mingled food and garden waste collections will give an increase in BVPI performance of just over 6 percentage points to 40.3%.

7) The collection of food waste across the borough using either of the collection methods used in the trial areas would generate higher costs than the do-nothing scenario, even when the savings in purchasing LATS allowances are taken into account. Without reducing the service costs for food waste collection MKC would be financially better off not collecting food waste (based on the assumptions used in the modelling).
8) Overall, it appears that the method of food waste collection, either separately or co-mingled in the same container as garden waste, does not impact greatly on the tonnage of organic waste collected per household per year. However, when the cost of collection, transport and treatment are taken into account, the modelling work indicates that co-mingled collections provide the lowest cost option for the collection of food waste. This is dependant on the assumptions used in the modelling being accurate. It is important to recognise that relatively small changes in the assumptions used relating to sensitive variables could have a significant impact on the outputs from the modelling work and thus alter the results.
9) What is not taken account of in this piece of work is the potential impact that alternate week collections of residual waste, with co-mingled food and garden waste or with dry recyclables, might have on performance and cost. In addition there is the potential to combine separate collections of food waste on the same collection vehicle as other materials such as dry recyclables to make collection more cost effective.

Recommendations

a) To make the collections of food waste more cost effective, MKC must address the service costs and look to reduce them where possible. This could be achieved by:
    i. Reducing the frequency of co-mingled food and garden waste collections from weekly (as piloted in the trials) to fortnightly.
    ii. Collecting the separate food waste on the same vehicle as dry recyclables.

iii. Reducing the frequency of residual waste collection to fortnightly and possibly alternating the residual waste collections, with collections of organic waste or dry recyclables.

iv. Developing an Animal by-Product Regulation (ABPR) compliant facility within closer proximity to the collection rounds.

b) MKC should consider undertaking further modelling of the service costs associated with each food waste collection option. This should include modelling of variations in the parameters that could significantly impact on costs including reducing the collection frequency for co-mingled food and garden waste from weekly to fortnightly.

c) MKC should consider undertaking further modelling of the LATS implications associated with each food waste collection option. This should include modelling of variations in the parameters having a significant impact including the trade price of LATS allowances and the participation rate associated with the services.

d) Should MKC move towards rolling out either food waste collection method borough-wide, the lessons learnt and issues raised in this pilot should be remembered and solutions developed well in advance of any roll-out. These might include:

i) Allowing for adequate contingency within the annual budget for food waste collections to cover unforeseen expenditure.

ii) Adequate resources to manage resident queries especially in the start-up phase.

iii) An improved crew ticketing system to ensure that both contractor and council know exactly who had been ticketed, when, what the result is and any follow up that takes place.

iv) Suitable resources and operating procedures to address issues such as contamination, elderly or disabled residents who want to use the scheme, residents who don’t want to use the scheme and contingency treatment options in case of emergency.

v) A clear strategy on how food waste recycling will be extended to flat dwellers and others where wheeled bins may pose problems.

vi) A clear strategy on how to identify empty dwellings prior to any roll out. Use of new homeowner packs which include details of recycling opportunities may also be beneficial in this respect.

vii) A clearly defined communications strategy with sufficient resources to ensure that the printed material provided is relevant, accessible and attractive.

viii) Designing communication materials to include detailed instructions on how the 25 litre bin can be locked by residents to ensure that food waste is stored securely.

ix) Resources should also be budgeted to allow for enforcement (e.g. for contamination of the food waste bins) and targeted door-knocking.

x) Given that a key issue raised by residents at the focus groups was annoyance over not having their own bins returned to them after emptying MKC should address this.

e) A key advantage of the trial has been the resource allocation for intensive tonnage and participation monitoring as well as auditing. Whilst it will be impossible to continue with a similar level of monitoring on a borough-wide scale, a rolling programme of periodic monitoring is essential to gauge the success and continuing performance of any roll out.

1. Introduction

The Organic Resource Agency Ltd (ORA) were commissioned by Milton Keynes Council (MKC) to provide project management for a pilot trial of kerbside collection of food waste from domestic properties within the borough of Milton Keynes. The trial management work followed on from an earlier piece of work undertaken by ORA for MKC on behalf of the Waste and Resources Action Programme (WRAP) in which food waste collection options were appraised and recommendations for trials were given.

The pilot trial was scheduled to run for 12 months from the end of September 2005 until the end of September 2006. However, it was decided to extend the trial for an additional month in October 2006 to give a full twelve months of data excluding the first month when the trial was becoming established. The trial involved monitoring waste arisings from approximately 1,500 households split into three areas. One area acted as a 'control' for comparison where no change to the existing collections was made. In the other areas two different modes of kerbside food waste collection were investigated. In one, a 25 litre lidded container was supplied to householders for separation of food waste and this was collected weekly with no change to other residual waste or recyclables collections. In the other area a mixed food and garden waste collection was implemented on a weekly basis. This replaced the existing fortnightly, chargeable 'opt-in' garden waste only collection service.

The objectives of the trials were to assess performance of the different food waste collection methods to see which one resulted in:

- the greatest tonnage collected, and more importantly, diverted from the residual waste stream
- the greatest capture rate of food waste
- the optimum sustained participation rate

In addition, queries, complaints and comments from the residents, collection contractor and other stakeholders were assessed to gain an understanding of the key

issues relating to the collections so that these could be addressed in the event of a wider expansion of the scheme.

Further work was then undertaken to look at the potential impact of the different collection options on the recycling and composting rate and obligations under the landfill allowance trading scheme (LATS) if either option was rolled out across the borough.

ORA were commissioned to disseminate the findings in the form of an interim report after three months of collections had taken place; a full report at the end of the trial, and if required, a presentation to Council members.

2. Methodology

An overall project plan was drafted by ORA prior to commencing work on the trials which included a detailed methodology. The following methodology sections are drawn from the project plan but include amendments that have been adopted during the course of the trial with the agreement of the steering group.

2.1 Roles and responsibilities

- Overall control of the project remained in the hands of MKC and their waste and recycling team.
- Project management and reporting was undertaken by ORA.
- Collections of the waste and recyclate, reporting of tonnages collected and participation monitoring was undertaken by Cory Environmental (Cory) – the incumbent waste collection contractor.
- Waste compositional analysis was undertaken by AEA Technology.
- Communications materials and attitudinal evaluations were developed and undertaken by MKC and ORA.
- Other tasks were contracted out as required.

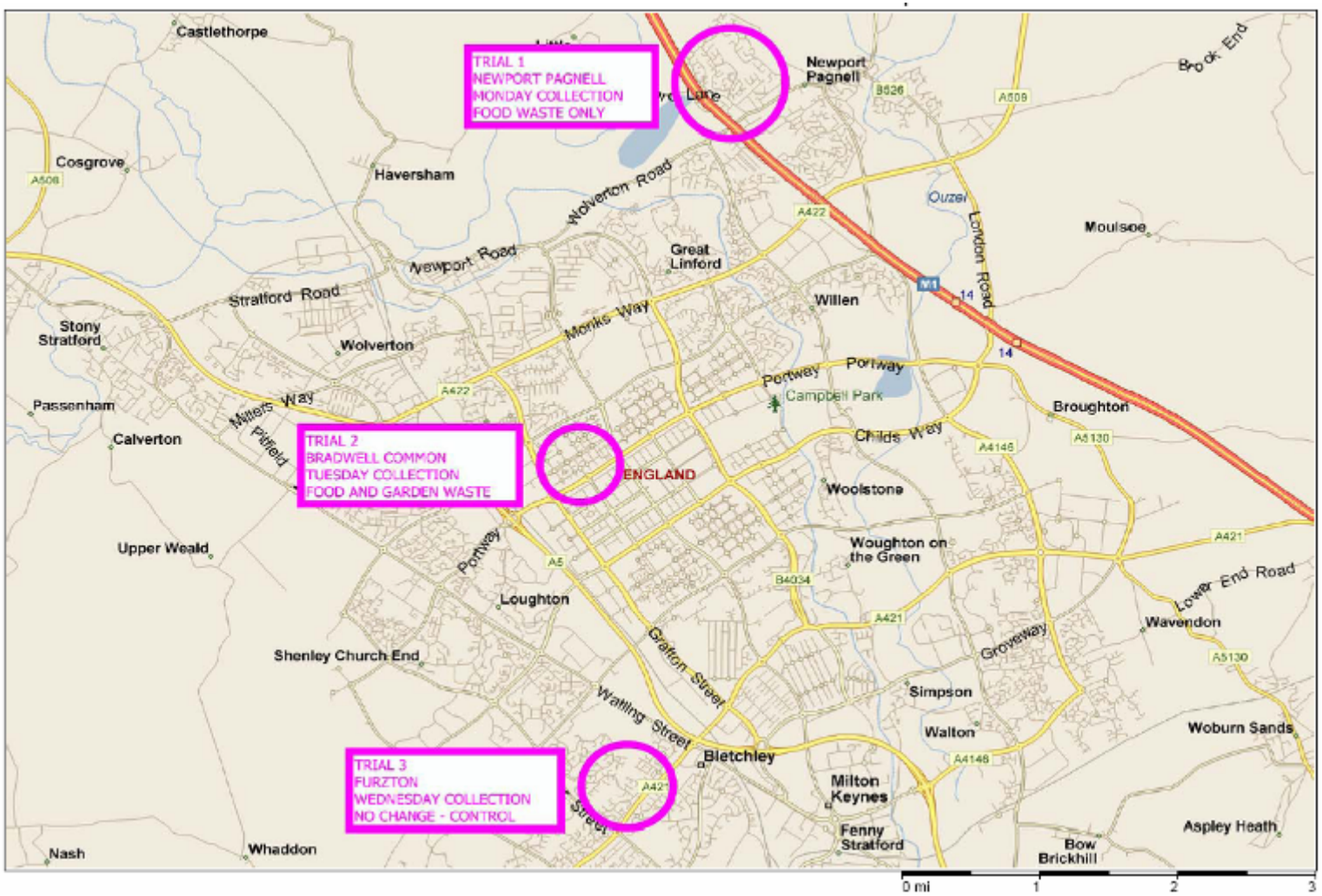
2.2 Trial areas and treatments studied

The trial was divided into three geographically distinct trial areas each with a separate type of collection taking place. The trial areas are shown in Figure 1.

- **Trial Area 1 in Newport Pagnell** received separate weekly collections of food waste in 25 litre lidded bins and residents were provided with a small silver coloured, lidded caddy for use in the kitchen. Liners were not provided and residents were advised to line the caddy with old newspaper if desired. The food waste collections were completely separate from the fortnightly opt-in chargeable collections of garden waste in 240 or 140 litre wheeled bins already available to residents who chose to subscribe to the scheme. Residual waste was collected weekly in black sacks and dry recyclables were collected weekly in blue boxes (for glass) and pink sacks (for paper, cardboard, cans, plastic bottles and aluminium foil).

- **Trial Area 2 in Bradwell Common** received weekly collections of food ***and*** garden waste, co-mingled in a 140 litre lidded wheeled bin. Residents were also provided with a small silver coloured, lidded caddy for use in the kitchen and no liners for the caddies were provided. Within the trial area this collection replaced the fortnightly chargeable opt-in collections of garden waste already available to residents and was free of charge. Residual waste was collected weekly in black sacks and dry recyclables were collected weekly in blue boxes and pink sacks.
- **Trial Area 3 in Furzton** was used as a 'control' area for comparison. No changes to the standard refuse, recycling and garden waste collections were implemented here, nor were any communication materials sent out other than those sent to all residents in Milton Keynes as part of the general recycling service and not related specifically to the food waste collections. Data was simply gathered to provide a benchmark against which to compare the other trial areas.

Figure 1: Trial areas



The areas were selected to be geographically distinct, each had to comprise a single collection round of approximately 500 households and they all had to be broadly representative of housing in Milton Keynes as a whole. They were not intended to be identical but were broadly similar in the size and types of housing as far as possible. No flats were included in the Bradwell Common trial area as flats would not be included in the co-mingled collections of food and garden waste in wheeled bins should the collections be rolled out across the borough. The collection regime that was to take place in each area is presented Table 1 and details of the roads and street names included in each trial are provided in Appendix A.

Table 1: Collection regime by trial area highlighting food and garden waste collections

Trial area	Newport Pagnell	Bradwell Common	Furzton
Trial Area Number	1	2	3
Treatment name	Separate food waste	Food/garden mix	Control
Residual waste container	Black sacks	Black sacks	Black sacks
Residual waste collection frequency	Weekly	Weekly	Weekly
Dry recyclables containers	Pink sack / blue box	Pink sack / blue box	Pink sack / blue box
Dry recyclables collection frequency	Weekly	Weekly	Weekly
Garden waste container	Existing 'opt in' 240 or 140 litre green wheeled bins for those already using the existing scheme	New, 140 litre green wheeled bin – for both garden and food waste combined	Existing 'opt in' 240 or 140 litre green wheeled bins for those already using the existing scheme
Garden waste collection frequency	Fortnightly	Weekly	Fortnightly
Food waste container	New 25 litre, lidded green food waste only bin and small silver caddy for use in the kitchen. No liners provided	As above – new 140 litre green wheeled bin – for both garden and food waste combined. Small silver caddy for use in the kitchen. No liners provided	-
Food waste collection frequency	Weekly	Weekly (see above)	-
No. of households	465	483	473

2.3 Monitoring

Having identified the trial areas it was then necessary to organise a programme of monitoring. This comprised the following:

- Waste compositional analysis
- Tonnage data on the different waste streams collected
- Set out monitoring (from which participation rate could be calculated[2])
- Assessment of feedback from stakeholders

2.3.1 Waste compositional analysis

Two waste audits were scheduled for the trial, one prior to the food waste collections starting, and one once the collections of food waste had become established. Fifty households in each trial area were audited to assess the composition of each of the waste and recyclable streams put out for collection. The audit households were selected to be a subset of the 150 households selected for participation monitoring in each area and are broadly representative of the council tax split in Milton Keynes. In addition, approximately 15 households in each area were also subscribers to the garden waste collection scheme which reflected the uptake of the garden waste scheme across MKC as a whole (approximately 29%).

The first audit took place on 19th, 20th and 25th July 2005 and the second mid-trial audit was undertaken on the 18th, 19th and 24th July 2006. Both audits were split over two weeks to allow the fortnightly collections of garden waste to be included from all the trial areas. The fortnightly frequency of garden waste collections had to be accounted for when analysing the results to ensure that kg per week of garden waste per household were not overestimated. The results of the waste audits and full report are provided in Appendix B.

[2] Set out rate is the number of households that 'set out' a particular waste stream on a given day. Monitoring was done in such a way as to allow the data to be allocated to a given address. Participation was calculated as the number of addresses who 'participated' in a given scheme *one or more times* over a given period – commonly four consecutive weeks or calendar month. Both measurements are usually presented as a percentage of the catchment area. In this trial participation rate was calculated on a monthly basis as the number of people who set out one or more times in the month.

2.3.2 Tonnage data

Tonnage data was provided weekly by the collection contractor for all the waste and recyclables collected. Tonnage data on the food and garden waste arisings was taken directly from weighbridge tickets obtained at the processing sites and was a precise measurement of tonnage collected. The tonnage for the residual waste and dry recyclables was obtained from data gathered from the round as a whole.

2.3.3 Set out and participation monitoring

In each trial area 150 households were identified for set out monitoring purposes. Selection was made based on council tax band so that the chosen households had a similar breakdown of council tax to that of Milton Keynes as a whole. Set out monitoring was carried out weekly for the duration of the trials to give a comprehensive data set over the year and records were taken for all the waste streams presented (residual black bag waste, dry recyclables in blue boxes and pink sacks, garden waste and where appropriate food and/or food and garden waste mixed).

Monitoring of tonnage data and set out rate began on 6th September 2005 prior to the start of food waste collections to obtain some baseline data on the similarities and differences between the areas prior to the trial.

Each week, Cory fed back the raw tonnage and set out data to ORA who then summarised it, calculated participation (on a calendar month basis) and submitted the information as weekly data summaries to MKC. Collection monitoring ceased on the 1st November 2006.

2.3.4 Stakeholder feedback

Part of the project was to assess the reactions and views of stakeholders, including the public and the waste collection contractor. The views of the collection contractor (Cory) and the waste services officers (WSOs) responsible for the smooth running of the collections were relatively easy to obtain though regular feedback to MKC and attendance at project steering meetings. Comments, complaints and questions from the public were collated and phone calls or personal callers to MKC's offices were logged and dealt with as appropriate. Data from the spreadsheet was passed to Cory

and the WSOs for action where necessary or the MKC recycling team dealt with queries directly.

2.3.4.1 Crew Tickets

In addition, where there were issues related to the collection of food waste such as contamination, or side waste, Cory were provided with triplicate forms to complete, the top copy of which was put through the letterbox of the appropriate house giving specific information on the issue encountered. One of the other copies was sent back to MKC so this could also be logged to gain an idea of the reasons for non collection over the course of the project.

2.3.4.2 Focus groups

Two sets of focus groups were included in the original project plan to obtain a qualitative assessment of the public's views regarding the scheme – both from participants and non participants. The focus groups took the form of small group discussions facilitated by MKC and ORA staff and took place in both trial areas in May 2006 once the trials were established.

2.3.4.3 Door knocking

As an addition to the original project plan it was agreed by ORA, MKC and Cory part way through the trials that door-knocking and face to face communication would be carried out with a limited number of households identified as being non-participants in the food waste collections, or being persistent contaminators of the food waste bins. Door knocking was carried out separately for each of these groups by MKC staff in August 2006.

2.4 Communications

From the outset it was decided that communications associated with the pilot trial had to reflect the type of communications that could realistically be employed should the pilot be rolled out borough-wide. Even though it might have been possible to give extra attention to residents on a small scale pilot it was felt that this might have an impact on participation and capture rates that would not be matched if a similar level of input was unfeasible for a larger rollout.

However, it was recognised that other communication methods and material used by MKC in the promotion of their wider recycling services were also likely to give reference to the food waste collection service and as such impact on the performance of the trial collections.

2.4.1 Printed material

Printed material was distributed before the scheme started (notifying residents of the impending trial) and on delivery of the bins and kitchen caddies (providing full instructions/bin stickers and answers to frequently asked questions). Subsequently, Christmas and summer newsletters were sent out prior to bank holidays including targeted information relative to the season. It had originally been intended to send out quarterly newsletters but the project team decided that twice yearly newsletters were adequate.

A summary of printed communications for the trial from the original project plan is provided in Table 2 with amendments shown in bold text. Examples of the communications material sent out during the trial are provided in Appendix C.

Table 2: Summary of printed communications

Written Communications	Essential Content	Quantity	Distribution Date
Initial notification of trial (A4 max 2 sides full colour)	o Why MKC are doing the trial – importance of capturing food waste o Why residents should participate – LATS, landfill directive	1100	12/09/05 **See key dates sheet for actual distribution dates**
Instructions for Treatment 1 (2 x A4 max 4 sides full colour)	o Why have new 25 litre bins been provided o Highlight extra service – weekly, free food waste collections. o What can what can't go in bin o Use of kitchen caddies o Frequently asked questions and responses o Sources of more information / helpline no. o Appeals/exemption procedure	550	19/09/05 **See key dates sheet for actual distribution dates**

Written Communications	Essential Content	Quantity	Distribution Date
Instructions for Treatment 2 (2 x A4 max 4 sides full colour) **In addition 1100 A5, 8 sided full colour leaflets providing a guide to the food waste trial were produced containing frequently asked questions and responses and sources of more information / helpline no.**	o Why green 240 litre garden waste bins have been replaced with new 140 litre bins o Highlight extra service – free food *and* garden waste; weekly not fortnightly o Identify means by which existing green bin participants can claim back this year's fee o What can what can't go in bin o Use of kitchen caddies e.g. how to line them with newspaper o Appeals/exemption procedure	550	19/09/05 **See key dates sheet for actual distribution dates**
Bin Stickers Treatment 1 for kitchen caddy and bin (Self adhesive, max 20cm x 20 glossy water resistant, 2 colour)	o What can and can't be included – food waste only o Helpline number	1100	19/09/05 **See key dates sheet for actual distribution dates**
Bin Stickers Treatment 2 for kitchen caddy and bin (Self adhesive, max 20cm x 20 glossy, water resistant, 2 colour)	o What can and can't be included – food and garden waste o Helpline number	1100	19/09/05 **See key dates sheet for actual distribution dates**
Crew Tickets **Triplicate forms**	o Reason(s) for non collection (tick boxes to be completed by collection contractor)	2860	During collections
Newsletter 1 - Christmas (A4 max 2 sides full colour) **Split into two different newsletters one for each trial area**	o Update on overall tonnage of food waste collected – not specific to treatments o Details of Christmas and new year collection schedule o Thanks and encouragement to those participating o Motivation to non participants to start.	1100	07/12/05 **See key dates sheet for actual distribution dates**

Written Communications	Essential Content	Quantity	Distribution Date
Newsletter 2 – Summer (A4 max 2 sides full colour) **Split into two different newsletters one for each trial area**	o Update on overall tonnage of food waste collected – not specific to treatments o Details of August bank holiday collection schedule and spring bank holidays o Thanks to those participating o Motivation to non-participants to start.	1100	05/06/06

In addition to the above a general recycling newsletter was sent to all MKC residents in March 2006. Special sections were included in those newsletters sent to the food waste trial area residents so that the message provided by the council was as relevant as possible.

Furthermore, with the appointment of a new recycling communications officer by MKC in July 2006, a range of promotional activities took place in Milton Keynes towards the end of the trial, at which the food waste collection trials were either directly or indirectly referred to.

2.4.2 Hotline support

Prior to the start of the trial, MKC and Cory staff were briefed on the trial objectives and methodology involved, and MKC front line reception staff were given instructions on how to deal with questions from callers or visitors. The MKC recycling team also employed a temporary staff member to man a phone line during the period from when initial notification of the trial was made until 1 month after collections had started. This was intended to provide additional phone support in the event of a steep increase in calls relating to the project.

2.5 Timescales and activities undertaken

The trial comprised four phases:

1. Planning (25/05/05 – 18/07/05)
2. Pre-implementation (18/07/05 – 26/09/05)
3. Implementation (26/09/05- 01/11/06)

4. Reporting – interim report submitted 31/01/06, end of project final report 06/12/06

2.5.1 Planning Phase

This comprised the development of a project plan, schedule and budget, which were submitted for approval by MKC on 10th June 2005. In addition a communications brief was drafted which detailed the communications material to be used, a schedule of distribution and draft text for each of the items specified. The project plan detailed the objectives, responsibilities and components of the project. The schedule itemised the tasks involved and laid out a framework of delivery dates, and the budget provided a breakdown of costs and has been used as a framework for monitoring costs incurred as the project progressed.

A copy of the schedule (key dates) is included in Appendix D. This has been updated to include changes agreed by the project steering group since it was originally submitted.

2.5.2 Pre-Implementation

During the pre-implementation phase, formal quotations were obtained from the various suppliers and subsequently orders were placed. These included the supply of bins and kitchen caddies and development of pre-trial communications materials. A pre-trial waste audit was commissioned and undertaken in July 2005 and the means of processing the food waste was formalised after a visit to the High Heavens composting facility (near High Wycombe) and negotiations with Buckinghamshire County Council who own the site. The pre-trial communications materials (see Table 3 and Appendix C) were drafted, consulted on and signed off for printing. On 1st September 2005 there was a briefing meeting for all members of the team including MKC reception staff, waste services officers (WSOs), and the collection contractor to go through the schedule, explain what communication materials were being sent out and to identify any potential problems in advance.

Weekly monitoring of waste arisings (residual, recyclable and compostable) and set out rates began in the three trial areas on Monday 5th September 2005. This preceded the start of food waste collections by three weeks in the case of Trial Area 1 (Newport

Pagnell) and 4 weeks in the case of Trial Area 2 (Bradwell Common). This was intended to enable a small amount of baseline data to be gathered to compare trial areas prior to the start of the food waste collections.

2.5.3 Implementation

The trial went live on Monday September 26th 2005 with the first food waste collections from Newport Pagnell. The following week on Tuesday 3rd October collections of mixed food and garden waste commenced in Bradwell Common. During the month following start-up WSOs accompanied the collection crews on the rounds to troubleshoot any problems as they arose as far as possible.

In October two newsletters were drafted one for each of the trial areas receiving food waste collections. The objective was to update participating residents on the scheme, inform new residents and encourage existing non participants to take part. It also included details of Christmas collection dates. Although it was originally intended for a single generic newsletter to go to both trial areas, on reflection it was decided that two separate newsletters which referred specifically to the type of collection available in that area was more appropriate and would lead to less ambiguity. These were distributed on 16-18th December 2005 and copies are provided in Appendix C.

In July 2006 summer newsletters were drafted and agreed with different versions being created for each trial area. Again the newsletter provided an update for residents on the performance of the scheme and included messages specifically related to the summer season including what residents should do with their waste whilst away on holiday, how to manage food waste in the warmer weather, and specific types of food waste arising in the summer including BBQ waste. The summer newsletter was distributed in August 2006 and copies are provided in Appendix C. Other activities and the dates that they occurred are listed in the key dates table in Appendix D.

3. Results and discussion

This section presents the monitoring data collected during the trial up to the end of October 2006. It includes sections covering:

- Tonnages of separately collected food and garden waste from the trial areas
- Participation data gathered for each trial area
- Waste composition analysis from the pre-trial and mid-trial waste audits
- Cost modelling for borough-wide roll out of the food waste collection
- Performance modelling for borough-wide roll out of the food waste collections
- A summary of the stakeholder feedback received from residents (via telephone call, personal visit and letter) including the results of the focus groups, and door knocking exercise
- A qualitative review of the food waste collection logistics from the collection contractor

3.1 Tonnage of food and garden waste collected during trial

The tonnage data presented includes the separately collected food and garden waste and co-mingled food and garden waste arisings collected from November 2005 to October 2006 inclusive. Table 3 shows the total tonnage of material collected in each trial area during the 52 weeks from the week commencing the 7th November 2005 to the week commencing 30th October 2006.

Table 3: Tonnage of organic waste collected

Trial and waste stream	Tonnage collected	Comments
Trial area 1: Newport Pagnell – Separate food waste collections		
Food waste separately collected	41.2	
Garden waste separately collected	32.7	Fortnightly collection over 41 weeks. 19 December – 27 February (11weeks) no collection.
Total, *separately* collected food and garden waste	73.9	
Trial area 2: Bradwell Common – Mixed food and garden waste collections		
Food and garden waste mixed	72.6	

Trial area 3: Furzton – Control, no change		
Garden waste separately collected	29.1	Fortnightly collection over 39 weeks. 28 November – 20 February (13weeks) no collection.

To compare trial areas more accurately, tonnage data for organic waste collected in each trial area has been converted to show the information in terms of kg per household per week (kg/hh/wk) and is presented in Table 4.

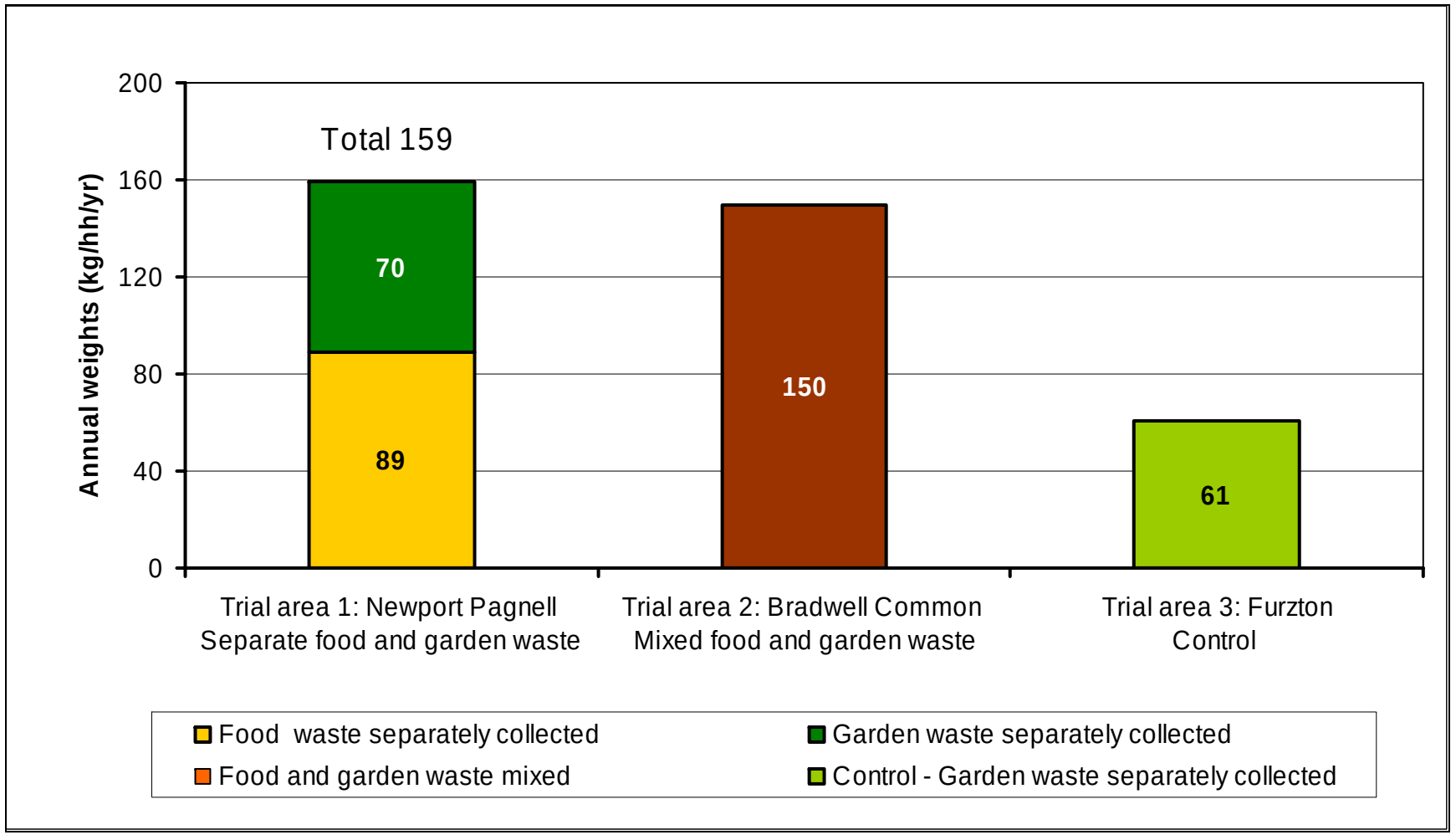
Table 4: Amount of organic waste collected

	kg/hh/wk 52 wk average	kg/hh/wk collection period average[3]	Comments	Annual arisings (kg/hh/yr)
Trial area 1: Newport Pagnell – Separate food waste collections				
Food waste separately collected	1.72	1.72	460 households in trial, 5 exempt	89
Garden waste separately collected	1.35	1.71	465 households in trial	70
Total, *separately* collected food and garden waste	3.07	3.43		160
Trial area 2: Bradwell Common – Mixed food and garden waste collections				
Food and garden waste mixed	2.89	2.89	483 households in trial, 45 exempt	150
Trial area 3: Furzton – Control, no change				
Garden waste separately collected	1.18	1.58	473 households in trial	61

The last column in Table 4 presents the annual waste arisings per household (based on all households included in the trial food waste collections and not just participating households). This is summarised in Figure 2.

[3] Allows for green waste non-collection weeks over winter period

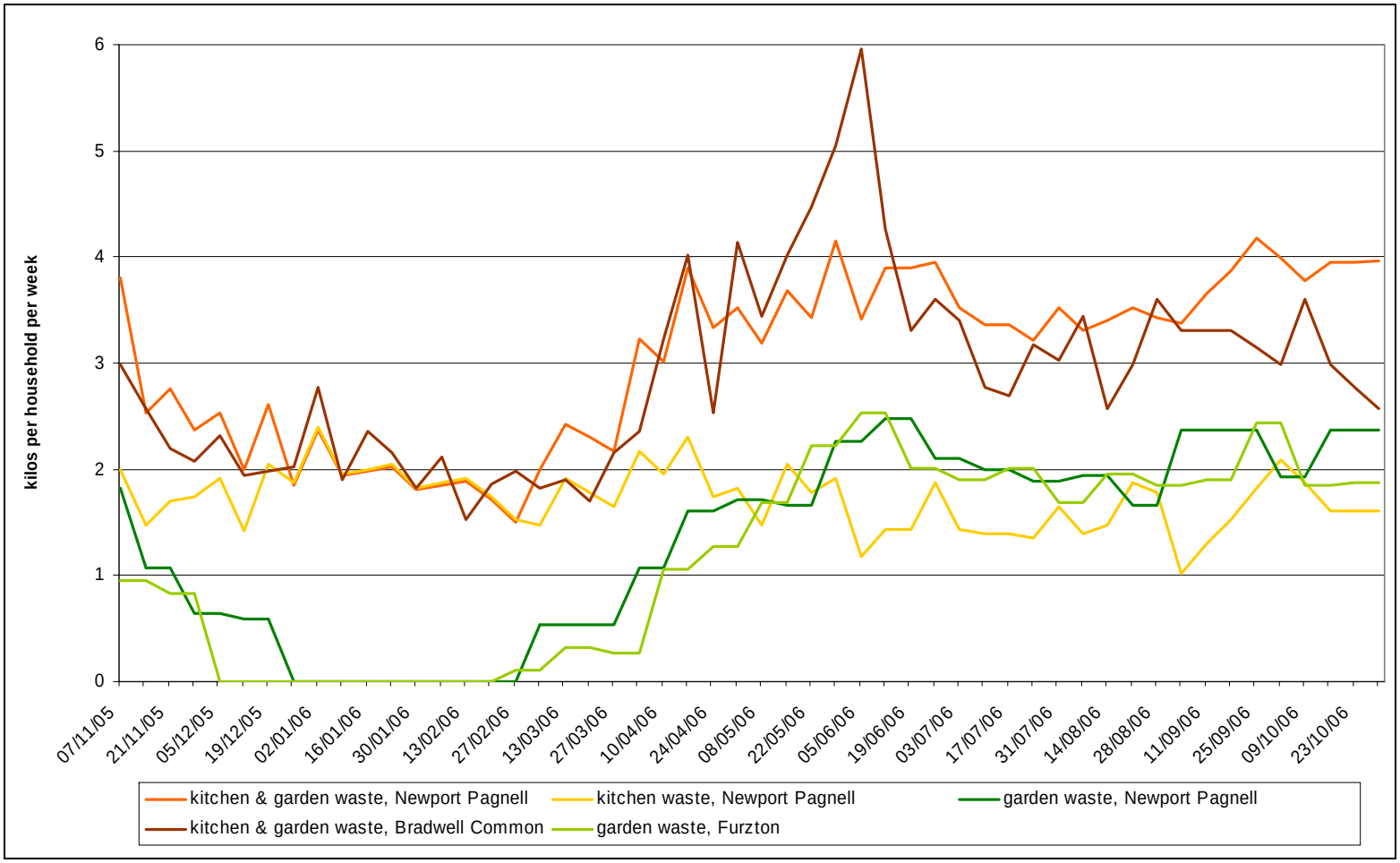
Figure 2: kg/hh/yr organic waste collected



It is evident from Figure 2 that Trial Area 1 (Newport Pagnell), where food and garden waste are collected separately, yields a slightly higher weight of the two waste streams compared to the mixed collection used in the Trial Area 2 (Bradwell Common). However, the difference is small which is surprising given that the residents in Bradwell Common were provided with a free, weekly collection of garden waste to replace the previous chargeable and fortnightly collection. The reasons for this are unclear but it is possible that the socio-economic characteristics of Bradwell Common (including small garden size in general) may have an impact on the amount of garden waste collected.

Garden waste collected separately in Trial Area 1 (Newport Pagnell) has increased by 13% in comparison to the control area of Furzton suggesting that the introduction of the food waste collections has had a positive impact on the amount of garden waste collected. Figure 3 shows a more detailed breakdown of the month by month arisings of organic waste collected in the trials.

Figure 3: Weekly arisings of organic waste



The garden waste only collections ceased for three months during December 2006 and January and February 2007 so this would explain the sudden drop in garden waste collected in Newport Pagnell and Furzton. The general decrease in co-mingled food and garden waste collected in Bradwell Common is likely to reflect the decrease in garden waste production at this time of year. There does not appear to be a significant decrease in the amount of food waste only collected in Newport Pagnell which would suggest that the food waste only collections are not overly influenced by the garden waste collections.

It is impossible to identify any impact of the Christmas newsletter distributed in December 2005, and the summer newsletter distributed in August 2006 on the amount of organic waste collected. It is more likely that the holiday periods during these times of the year will impact on waste collected. The seasonality of garden waste collections is apparent from the graph with less garden waste being collected during the autumn and winter months, and increasing garden waste being collected during the spring and summer months.

3.2 Tonnage of residual and total waste collected during the trial

Figure 4 shows the amount of residual waste and total waste collected in each trial area during the 52 weeks from the week commencing the 7th November 2005 to the week commencing 30th October 2006. Figure 5 shows the average arisings of residual waste and total waste per household per week monitored both before the implementation of the trial (over a period of 3 weeks in Newport Pagnell 4 weeks in Bradwell Common), and during the trial for the 52 weeks from the week commencing on the 7th November 2005 to the week commencing 30th October 2006.

Figure 4: Arisings of residual and total waste (kg/hh/year)

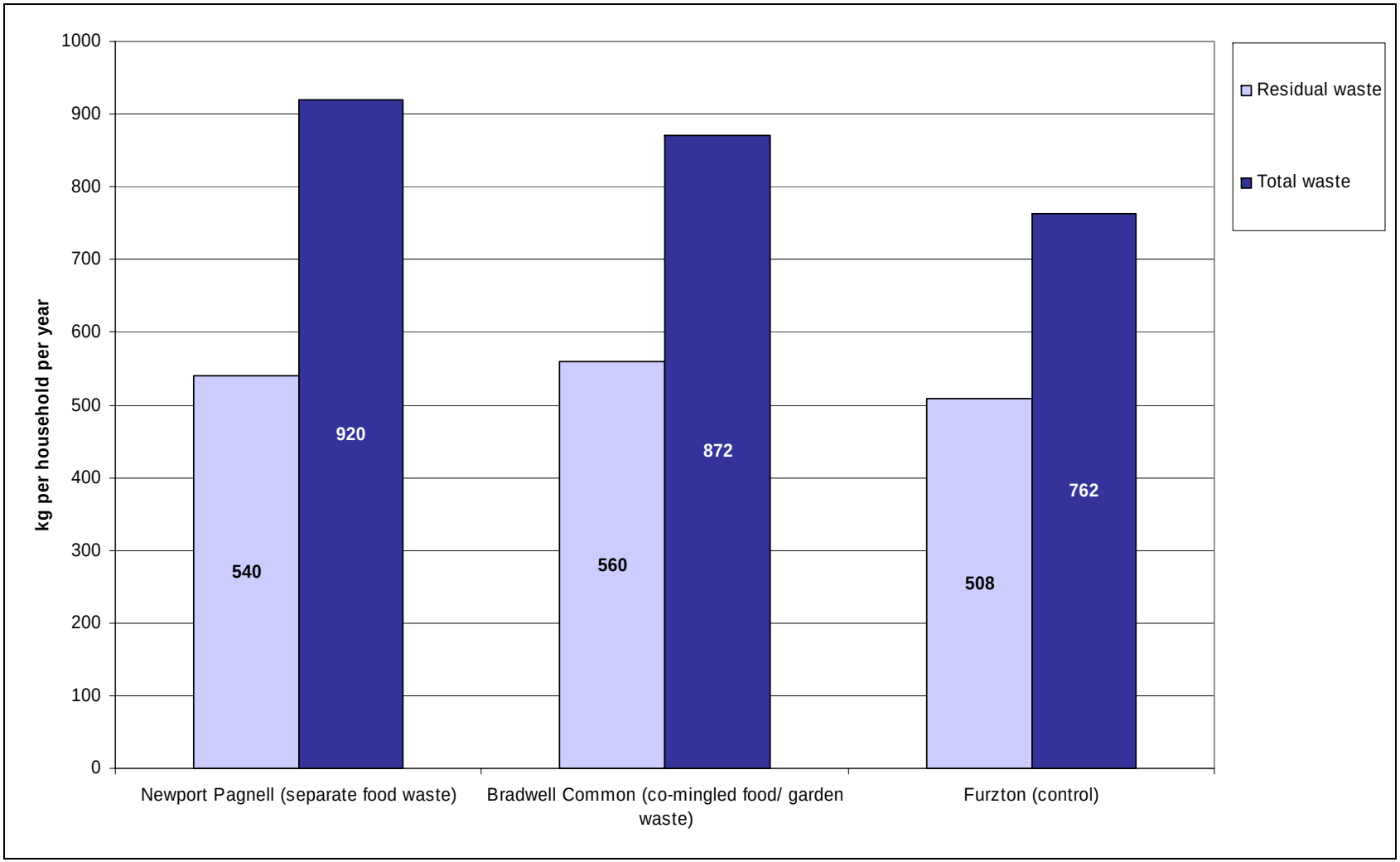


Figure 5: Average residual and total waste arisings (kg/hh/week)

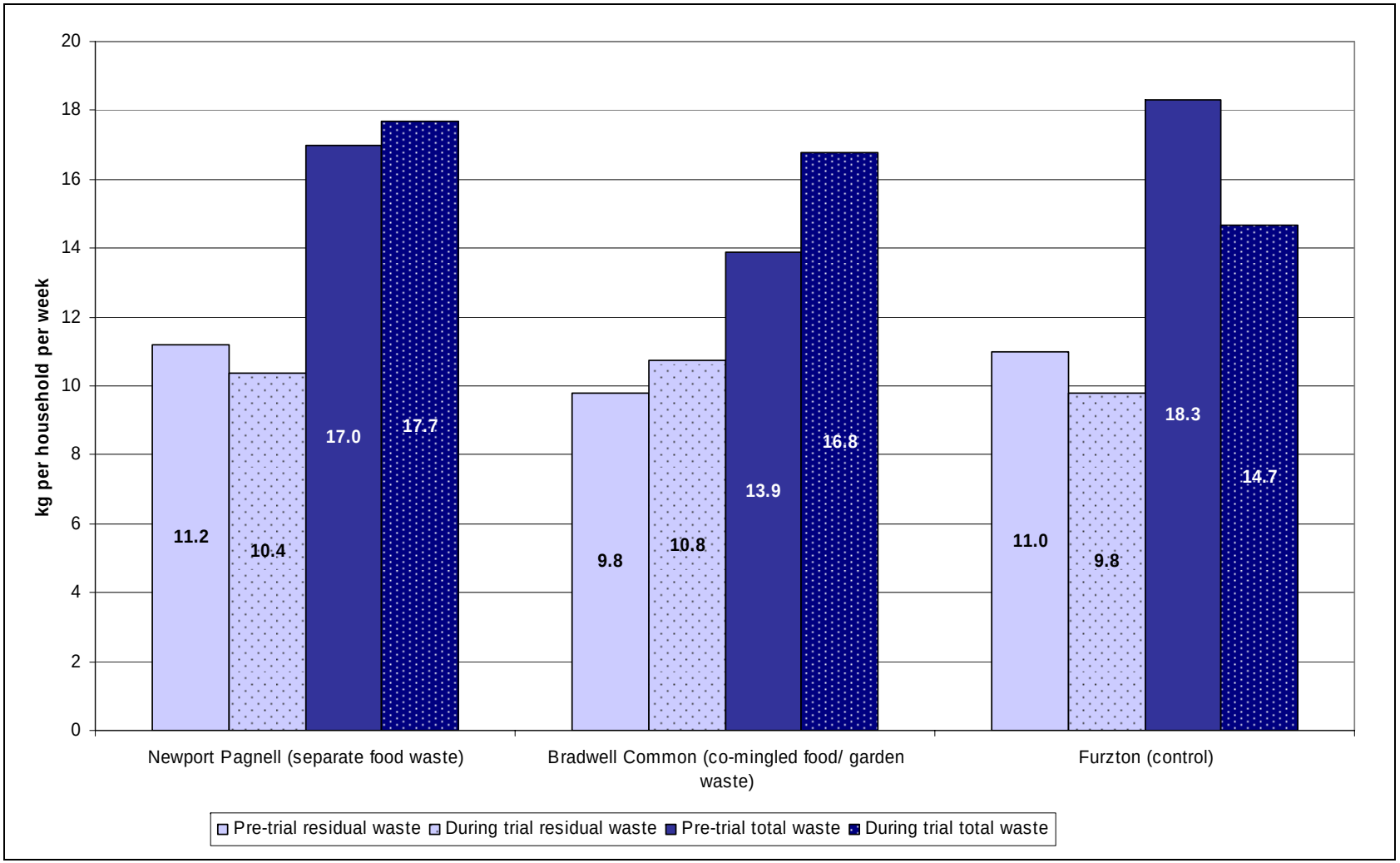


Figure 4 shows that in comparison to the control area of Furzton, both residual and total waste arisings are higher in the trial areas provided with food waste collections.

Figure 5 shows that the average arisings of residual waste put out per household per week in Newport Pagnell have decreased slightly from 11.2 to 10.4 kg/hh/wk since the collection of food waste was implemented, whereas there has been an increase in Bradwell Common from 9.8 to 10.8 kg/hh/wk. In the control area of Furzton residual waste arisings per household per week have also decreased from 11.0 to 9.8 kg/hh/wk. The decrease in residual waste arisings in Newport Pagnell could be due to the diversion of food waste to the source segregated collection although it is likely that other factors will also contribute, including the impact of waste minimisation activities across the whole of Milton Keynes.

Total waste set out per household appears to have increased from an average of 17.0 to 17.7 kg/hh/wk in Newport Pagnell and from 13.9 to 16.8 kg/hh/wk in Bradwell Common. Total waste arisings have decreased in the control area of Furzton from 18.3 to 14.7 kg/hh/wk. The increase in total waste arisings is perhaps to be expected in Bradwell Common where residents have been provided with a free, weekly collection of garden waste when previously they would have paid for a fortnightly collection of garden waste. This can result in additional garden waste being disposed of through the kerbside collection that would previously have been disposed of to CRCs, to home composting, or simply left to rot in-situ in the garden. However, an increase in total waste arisings per household per week is also seen in Newport Pagnell where food waste is collected separately and the chargeable fortnightly garden waste collection remained unchanged. The reasons for this increase are unclear but it could be that the provision of the free food waste collection has raised the residents' awareness of their recycling services in general and as such they may be utilising the garden waste collection service to dispose of more waste.

The waste audits carried out before the implementation of the trials and during the trials provide more information on the characteristics of the waste steams in each of the trial areas and this is provided in Section 3.4.

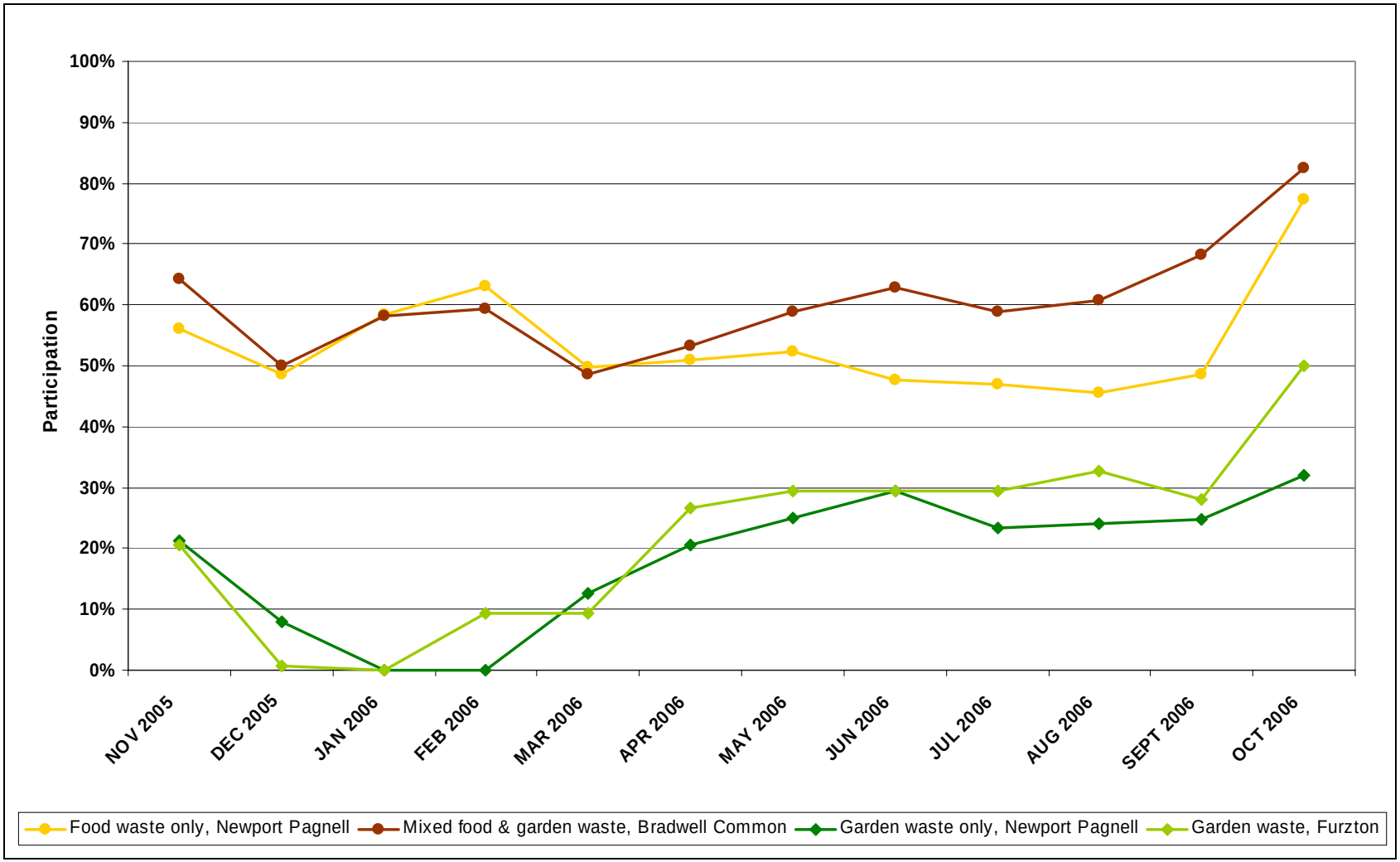
3.3 Participation results during the trial

The extent to which households contribute to a recycling scheme can be measured in two ways; set out rate and participation rate.

Set out rate measures the proportion of householders that put the appropriate container out for collection at the correct time during the week in question. Participation rate measures the proportion of householders that put the appropriate container out for collection at the correct time once or more over a pre-defined period (in this trial, over any given calendar month). Set out data was collected weekly and collated to give percentage participation on a calendar month basis for each of the organic waste streams studied in the trial.

Figure 6 shows the monthly participation rate associated with the collections of garden waste, food waste and co-mingled food and garden waste in each area over the duration of the trial. It should be noted that the low participation in the garden waste collections for both Trial Area 1 Newport Pagnell and Trial Area 3 Furzton in December is because the scheduled collections ceased in mid December 2005 until late February 2006. Data gathered over this period was therefore only from a few households.

Figure 6: Participation rate – organics collection



It appears that overall participation in the separate collection of food waste in Trial 1 Newport Pagnell and the mixed collection of food and garden waste in Trial 2 Bradwell Common was broadly similar in the early stages of the trial. However, since April 2006 and over the summer period, the participation rate appears to be higher in Trial Area 2 Bradwell Common than in Trial Area 1 Newport Pagnell.

The monthly participation rate averaged over the year of the trial is 54% in Newport Pagnell for the separate food waste collections, which is slightly lower than the 60% rate for the co-mingled food and garden waste collections in Bradwell Common.

The participation rate in Newport Pagnell may decrease in the summer because food waste that is collected on its own can be smellier than where it is collected co-mingled with garden waste. The garden waste can mask or cover the wetter more odorous food waste whilst in the bin and mixing food waste with garden waste can mitigate against food waste sticking to the sides of the bin as the coarser garden waste helps to 'self-clean' the bin when emptied. This may be a reason for the decline in participation rate seen in Newport Pagnell when compared to the participation rate in Bradwell Common.

Participation in the garden waste scheme seems to have started off at a higher rate in Trial Area 1 Newport Pagnell than in Trial Area 3 Furzton in the early stages of the trial but since April 2006 participation has been slightly higher in Trial Area 3 Furzton.

In all areas in October 2006 the monthly participation rate is markedly higher than in previous months. One reason for this which has been suggested by the waste collection contractor is that, due to a change in staff, monitoring of the set-out rate was done at a slightly later time on the monitoring day giving residents more time to put their food and garden waste bins out for collection. A risk of carrying out participation monitoring closer to the time that the collections were made was that it was possible that on some occasions bins would have been collected before the monitoring could have been done. The main implication of this is that the overall

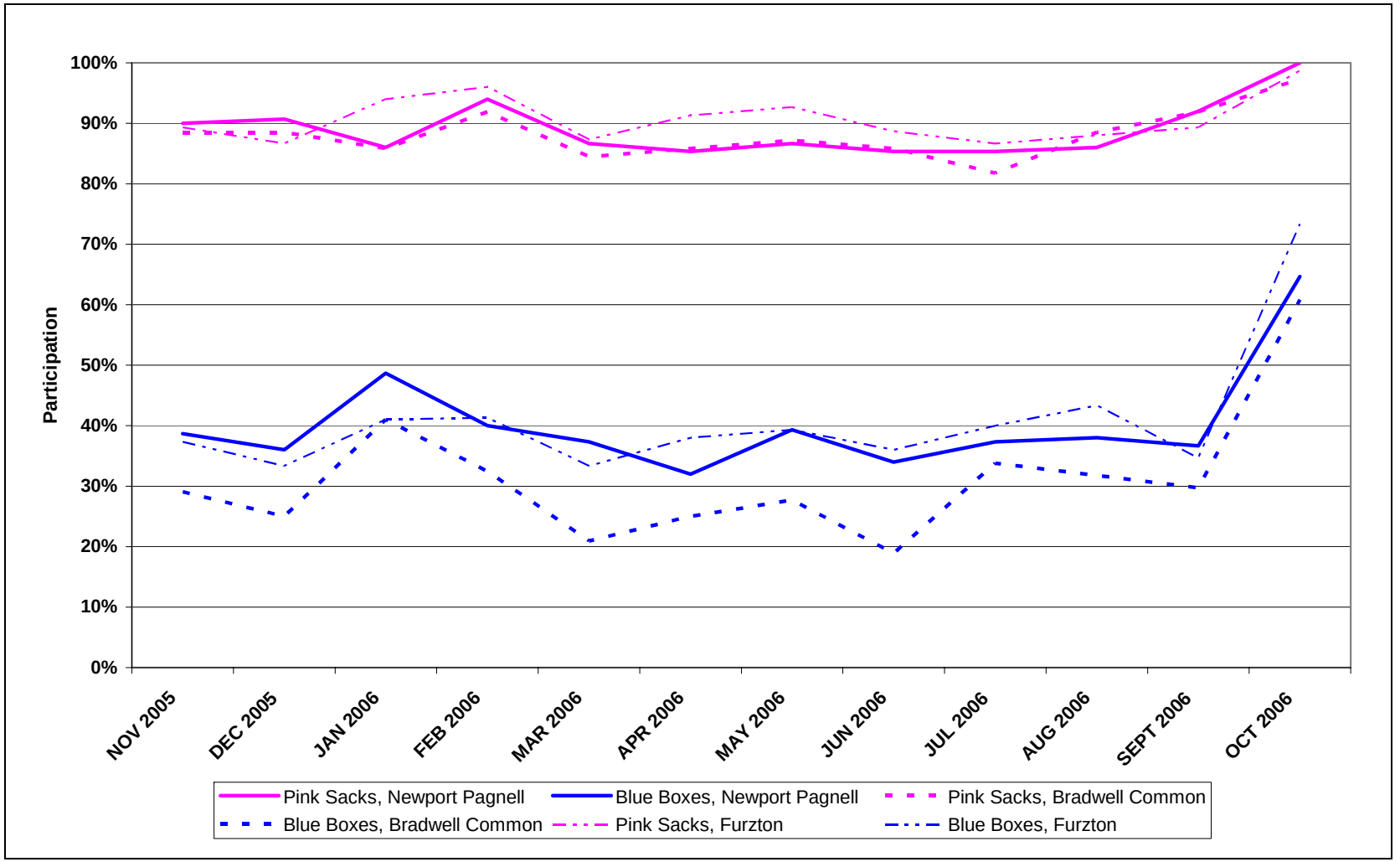
participation rates shown in Figure 4 may be conservative, but they are still relevant for the purpose of comparing the participation rates associated with each scheme.

Another potential reason for the general increase in participation rates towards the end of the monitoring period is that a new employee had been taken on by MKC with responsibility for communications about recycling. It is possible that this new and targeted resource may have impacted positively on the participation rate for the food and garden waste collections.

The participation rates for the food and garden waste collections do not appear to have been influenced by the Christmas or summer newsletters. However, during the Christmas and summer period many people are away from their homes on holiday and this will impact on the participation rate.

Figure 7 shows the monthly participation rate associated with the collections of dry recyclables in pink sacks (paper, cardboard, cans, plastic bottles and aluminium foil) and blue boxes (glass) in each area throughout the trial.

Figure 7: Participation rate - dry recyclable collection



The results demonstrate that there is little difference between the participation rates for dry recyclable collections in each trial area although the participation rate for blue boxes in Trial Area 2 Bradwell Common does appear to be lower than in the other trial areas. Participation in the blue box glass collection service is lower than that for the pink sack service because residents tend to generate relatively little waste glass each week and are likely to keep the blue box until it is full enough for them to consider it worth being put out for collection.

It is important to bear in mind that it cannot be guaranteed that any of these differences are due *entirely* to the different collection methods being employed. It is likely that there are a range of factors beyond method of collection, which have influenced participation and which may or may not be interrelated. These include inherent differences between trial areas due to socio-demographic reasons and differences in the drivers motivating people to separate food waste.

An attempt was made to minimise inherent socio-demographic differences between trial areas when the areas were selected, but a pragmatic view was taken that it would be impossible to achieve completely identical trial areas. Limited pre-trial tonnage and participation data was gathered in each area during September 2005 to try to quantify some of these potential differences and a review of the participation data for the opt-in garden waste scheme does reveal some small differences. This is shown in Figure 8. It would appear that participation for garden waste collections is slightly higher in Trial Area 1 (Newport Pagnell) than Trial Area 3 (Furzton) and both have higher participation in the scheme than in Trial Area 2 Bradwell Common. This is not reflected in the participation rates for garden waste during the trial where Furzton appears to have higher participation. This pattern is supported by the participation data gathered for the blue box scheme operated by MKC for glass, but not for the pink sack scheme collecting paper, cans and plastic and shown in Figure 9.

Figure 8: Pre-trial participation in garden waste collection scheme

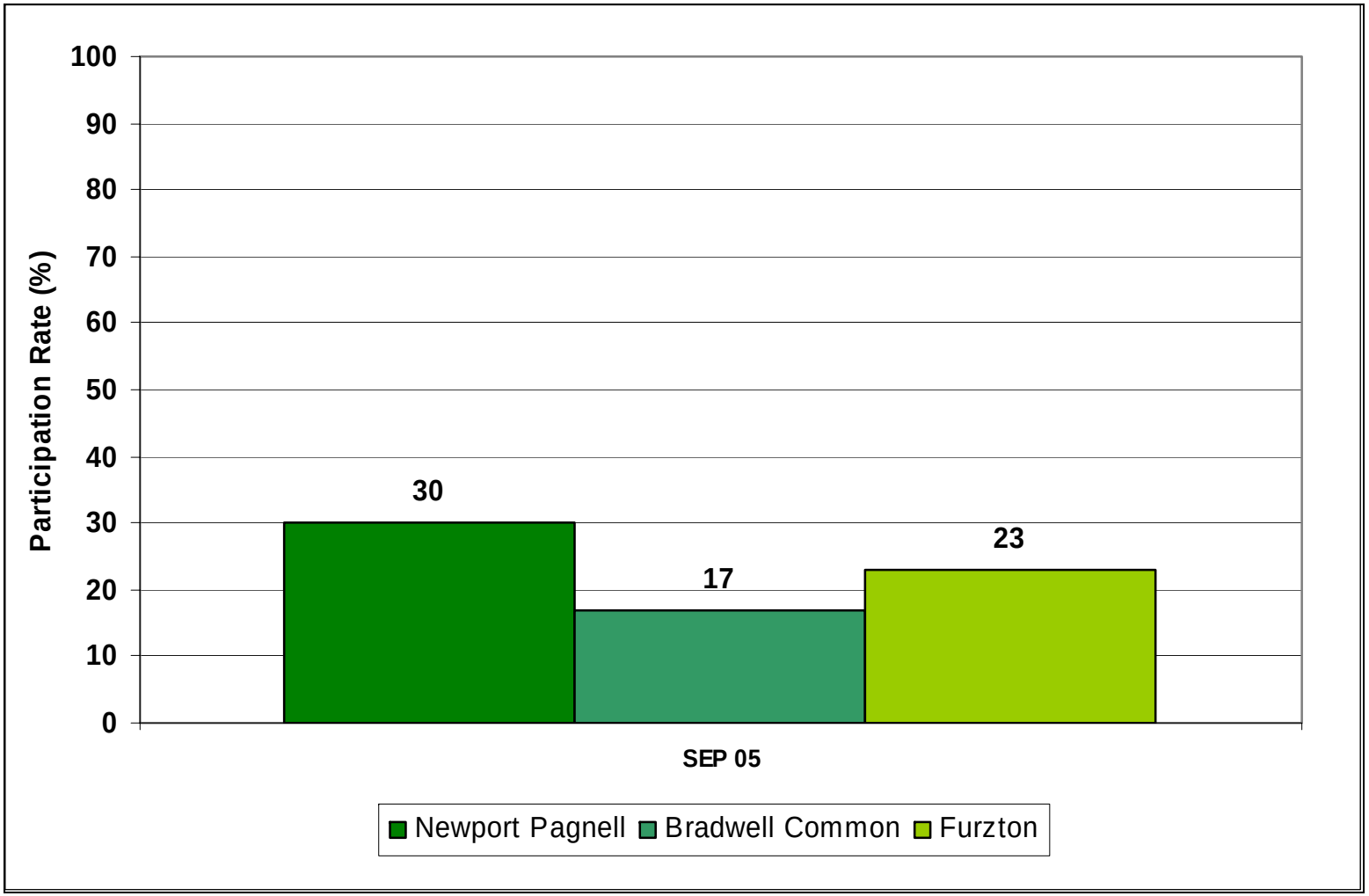
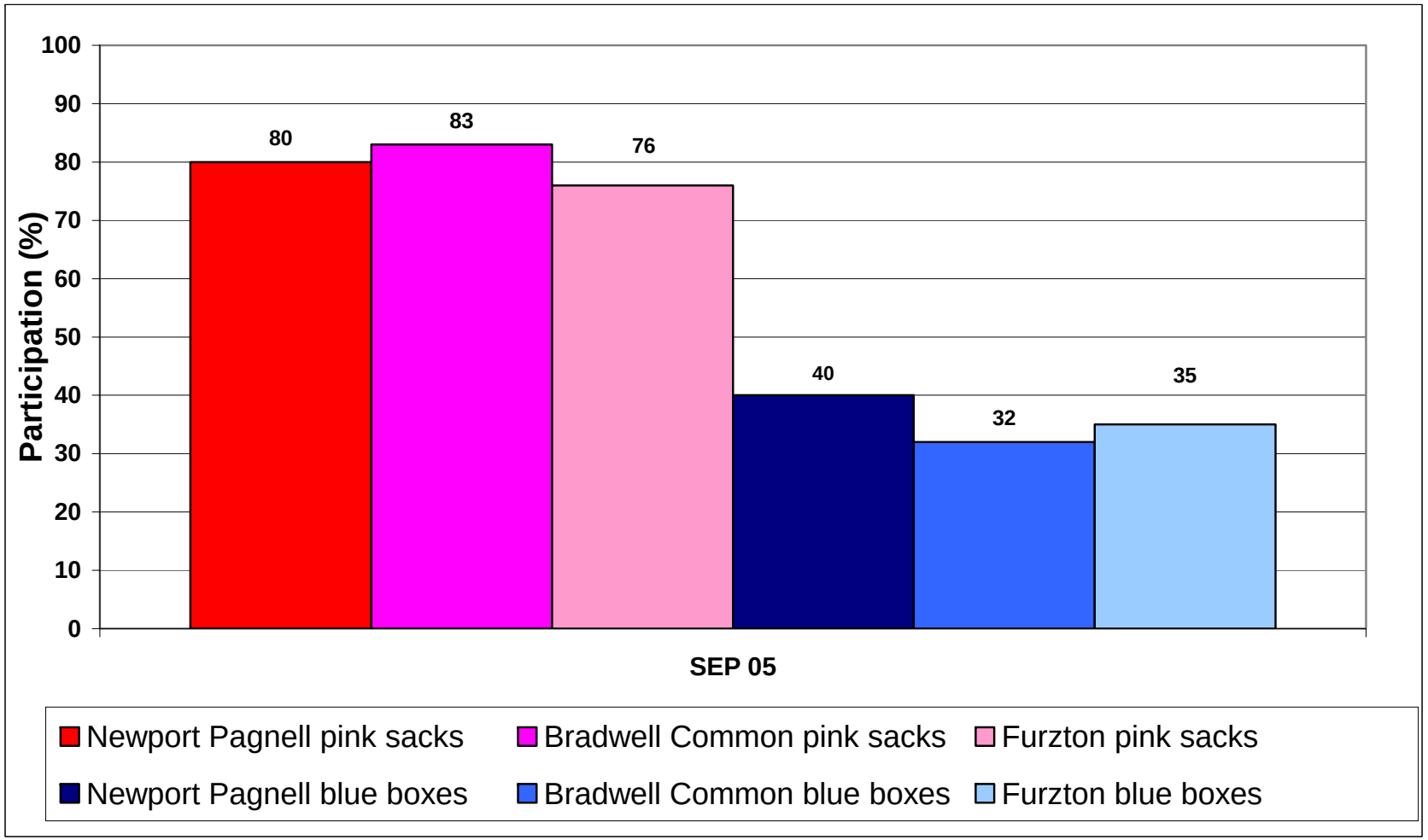


Figure 9: Pre-trial participation in dry recyclable collections



The results shown in Figure 9 support the lower overall participation rate for blue boxes observed throughout the trial in Bradwell Common.

The drivers that motivated or de-motivated people to participate in food waste collections were investigated in the focus groups and are discussed in more detail in Section 3.7.3.

3.3.1 Quality of participation

In addition to calculating overall participation, the survey also enabled a calculation of the frequency with which individuals participated i.e. how many times a household set out a container during the month. The data for the food waste only collections in Newport Pagnell is provided in Figure 10 and in Figure 11 for the co-mingled food and garden waste collections in Bradwell Common. The percentage of residents not participating at all in the collections is not included in the graphs and as such the total participation percentages in the figures do not equal 100%.

Figure 10: Participation frequency for separate food waste collection in Newport Pagnell

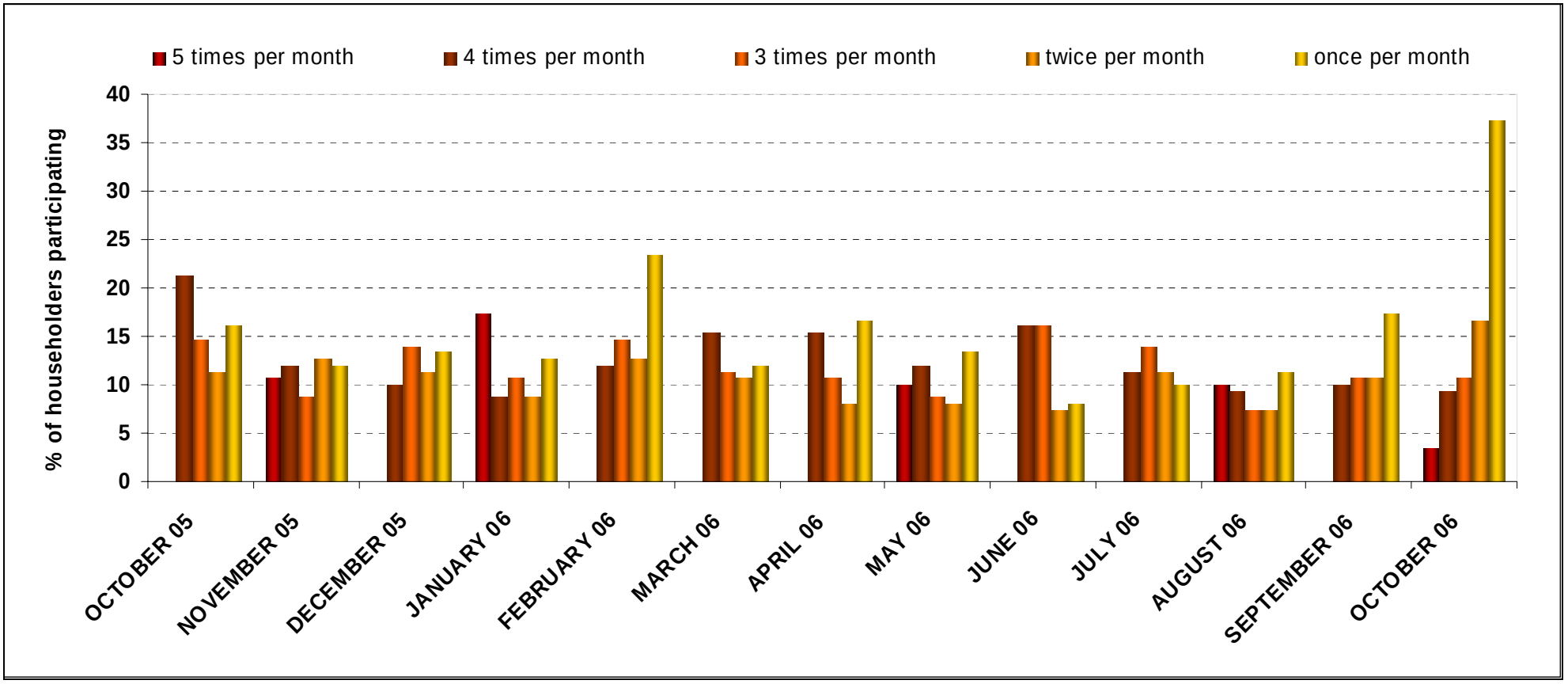


Figure 11: Participation frequency for co-mingled food and garden waste collection in Bradwell Common

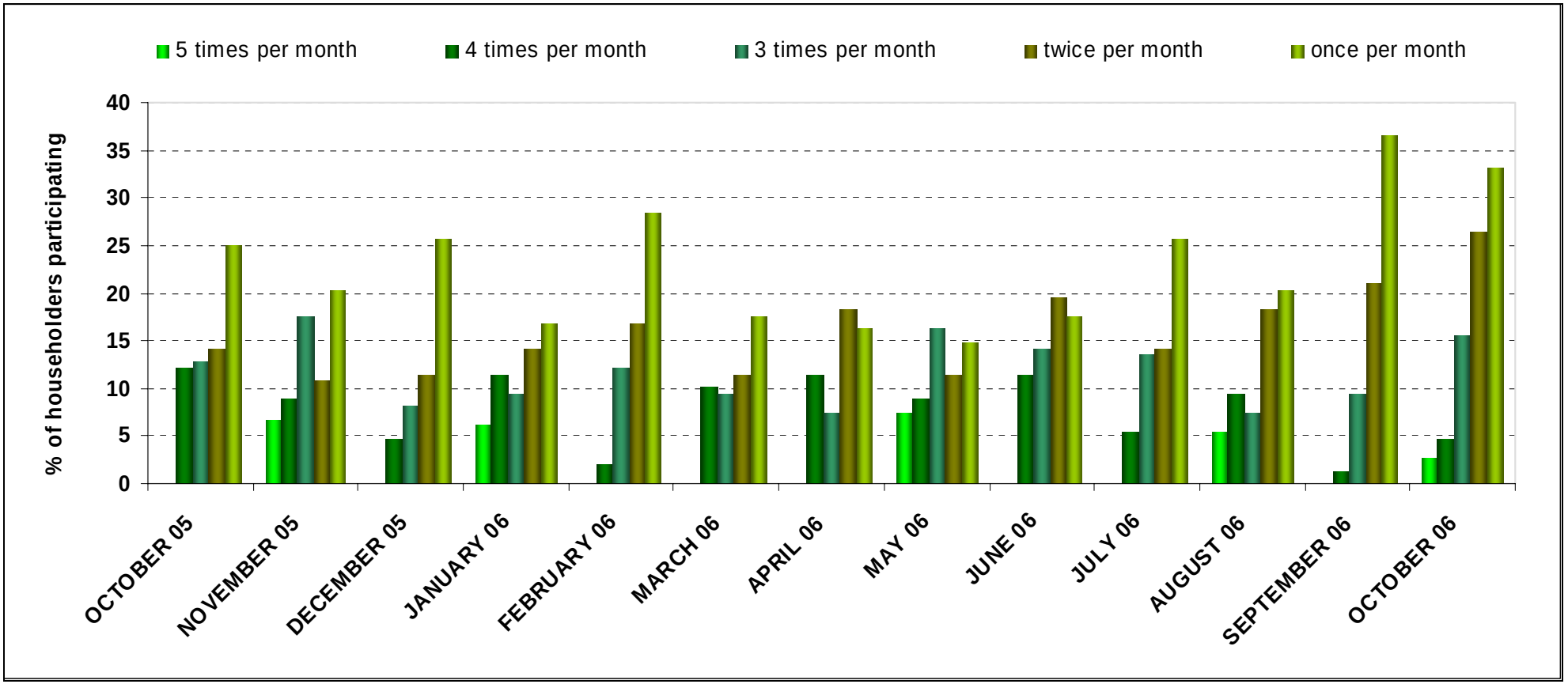


Figure 10 reveals that for the separate food waste collection in Newport Pagnell, most residents do not put their food waste bin out for collection every week. Figure 11 shows that in Bradwell Common where food and garden waste are collected co-mingled in the same container, most residents also put their organics bin out for collection less frequently than once every week. The reasons for this behaviour are unclear but would suggest that residents are either storing their food, or food and garden waste, between collections, are using the residual waste bin to dispose of organic waste on some weeks, or are home composting a proportion of their food and garden waste. Alternatively they may not generate sufficient organic waste to justify the weekly set out of the food or food and garden waste bin. This behaviour could possibly suggest that a fortnightly collection frequency might be sufficient for the collection of separate food waste or co-mingled food and garden waste but this would require further investigation especially with regards to the public acceptability of such a strategy.

There is a notable increase in the percentage of people in both trial areas only setting out food once per month in the final month of monitoring (October 06). Although the reason for this is unclear it is likely that a key factor in this is likely to be the change in monitoring staff described in the previous section rather than a significant change in behaviour for other reasons.

3.3.2 Participation data summary

If the above issues are taken into account the following points can be made regarding participation:

1) Participation in the separate food waste collection in Newport Pagnell, and the co-mingled food and garden waste collection in Bradwell Common appears to follow the same pattern and is broadly similar. However the participation rate is higher with the co-mingled collection in Bradwell Common especially over the summer months. This gives a slightly higher annual average participation rate (60%) for the co-mingled food and garden waste collection compared to the separate food waste collection (54%). This may be an indication that co-mingled collections of food waste with garden waste are more attractive to residents than separate food waste collections during hot weather when there is

a greater potential for odour and fly problems and there is likely to be more garden waste requiring disposal.

2) The participation level in the garden waste only scheme in Newport Pagnell and in Furzton appears to follow the same pattern but after the first four months of the trial the participation rate is higher in Furzton. This would suggest that the additional publicity relating to the food waste trial has not impacted on the collection of garden waste in Newport Pagnell.
3) In Newport Pagnell the majority of participating residents set out their food waste bin at a frequency of less than every two weeks.
4) In Bradwell Common the majority of participating residents also set out their food and garden waste bin at a frequency of less than every two weeks. Where food and garden waste is collected in the same bin the residents may be more likely to keep the waste for longer if they feel that their bin is not 'full enough[4] to be put out for collection as there are likely to be fewer issues about odours arising from the bins. This might suggest that a collection frequency of fortnightly for the co-mingled food and garden waste would be sufficient and acceptable to the residents.
5) In both areas a decline in the number of households setting out weekly is seen.
6) The above figures will be influenced to some degree by inherent socio-demographic differences between the trial areas as described above. However in the absence of more extensive comparative pre-trial data, ORA do not feel they can quantify these inherent differences satisfactorily. Any apparent differences between treatments must therefore be treated with caution and any conclusions drawn should take this into account.

3.4 Waste composition analysis

To assess the impact that the trial collections of food waste had on waste composition, two waste audits were carried out in the trial areas as well as in the control area of Furzton. The first was undertaken in July 2005 prior to the start of the trials, and the second took place in July 2006 mid-way through the trial period. The primary objective of the audits was to compare the two collection methods in terms of the amount of food waste that they capture.

[4] This was established as a result of the focus groups. See section 3.7.3 for details.

This section of the report summarises the results of the waste audits and the impact that the food waste collections had on waste composition. The data gathered during the audits is provided in Appendix B. When considering the waste audit findings it is important to bear in mind that the data and conclusions are drawn from two 'snapshot' monitoring dates. They involved the same properties as far as was possible at the same time of year, but nevertheless the data produced, whilst useful for comparative purposes does not take into account factors such as seasonal movement of residents during holidays as well as climatic variations. The latter will affect garden waste arisings in particular both at different times during the year and from one year to the next. The use of the waste analysis data as a predictor of waste composition at other times of year and between years should be done with caution.

3.4.1 Residual waste

Table 5 shows the residual waste arisings, in kg/household per week, in the trial areas.

Table 5: Average arisings (kg per household per week)

Trial Area	July 2005	July 2006
Newport Pagnell	8.1	7.6
Bradwell Common	12.1	7.2
Furzton	11.1	9.9

The results suggest that in all three areas residual waste arisings per household have decreased slightly between 2005 and 2006 although the decrease is smallest in Newport Pagnell where food waste has been collected separately. The largest decrease in residual waste arisings of 41% is apparent in Bradwell Common where co-mingled food and garden waste is being collected. These results differ from those resulting from the monitoring of tonnage where a decrease of residual waste arisings per household was observed in both Newport Pagnell and Furzton but an increase was seen in Bradwell Common.

Table 6 shows the composition (Wt %) and Table 7 shows the weight (kg/hh/wk) of the residual waste in July 2005 and 2006.

Table 6: Composition (Wt %) of residual waste arisings

Category	Newport Pagnell 2005	Newport Pagnell 2006	Bradwell Common 2005	Bradwell Common 2006	Furzton 2005	Furzton 2006
Newspapers and magazines	4.5	15.5	7.7	7.2	3.4	4.0
Other paper and card	11.8	12.1	15.9	12.3	14.0	11.1
Plastic Film	5.0	5.2	5.1	6.2	6.2	5.3
Dense Plastic bottles	2.1	2.9	2.0	2.6	1.3	1.6
Other dense plastic	4.6	5.9	6.1	6.0	5.1	4.6
Textiles	4.7	3.7	1.4	3.2	2.2	1.7
Other Combustibles	13.2	8.6	10.3	9.1	6.7	6.8
Glass packaging	6.9	5.2	4.0	5.7	3.9	4.3
Other glass	0.3	0.5	0.5	0.2	0.7	0.3
Non-Combustibles	0.5	0.8	10.3	0.4	1.0	0.4
Food and kitchen waste	**33.5**	**24.9**	**38.0**	**31.7**	**41.1**	**42.3**
Garden waste	**6.5**	**5.6**	**1.1**	**5.4**	**8.1**	**1.7**
Other organics	1.9	3.8	2.6	4.9	2.3	8.5
Ferrous metal cans	1.1	1.3	0.9	1.2	1.1	1.4
Other ferrous metal	1.1	1.0	0.4	0.8	0.9	3.1
Non-Ferrous Metal	0.7	0.9	1.1	1.1	0.8	1.4
Household hazardous items	0.1	0.1	0.1	0.3	0.5	0.6
WEEE[5]	0.4	0.3	1.5	0.9	0.5	0.2
Fines	0.9	1.8	0.7	0.9	0.5	0.6
Total	100.0	100.0	100.0	100.0		100.0

[5] WEEE – Waste Electrical and Electronic Equipment

Table 7: Weight (kg/hh/wk) of residual waste arisings

Category	Newport Pagnell 2005	Newport Pagnell 2006	Bradwell Common 2005	Bradwell Common 2006	Furzton 2005	Furzton 2006
Newspapers and magazines	0.37	1.18	0.93	0.52	0.38	0.39
Other paper and card	0.96	0.92	1.92	0.88	1.55	1.10
Plastic Film	0.41	0.39	0.67	0.45	0.69	0.52
Dense Plastic bottles	0.17	0.22	0.24	0.18	0.14	0.16
Other dense plastic	0.38	0.45	0.74	0.43	0.56	0.45
Textiles	0.38	0.28	0.17	0.23	0.24	0.17
Other Combustibles	1.07	0.66	1.25	0.66	0.75	0.68
Glass packaging	0.56	0.40	0.48	0.41	0.43	0.43
Other glass	0.03	0.04	0.06	0.01	0.08	0.03
Non-Combustibles	0.04	0.06	0.02	0.03	0.11	0.04
Food and kitchen waste	**2.71**	1.89	**4.60**	2.28	**4.57**	4.19
Garden waste	**0.53**	0.43	**0.14**	0.39	**0.90**	0.17
Other organics	0.15	0.29	0.31	0.36	0.25	0.85
Ferrous metal cans	0.09	0.10	0.11	0.09	0.12	0.14
Other ferrous metal	0.09	0.07	0.05	0.06	0.10	0.31
Non-Ferrous Metal	0.06	0.07	0.13	0.08	0.09	0.14
Household hazardous items	0.01	0.01	0.02	0.02	0.05	0.05
WEEE[6]	0.03	0.02	0.18	0.06	0.06	0.02
Fines	0.07	0.14	0.08	0.06	0.05	0.06
Total	8.10	**7.60**	12.10	**7.20**	11.10	**9.90**

The results in Table 6 show that the proportion of food waste in the residual waste has decreased in both trial areas with food waste collections but has increased very slightly in the control area of Furzton.

The results for garden waste are more surprising. In the control area of Furzton the proportion of garden waste in the residual waste decreases from 8.1% on July 2005 to 1.7% in 2006. In Newport Pagnell the decrease is smaller from 6.5% in 2005 to 5.6% in 2006. This could perhaps be expected given that there has been no change to the garden waste collections. However, in Bradwell Common the proportion of garden

[6] WEEE – Waste Electrical and Electronic Equipment

waste in the residual waste has increased from 1.1% to 5.4%. This is perhaps the most surprising result given that the residents have gone from a chargeable fortnightly garden waste collection service to a free weekly collection of garden waste in wheeled bins from all households.

The amount of food waste has decreased in the residual waste. It has decreased by 30% in Newport Pagnell and 50% in Bradwell Common. In the control area of Furzton it has decreased by only 8%.

The results demonstrate that whilst the greatest % decrease in garden waste is observed in Furzton, this area actually had much more garden waste than the other areas according to the results of the initial audit in 2005.

According to the waste audits residual waste arisings have decreased in all areas. The greatest decrease is seen in Bradwell Common at 41%. In Newport Pagnell residual waste has decreased by 6% whilst in the control area of Furzton arisings have fallen by 11%.

3.4.2 Dry recyclables

Table 8 shows the collection rates[7], in kg/household per week, for dry recyclables in each sample area, as well as the % change.

Table 8: Collection rates for dry recyclables

	July 2005 kg/hh/wk	**July 2006 kg/hh/wk**	**% change**
Newport Pagnell	3.3	4.2	+27.2%
Bradwell Common	4.5	5.2	+15.6%
Furzton	4.0	4.2	+5.0%

The collection rate for dry recyclables in July 2006 is higher in each of the three areas than in July 2005. The % increase is much greater in the two areas provided with food waste collection than in the control area, where an increase of only 5% is seen.

[7] Collection rate is defined as the weight of material, in terms of kg per household per week that is collected from each audited household.

3.4.3 Organic waste

Tables 9 to 11 show the collection rates in kg/household per week for source separated organic waste in July 2005 and 2006 (only green waste was being collected in 2005).

Table 9: Newport Pagnell organic waste

	Garden waste (separate)	Food waste (separate)
	Kg/hh/wk	kg/hh/wk
July 2005	0.9	-
July 2006	1.6	0.9

Table 10: Bradwell Common organic waste

	Garden waste (co-mingled)	Food waste (co-mingled)
	Kg/hh/wk	kg/hh/wk
July 2005	1.6	-
July 2006	2.8	1.7

Table 11: Furzton organic waste

	Garden waste
	kg/hh/wk
July 2005	2.8
July 2006	3.1

The results show that there has been a significant increase in the amount of source segregated organic waste collected in Newport Pagnell and Bradwell Common. However, an increase is also observed in the control area of Furzton which would suggest that more residents are participating in the garden waste collections or that the capture rate has improved. This could be as a result of communication regarding the service.

In Newport Pagnell 33% of the total food waste (0.9kg/hh/wk of a total 2.71kg/hh/wk) is source separated. In Bradwell Common 37% of the total food waste (1.72kg/hh/wk of the total 4.60kg/hh/wk) is source separated. The audit results suggest that the

capture rate for food waste will be slightly higher where it is collected co-mingled with garden waste than where it is collected separately.

It is assumed that the majority of the food waste being source segregated and collected in the trial areas would originally have been in the residual waste, although some may have been diverted away from home composting. This is not the case for garden waste as the reduction of garden waste in the residual bin is not sufficient to account for the amount of garden waste being source segregated for collection.

The results of the waste audits (data provided in Appendix 1) demonstrate that there is no contamination of the food waste only bin in Newport Pagnell and minimal contamination in the food and garden waste bin in Bradwell Common at 0.2% (by weight) of non-combustible materials.

3.4.4 Total waste

Table 12 shows the overall arisings in kg/household per week for each of the sample areas.

Table 12: Overall arisings (kg/household per week) of household collected waste

Sample Area	July 2005	July 2006	% change
Newport Pagnell	12.3	14.3	+16.3
Bradwell Common	18.2	17.0	-6.6
Furzton	17.9	17.2	-2.8

The results demonstrate that in Furzton and in Bradwell Common total waste arisings have decreased by 2.8% and 6.6% respectively. However, in Newport Pagnell where food waste is collected separately, total waste arisings have increased by 16.3%. As the residual waste arisings have decreased in this area the increase in total arisings must result from an increase in the dry recyclables and organic waste collected. It should be noted that total waste arisings in this area are still significantly lower than in the other areas despite this increase.

These results differ from those provided by the tonnage monitoring carried out throughout the trial where total waste arisings per household have decreased in Furzton but increased in both Newport Pagnell and Bradwell Common.

3.4.5 Summary results

The main findings from the waste audits carried out in July 2005 and July 2006 are:

- Residual waste arisings per household have decreased between 2005 and 2006. The decrease is smallest in Newport Pagnell and largest in Bradwell Common at 41%. These results differ from the results of the tonnage monitoring carried out for the duration of the trials where a decrease of residual waste arisings per household was observed in both Newport Pagnell and Furzton but no change was seen in Bradwell Common.
- The amount of food waste in the residual waste has decreased. It has decreased by 30% in Newport Pagnell and 50% in Bradwell Common. In the control area of Furzton it has decreased by only 8%.
- In Furzton the proportion of garden waste in the residual waste decreases from 8.1% on July 2005 to 1.7% in July 2006. In Newport Pagnell the decrease is smaller at only 0.9%. In Bradwell Common the proportion of garden waste in the residual waste has increased from 1.1% to 5.4%.
- The collection rate for dry recyclables in 2005 ranged from 4 to 5 kg/household per week. The collection rate for dry recyclables in July 2006 is higher in each of the three trial areas than in July 2005. The increase is much greater in the two trial areas provided with food waste collections than in the control area.
- According to the waste audits the trial food waste collections have increased the total amount of organic waste collected in Newport Pagnell and Bradwell Common between 2005 and 2006.
- The majority of the food waste being source segregated in the trial areas would originally have been in the residual waste stream. This is not the case for garden waste as the decrease of garden waste in the residual bin is not sufficient to account for the amount being source segregated for collection.
- The trial in Bradwell Common achieved the highest overall diversion rate for food waste.

3.5 Cost modelling of food waste collection roll-out

To calculate the collection, transport and processing costs associated with separate food and garden waste collections (Scenario 1) and co-mingled food and garden waste

collections (Scenario 2) for the collection of food waste, ORA worked with their German partner company Ingenieurgemeinschaft Witzenhausen Fricke & Turk GmbH (IGW) to develop a bespoke model based on the population distribution of Milton Keynes, waste statistics collated as a result of the trial collections of food waste, specific cost estimates and working time estimates. Using this data the model was used to estimate the costs of collection, treatment and processing should the food waste collection methods be rolled out borough wide.

It was hoped that working time data would be available directly from MKC, but after consultation it was determined that some of this data was unavailable. As such ORA have used in-house data and some default data from the Kerbside Analysis Tool (KAT)[8]. To test the sensitivity of the model to the different input data, analysis was undertaken to highlight which datasets had the greatest impact on the overall result. The specific input data and the results of the sensitivity analysis are provided in Appendix E.

The output from the model is presented as estimated total costs for the do-nothing (or control) scenario based on the current situation, and as the costs of the two scenarios trialled for the collection of food waste. The impact that food waste collections may have on savings in the purchase of LATS is not considered as part of the cost modelling done here. It is considered fully in Section 3.6.2.

Some assumptions have been made in order to operate the model. These may not reflect final operational decisions but have been necessary in the absence of more specific data. These are listed below:

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[8] KAT is a spreadsheet that allows users to make projections of kerbside collection infrastructure and associated standardised costs. KAT was developed by Dr. Julia Hummel of Eco Alternatives Ltd, under a Landfill Tax Credit Scheme funded and project managed by Waste Watch. WRAP have reached an agreement with Waste Watch to take responsibility for KAT and to continue its development.

1. Collections of food waste only are assumed to be made using a bespoke collection vehicle with a capacity of $7m^3$ and a 3 tonne payload. The cost of each vehicle is assumed to be £29,000. An example of a similar vehicle used for the collection of food waste only in Preston is shown in Figure 12. It should be recognised that such vehicles are not currently in widespread use but are believed to offer a more efficient means of collection of food waste on its own than other more conventional waste collection vehicles.

Figure 12: Bespoke food waste collection vehicle used in Preston food waste collection pilot (similar, though not identical to that defined in cost model)

2. Collections of garden waste and co-mingled food and garden waste are assumed to be made using a standard RCV with 240 litre bin lifting equipment. The cost of each vehicle is assumed to be £120,000.
3. Food waste collections will not be combined with dry recyclable collections on the same vehicle.
4. Households in flats and multi-occupancy housing would not be provided with a co-mingled collection of food and garden waste, or a collection of garden waste only as they would be unable to accommodate the larger wheeled bins.
5. The amount of waste likely to be put out by participating households is based on the trial data.
6. The amount of waste likely to be diverted from the residual bin is based on the trial data.

7. Participation rates for different scenarios are based on the results of the trials.
8. The participating households are assumed to be evenly distributed across each ward.
9. Disposal costs have been set at:
    i. £23.50 per tonne for separately collected green waste
    ii. £40 per tonne for co-mingled garden and food waste, and separately collected food waste

Table 13 summarises the general information associated with each scenario and details the subsequent costs. The costs are presented as an overall total and also as a reduced total taking account of savings in costs from a) the processing of a reduced tonnage of residual waste, and b) the net revenue associated with the current chargeable garden waste collection once the estimated costs of administering the scheme had been deducted. The roll-out collection methods are named as follows:

1) Scenario 1a: Separate collection of food and garden waste with food waste being treated at the High Heavens in-vessel composting facility located in High Wycombe and garden waste being treated at local open windrow composting sites.
2) Scenario 1b: Separate collection of food and garden waste with food waste being treated at a “theoretical” in vessel composting facility located in Old Wolverton in Milton Keynes and garden waste being treated at local open windrow composting sites.
3) Scenario 2a: Co-mingled collection of food and garden waste for treatment at the High Heavens in-vessel composting facility located in High Wycombe.
4) Scenario 2b: Co-mingled collection of food and garden waste for treatment at a “theoretical” in vessel composting facility located in Old Wolverton in Milton Keynes.

Table 13: Overall cost summary

scenarios garden / food waste collection	Milton Keynes	

general information		current	scenario 1a	scenario 1b	scenario 2a	scenario 2b
total households		**83,396**	**94,768**	**94,768**	**83,396**	**83,396**
- co-mingled garden & food waste	hh				83,396	83,396
- garden waste	hh	83,396	83,396	83,396		
- food waste	hh		94,768	94,768		
participation rate		**20.3%**	**53.8%**	**53.8%**	**60.4%**	**60.4%**
- co-mingled garden & food waste	%				60.4%	60.4%
- garden waste	%	20.3%	23.7%	23.7%		
- food waste	%		53.8%	53.8%		
participating households	hh	**16,929**	**50,985**	**50,985**	**50,371**	**50,371**
- co-mingled garden & food waste	hh				50,371	50,371
- garden waste	hh	16,929	19,765	19,765		
- food waste	hh		50,985	50,985		
amount of waste to collect	t / y	**5,204**	**14,882**	**14,882**	**12,576**	**12,576**
- co-mingled garden & food waste	t / y				12,576	12,576
- garden waste	t / y	5,204	6,505	6,505		
- food waste	t / y		8,377	8,377		
reduction of residual waste	t / y	**5,204**	**8,586**	**8,586**	**7,797**	**7,797**
- co-mingled garden & food waste	t / y				7,797	7,797
- garden waste	t / y	5,204	963	963		
- food waste	t / y		7,623	7,623		

total costs		current	scenario 1a	scenario 1b	scenario 2a	scenario 2b
- per participating household per year	£ / hh / y	**58.8**	**70.3**	**63.2**	**46.2**	**43.3**
- per household per year (all hh)	£ / hh / y	**14.9**	**38.4**	**34.6**	**27.9**	**26.1**
- per tonne of waste per year	£ / t / y	**191.4**	**240.8**	**216.5**	**184.9**	**173.3**
- total cost per year	£ / y	**995,806**	**3,583,947**	**3,221,713**	**2,324,828**	**2,179,936**

total costs less savings / income		current	scenario 1a	scenario 1b	scenario 2a	scenario 2b
- per participating household per year	£ / hh / y	**48.1**	**58.6**	**51.5**	**40.7**	**37.9**
- per household per year (all hh)	£ / hh / y	**12.8**	**32.1**	**27.8**	**24.6**	**22.9**
- per tonne of waste per year	£ / t / y	**156.4**	**200.7**	**176.4**	**163.2**	**151.6**
- total cost per year	£ / y	**559,686**	**2,986,868**	**2,624,634**	**2,051,849**	**1,906,957**

Figures 13 and 14 graphically present the costs of each scenario as a total per annum as well as per household and per tonne of organic waste collected. Both graphs include any savings in the cost of processing residual waste, and costs and revenue associated with the current chargeable garden waste collection service.

Figure 13: Annual net cost of food waste collection

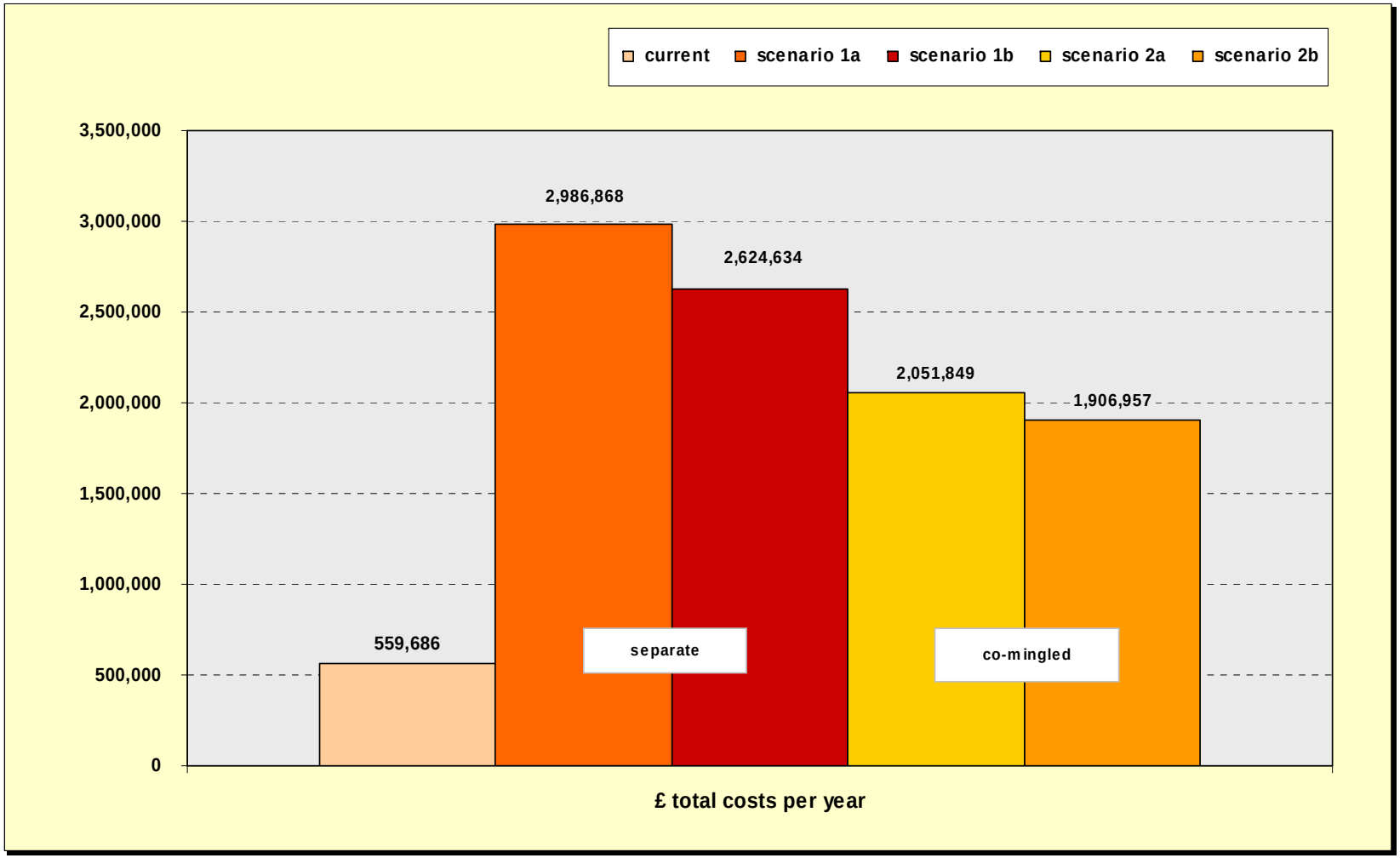
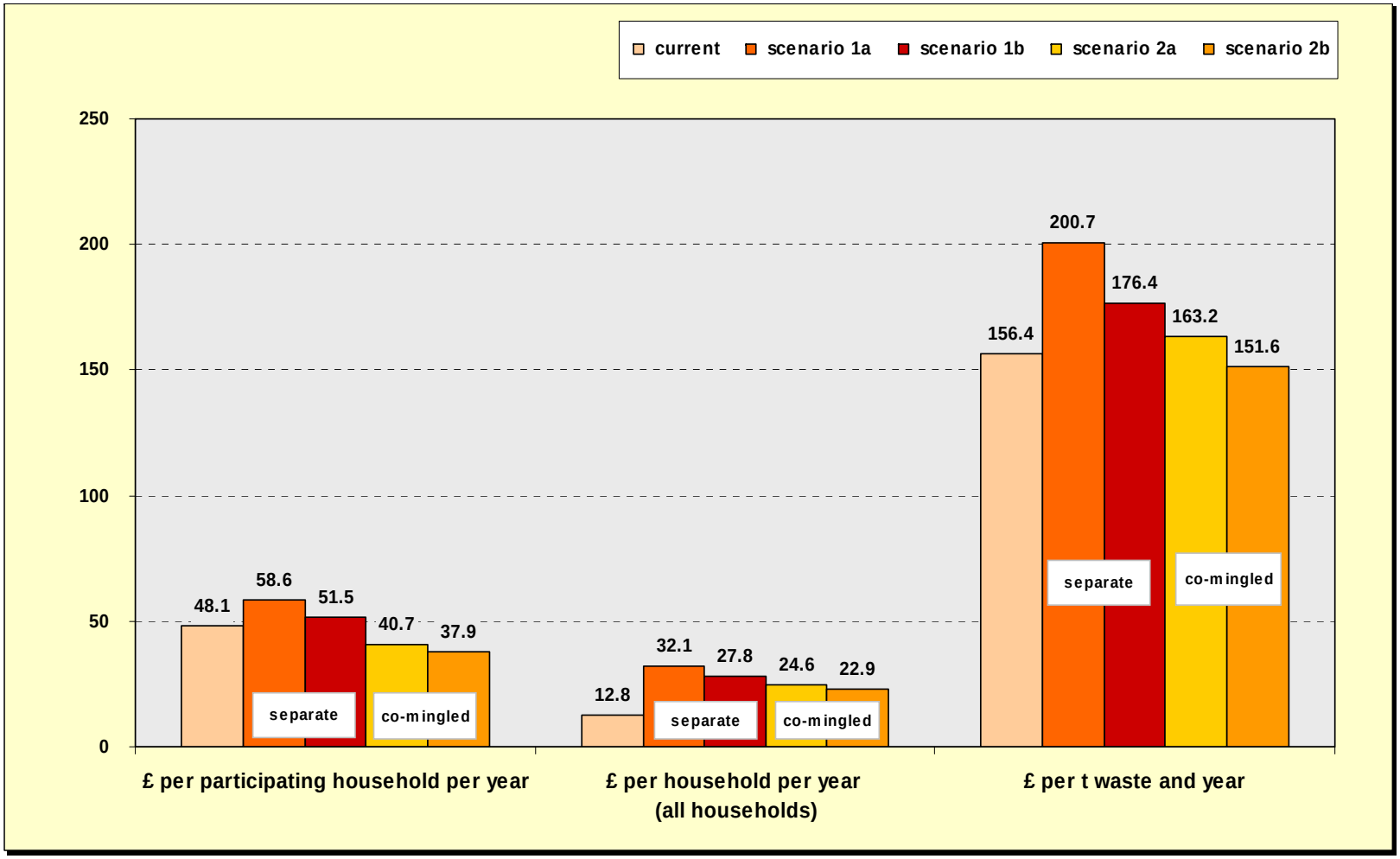


Figure 14: Annual net cost per household and per tonne



The results demonstrate that the collection of food waste in either scenario would give rise to higher overall annual costs than the current collection of garden waste. The implementation of Scenario 1 (separate food waste collection) gives the greatest increase in annual costs from the current cost of garden waste collection at just over £550,000 per year, to between £2.6 (if waste treated in Milton Keynes) and £3.0 million per year (if waste treated outside Milton Keynes). The cost per household and per tonne of waste is also significantly increased. This is because the collections demand a separate fleet of vehicles and yet involve relatively small tonnages. Garden waste is also separately collected through the chargeable collection service and thus adds additional costs.

Implementation of Scenario 2 would result in an increase in annual costs to between £1.9 (if waste treated in Milton Keynes) and £2.0 million per year (if waste treated outside Milton Keynes). However, the cost per participating household is decreased because as a greater number of households are provided with the service it becomes more economical. The cost per tonne of waste collected (if treated at a local facility – Scenario 2b) is also decreased. The extra tonnage of garden waste that has to be processed as catering waste at the higher gate fee with co-mingled collections is offset by the reduced cost of treatment at the local facilities and reduced collection costs achieved through co-mingled collections.

Both scenarios have reduced costs if the food waste or co-mingled food and garden waste is treated at a “theoretical” facility within Milton Keynes rather than at the in-vessel composting facility used to process the waste collected in the trials, located outside the borough at High Wycombe.

The model provides a useful tool to estimate possible relative costs of the different scenarios but it is important to recognise the limitations of the model, the accuracy of the input data and the assumptions made.

The key areas that need consideration are:

1. The participation rate associated with each scenario has a high impact on the resulting cost of the service. The model is sensitive to small changes in participation rate because it affects the number of bins that can be collected per day. ORA have used the participation rate observed in the trial areas as the basis for the modelling.
2. The weekly collection frequency of co-mingled food and garden waste has a large impact on the service costs. In ORA's experience where food and garden waste are collected in the same bin, a fortnightly collection frequency may well be adequate. The garden waste can mask or cover the wetter more odorous food waste whilst in the bin and mixing food waste with garden waste can mitigate against food waste sticking to the sides of the bin as the coarser garden waste helps to 'self-clean' the bin when emptied. Both of these effects can help make fortnightly collections more acceptable which would significantly decrease the overall service cost of Scenario 2.
3. The model does not include consideration of the savings that could be made by reducing the frequency of the collection service for residual waste to fortnightly if the food waste collections are successful. Practical examples of this are taking place in Somerset with residual waste collections alternating with weekly food and dry recyclables, or in Tonbridge and Malling Borough Council where food, garden and card waste are collected on alternating weeks to residual waste[9]. This may offer a potential saving that could offset the costs of additional food, or food and garden waste collection. It may also result in greater participation and captures rate associated with the dry recyclable and organics collections as the residual waste capacity available to the residents is limited.

3.6 Performance modelling

The data obtained during the trial has been used in the modelling of immediate performance against Best Value Performance Indicators (BVPIs) in recycling (indicator 82a) and composting (indicator 82b), and obligations under the Landfill Allowance Trading Scheme (LATS) until 2016-2017, should either of the food waste

[9] For a summary report on the TMBC collections see:
http://www.o-r-a.co.uk/pdf/TMBC_Final_Summary_Report_Edition_2.pdf

collection methods used in the trials be rolled out to the maximum number of households in Milton Keynes.

3.6.1 BVPI recycling and composting performance

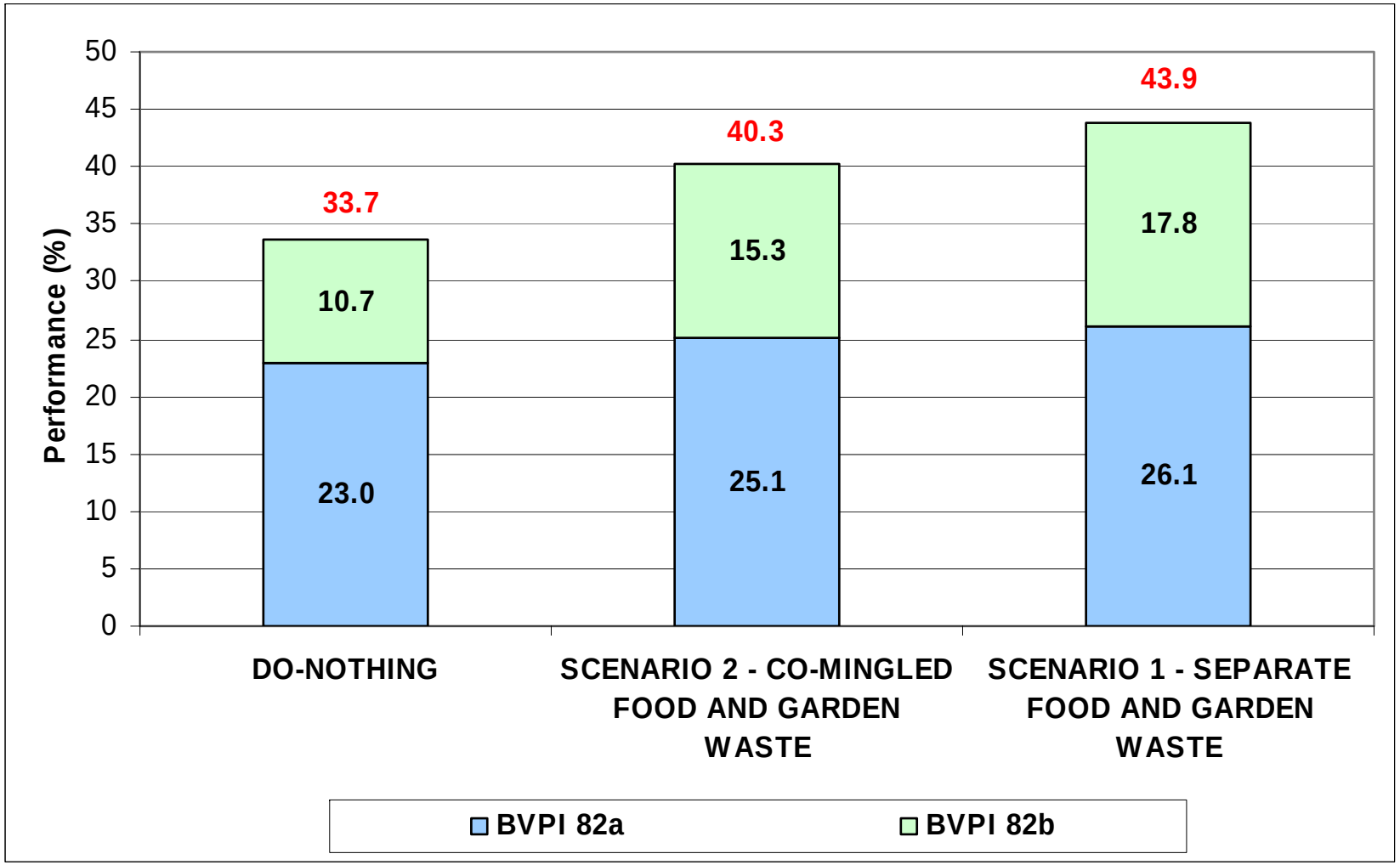
The BVPI performance that could be achieved if food waste collections are rolled out to all suitable households in Milton Keynes has been calculated against a 'do nothing' scenario where food waste is not collected and the garden waste collection continues as a chargeable opt-in service subscribed to by the same number of residents as it is currently.

The performance modelling has been based on data gained during the trial as well as borough wide data for the period of November 2005 to October 2006 including:

- Amount of food and garden waste collected per participating household
- Amount of food and garden waste diverted from the residual waste stream
- Participation rate
- Impact of food waste collection on the dry recyclable collection in terms of kg per household per week and participation rate

Figure 15 shows the impact that the implementation of food waste collections, either separately as trialled in Newport Pagnell, or co-mingled with garden waste as trialled in Bradwell Common, could have on BVPI performance. Full details associated with the calculations are provided in Appendix F

Figure 15: BVPI Performance



The results demonstrate that the greatest increase in BVPI recycling and composting performance will be achieved through the implementation of Scenario 1. This will give an increase of approximately 10 percentage points. Implementation of Scenario 2 will also give rise to an increase in performance of just over 6 percentage points.

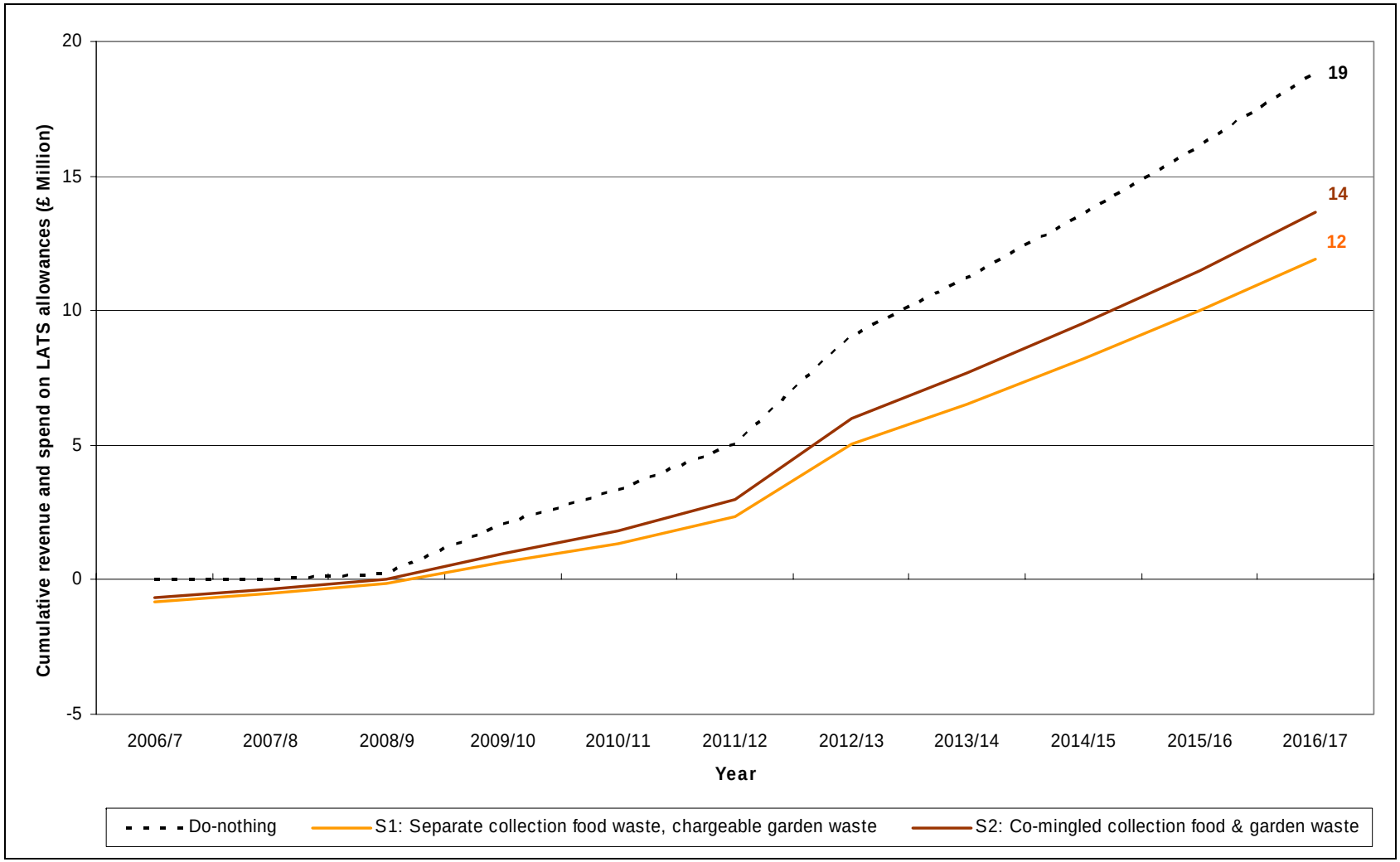
3.6.2 LATS obligations and cost benefit of food waste collection

The same data upon which the BVPI performance modelling is based has been used to model the impact that the introduction of food waste collections across Milton Keynes may have on the diversion of biodegradable municipal waste (BMW) as required by LATS. Modelling of the impact that the collection of food waste would have on LATS obligations was carried out for the next ten year period up until 2016-2017 inclusive. Again, the impact of food waste collection against the 'do-nothing' scenario has been compared. The impact of the food waste collections on the dry recyclable collections (which includes biodegradable materials such as paper and card) has been taken into consideration.

Figure 16 shows the impact that the collection of food waste will have on the spend on purchase of LATS allowances and on revenue from the sale of allowances. The price at which allowances are traded is fixed at £50 per allowance in all years except target years when they are £100 per allowance[10].

[10] These prices were suggested by MKC.

Figure 16: Annual revenue and spend on LATS allowances

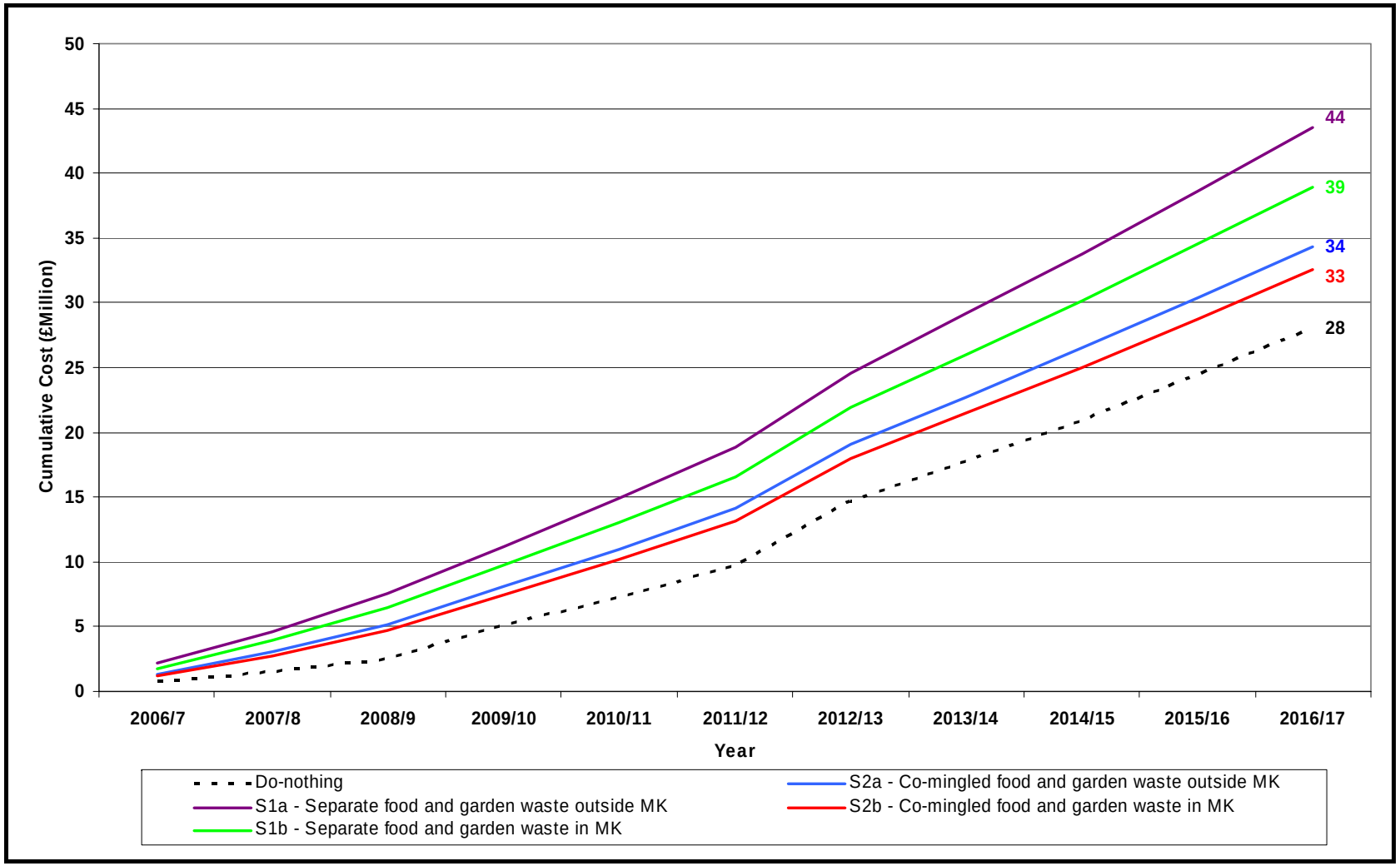


Implementation of food waste collection using either collection method will result in greater savings on purchase of LATS allowances and generation of revenue from the sale of allowances in comparison to the do-nothing scenario. Separate food waste collection gives rise to the greatest savings of £7M when compared with the do-nothing scenario.

However, the additional costs associated with the collection and processing of food waste, or co-mingled food and garden waste will need to be taken into account. Because of this a cost-benefit analysis was undertaken whereby any savings in the purchase of LATS allowances or revenue generated from trading in LATS allowances were offset against the increased costs for collection and processing as detailed in Section 3.6.

Figure 17 shows the cumulative costs of food waste collection against the do-nothing option. Costs include collection, transport and processing of the waste as well as savings in purchasing of LATS allowances and revenue from the sale of allowances. Full details of all the modelling are provided in Appendix G.

Figure 17: Cumulative cost of food waste collection and treatment, minus savings from reduced need to purchase LATS allowances and treat residual waste



The collection of food waste in either scenario would generate significantly higher costs than the do-nothing scenario, even when the savings in the purchase of LATS allowances associated with the diversion of BMW are taken into account. The option giving the lowest additional cost is the co-mingled collection of food and garden waste with treatment at an in-vessel facility within Milton Keynes at Old Wolverton in Scenario 2b (used for cost modelling purposes and proposed by MKC). Co-mingled collection of food and garden waste results in lower additional costs than separate food and garden waste collections as the waste collection costs are lower.

However, the modelling is based on the results of the trials and a number of assumptions have been made which, if varied, could give drastically different results. The key assumptions are:

a) Collection and processing costs are based on the tonnages of food and garden waste predicted by the trial results.
b) The participation and capture rate associated with the services remains constant and does not increase or decrease. The participation rate, and hence the number of bins collected per day, has been shown to have a significant impact on service cost. Increase in the participation rate could result in the collection of food and garden waste becoming significantly cheaper than the results of the modelling currently indicate.
c) The costs of collection and processing increase at an inflation rate of 2.5% per annum. This again could vary widely.
d) The gate fee for landfill increases by 9% per annum plus £1.50 per tonne in 2007-2008, and £3 per tonne per year thereafter.
e) Landfill tax increases by £3 per annum to a maximum of £35 per tonne.
f) LATS allowances can be traded at £50 per tonne or £100 per tonne in target years.
g) MKC are able to purchase allowances at these rates rather then incurring LATS fines of £150 per tonne.

Changing any of the above is likely to alter the modelling outcomes. It should also be remembered that should the council change the frequency of the residual waste

collection service to alternate weekly and utilise the same RCVs for the collection of residual waste and organic waste (collected fortnightly), significant savings could be made which might result in the collection of food waste becoming cost-effective. MKC should ensure that sufficient residual waste capacity is available to residents if they reduce the residual waste collection frequency to fortnightly. Alternate weekly collection of residual waste may also have a positive impact on the participation and capture rate associated with the collection of dry recyclables and organic waste and so increase the performance of these collections.

The council could also consider changing the collection frequency for co-mingled food and garden waste from weekly to fortnightly which would result in a reduction in the cost of the service and may make the collection costs of co-mingled food and garden waste in Scenario 2 more attractive.

3.7 Resident attitudes

Feedback from residents was received via phone, personal caller and occasional e-mail. In addition, feedback was supplied by Cory regarding the number and nature of tickets that were issued to residents explaining why their food or food and garden waste bins were not collected.

3.7.1 Phone, email and visitor enquiries

Figures 18 and 19 show the number and nature of phone, email and visitor enquiries logged from residents in the Newport Pagnell trial area (separate food waste collections) and the Bradwell Common trial area (co-mingled food and garden waste collections) broken down by the nature of the query. The ‘elderly/disabled’ category was used to indicate any enquiries from elderly or disabled residents regarding collection issues which could include requests for assisted collections. The ‘remove bin’ category was used where a resident requested that their food or food and garden waste bin be removed as they did not want to participate in the food waste trials. The ‘bin refund’ category was used in Bradwell Common where residents were enquiring about a refund of the annual charge they had already paid for the collection of garden waste only, under the ‘opt in’ garden waste collection service offered across Milton Keynes.

Figure 18: Number and nature of resident's enquiries in Newport Pagnell

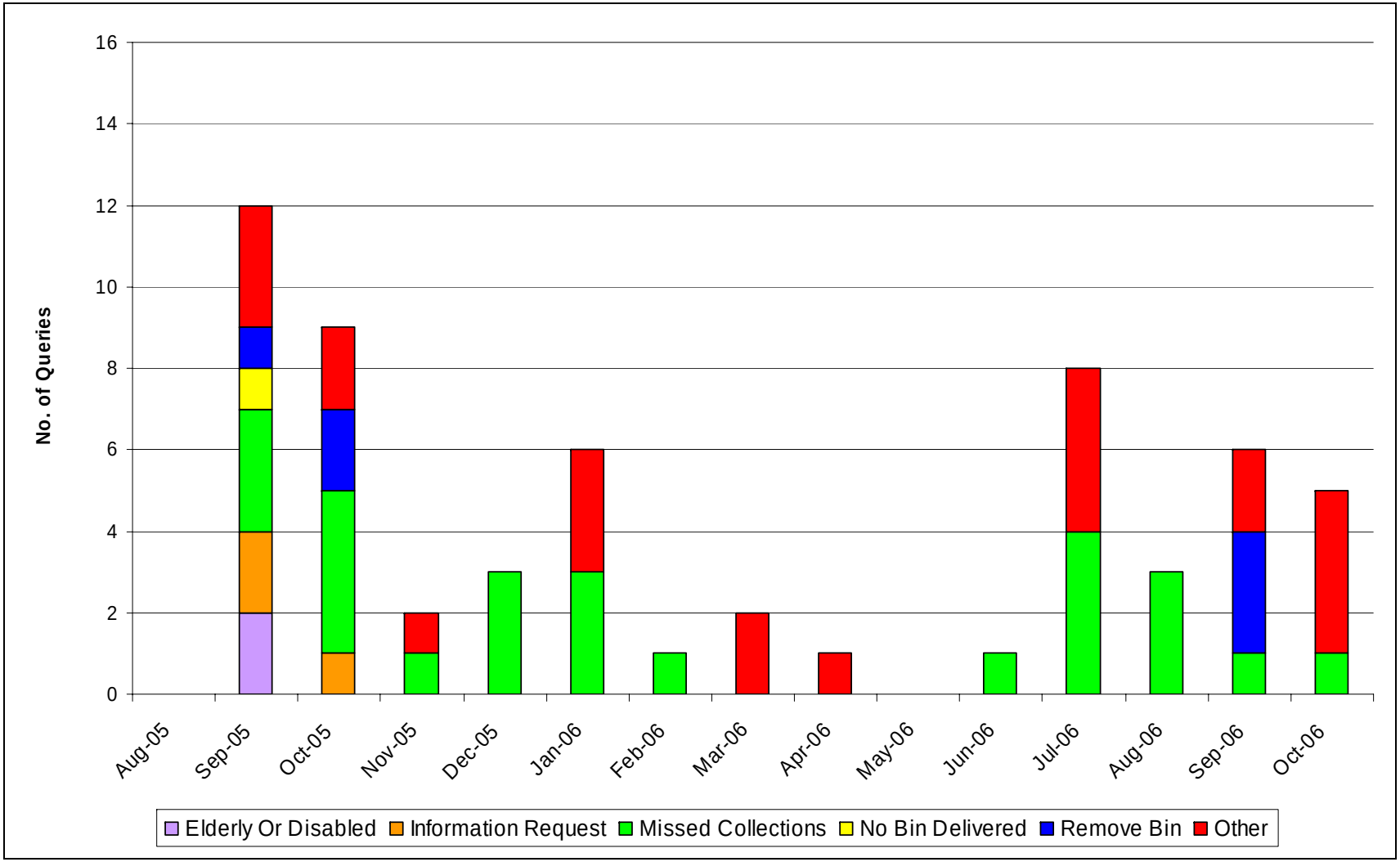
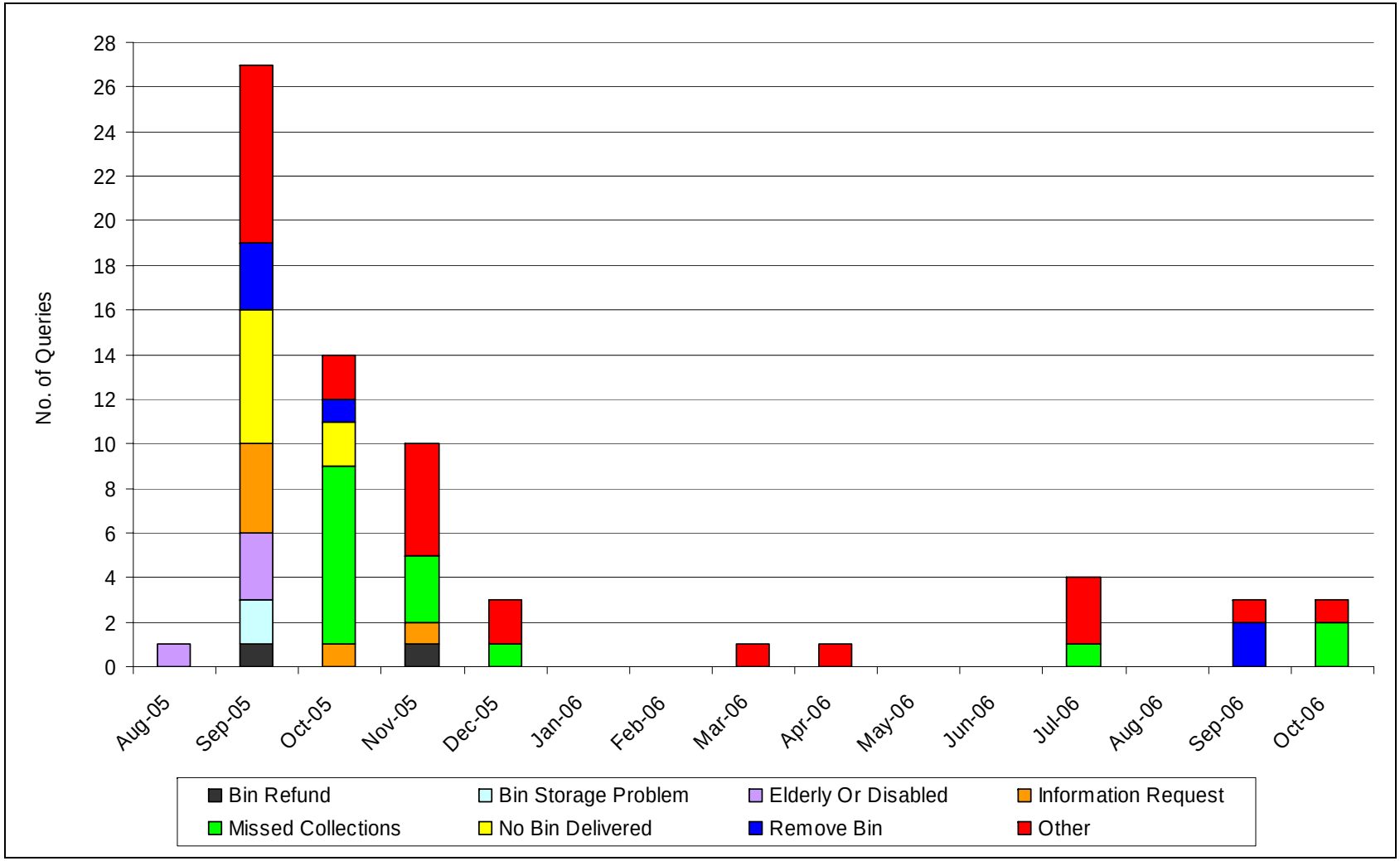


Figure 19: Number and nature of resident enquiries in Bradwell Common



Over the course of the trial 59 queries were received from Newport Pagnell and 69 from Bradwell Common. It is evident from the graphs that most queries were received in the initial stages of the trial presumably because it was a new service that residents needed to get used to. In September and October 2005 the number of queries received represented 35% of the total received in Newport Pagnell and 61% of the total received in Bradwell Common. The issue most frequently reported by residents in Newport Pagnell was missed collection of their food waste bins (42%) followed by a range of 'other' queries (37%). 'Other' queries were wide ranging in their nature – the only frequently identified reasons being damaged or stolen bins. In Bradwell Common 'other' queries were most common (36%) followed by missed collections (22%).

In the early stages of the trials residents in both areas also requested additional information, a few complained that no bin had been delivered and fewer still asked for their food waste bins to be removed as they did not wish to participate in the trials (only 6 queries in each area).

By December 2005, queries were related either to missed collections (mostly in Bradwell Common) or they fell into the 'other' category. .

It did not appear that distribution of either the Christmas or summer newsletter (in December 2005 and August 2006) had much impact on the number of queries received although it was notable that in each area in September 2006 there were several instances of people asking for bins to be removed (3 in Newport Pagnell and 2 in Bradwell Common). It is suggested that this was at least in part a result of the door knocking exercise of non-participants where some residents requested to be taken out of the trial.

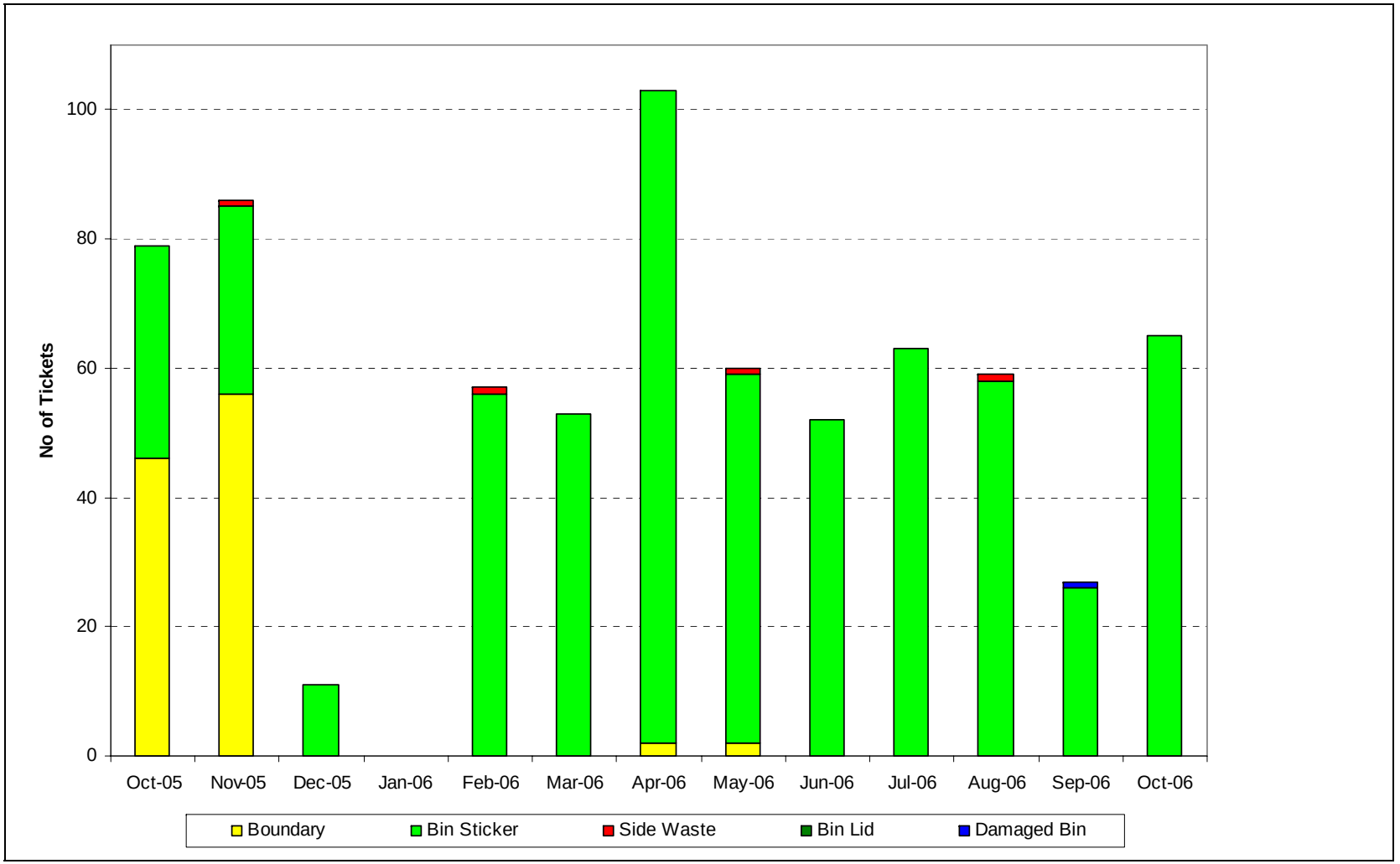
3.7.2 Crew tickets

Figure 20 shows the number of crew tickets issued by the collection crews in Bradwell Common and where possible is broken down into the reason for the ticket being issued. The reasons given on the information provided to residents for their bin not being collected included:

- The bin was not placed at the boundary of the property ('Boundary')
- The bin contained materials not permitted according to the bin sticker ('Bin Sticker')
- Side waste had been put out along with the food or food and garden waste bins ('Side Waste')
- The food or food and garden waste bin lid was not closed ('Bin Lid')
- The bin was damaged ('Damaged Bin')
- Other

There were approximately 715 crew tickets issued in Bradwell Common over the course of the trial compared to 5 in Newport Pagnell. Given the small number of tickets issued in Newport Pagnell no graph has been created.

Figure 20: Number and nature of crew tickets issued in Bradwell Common



It is evident from the graph that contamination of the bins (i.e. bins did not contain what was listed on the *bin sticker*) was by far the biggest reason for the crews leaving a ticket for residents. Where prohibited materials (according to the bin sticker) were included in the bin, a ticket was left. The most frequent contaminating material was plastic bags. The number of bins with contamination appears to show a general trend of increasing throughout the trial. In October and November 2005 during the initial stages of the trial there were some issues with residents not placing the bins at the boundary of their property. This problem appears to have been resolved as the trial became established and residents became accustomed to the new waste collections.

In December 2005 there was a decrease in the number of tickets issued by the crew with no tickets being issued in January 2006. This decrease may have been partly a result of the Christmas newsletter but it is difficult to quantify the extent of the impact. Interestingly, following the distribution of the summer newsletter in August 2006 there is another noticeable decrease in the number of tickets issued to residents as a result of contamination in the food or food and garden waste bins. It is possible that having read the summer newsletter, those residents participating in the food waste collection service had increased awareness of the acceptable materials that could be disposed of in the food waste bins and thus there were fewer incidents of contamination. However at the same time targeted door knocking was also carried out and a newly appointed Communications Officer was carrying out recycling promotional work. It is likely that all these factors have played a part in influencing the number of crew tickets distributed.

Perhaps the most obvious point to make about the crew tickets result is the difference in numbers issued between trial areas. It would be easy to draw a conclusion that the separate food waste collection scheme posed fewer challenges and issues for residents compared to the co-mingled collections but this is likely to be too simplistic, especially considering the novel waste stream, containers, and behaviours required of the separate food waste collections. It is likely that more contaminating materials were found in the wheeled bins used for the collection of food and garden waste because residents were accustomed to using these bins for the disposal of general waste, and as such might inadvertently place unsuitable materials in the food and

garden waste bin. It is possible that socio-demographic differences between trial areas were also a factor here although it is impossible to demonstrate this precisely.

3.7.3 Results of focus groups

The attitude of residents to the food/food and garden waste collection service provided in the two trial areas was assessed by means of focus groups. 129 residents from both trial areas were invited to the focus groups.

Respondents to the initial notification were assessed to ensure that they had participated in the food waste trial on at least one occasion and were then invited to attend the focus groups. One focus group was held per trial area in May 2006. The attendance at each focus group is shown in Figure 21. It should be remembered that with such a small sample size the responses from the residents at the focus group are not necessarily representative of the views of the other residents within the trial areas. It is likely that those residents attending the focus groups have a more positive attitude to the food waste collection trials than the 'average' resident. As such the responses may have a more positive skew than the general feeling in the trial areas. Nevertheless, it was considered a valid exercise to gain an understanding of residents' views.

The focus groups were structured around a series of open questions covering various aspects of the collection service. The attendees were asked what types of foodstuffs they usually placed in the food/food and garden waste bin. Attendees were specifically asked about meat, dairy products, bread and liquid food wastes. The responses varied between the groups as demonstrated in Figure 22.

Figure 21: Focus group attendance

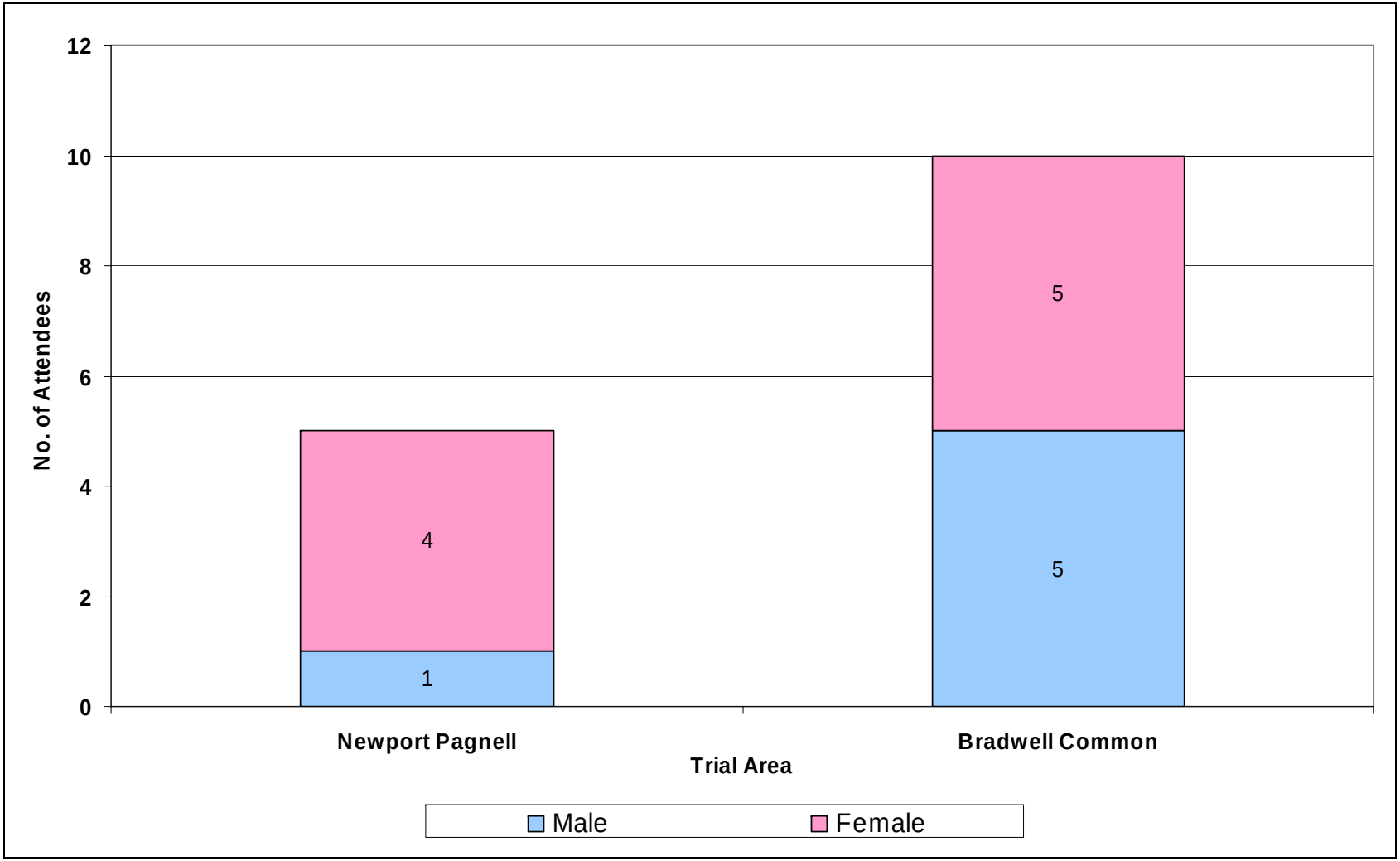
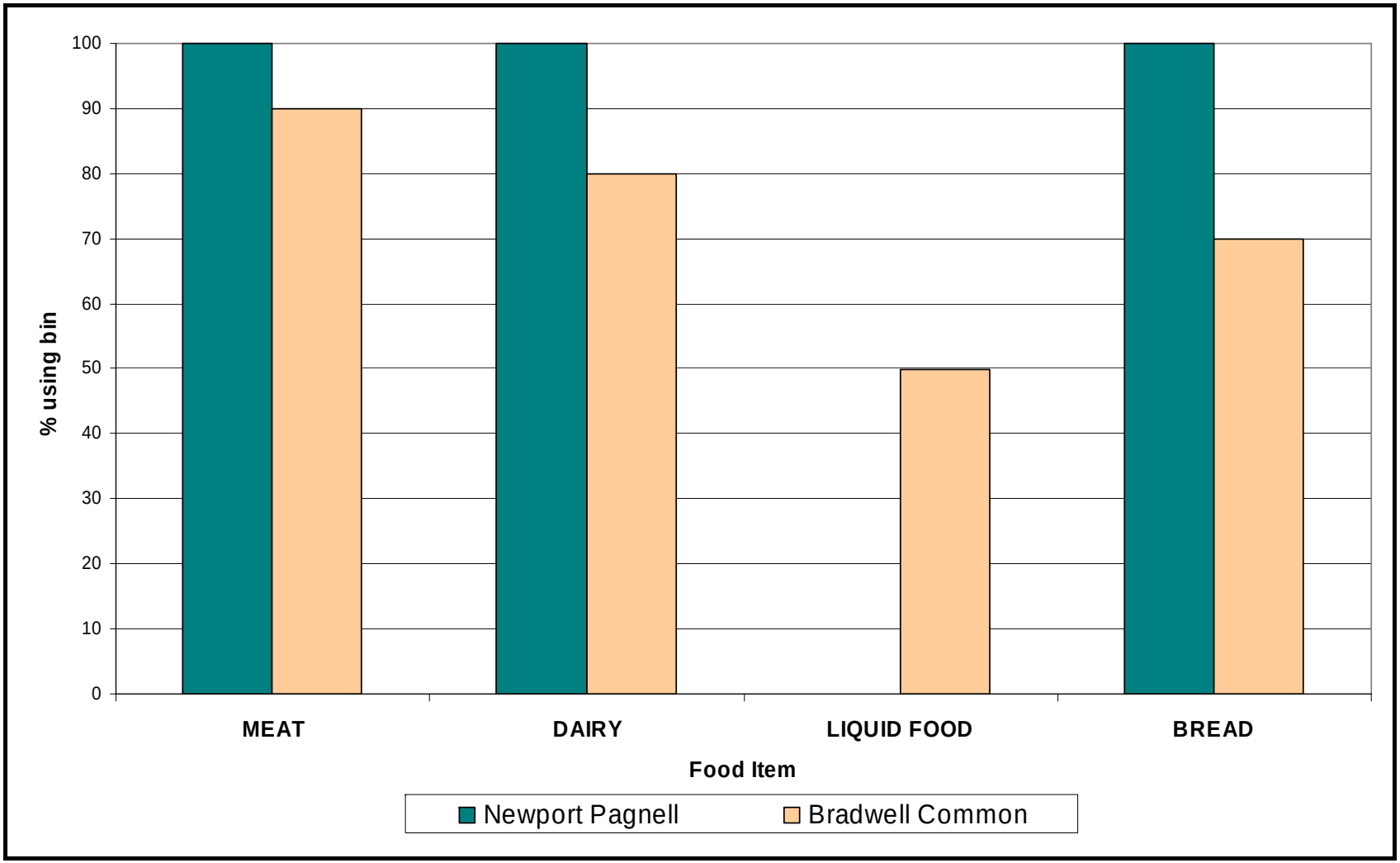


Figure 22: Use of food waste bin

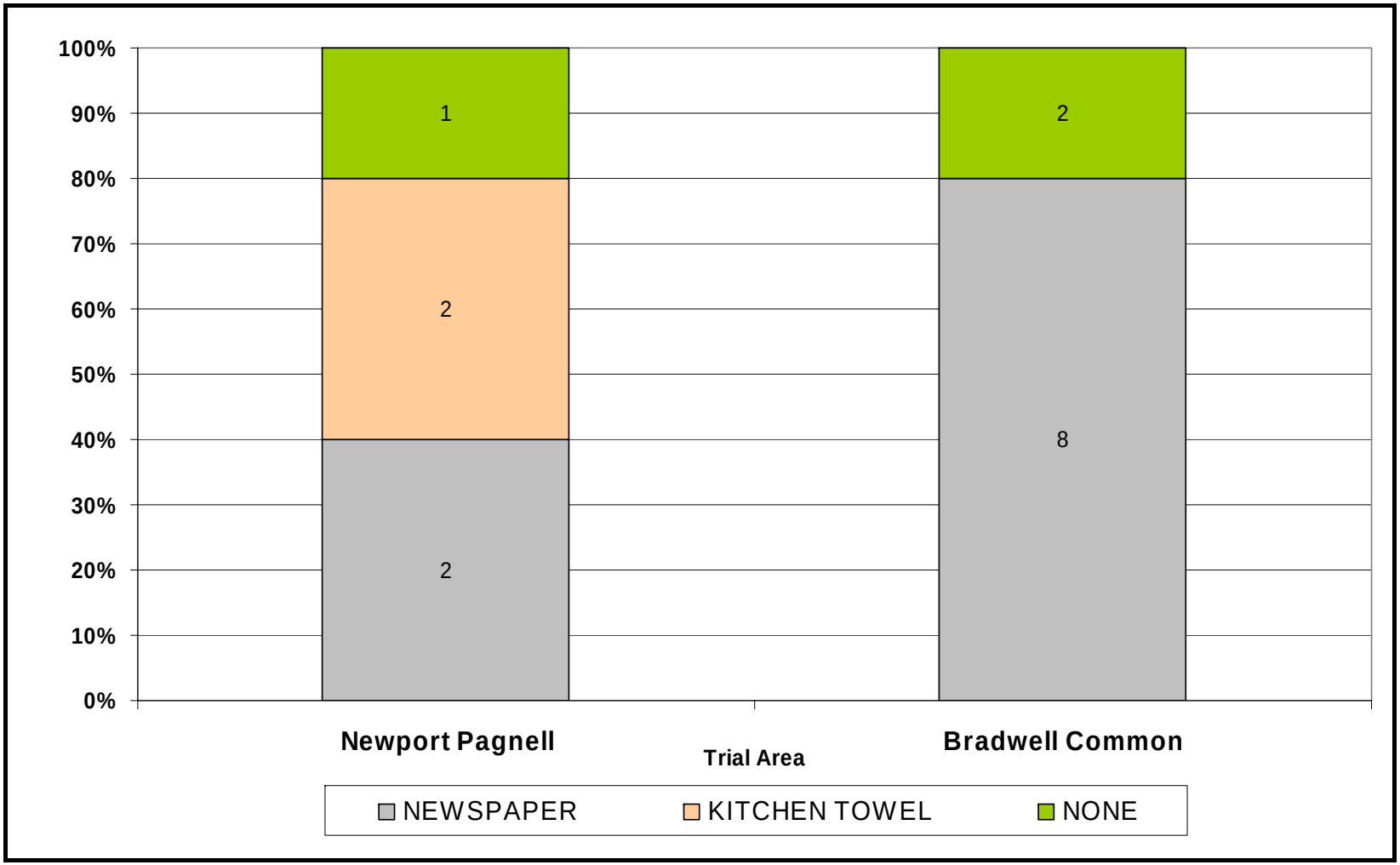


All attendees from Newport Pagnell used the bin for the items described, excluding liquid food waste which none of them disposed of in the food waste bin. In Bradwell Common the response was more varied. It is possible that those residents in Newport Pagnell (where food waste only is collected) do not use the bin for liquid waste as there is less drier garden waste to absorb the wetter food waste. It is also possible that the residents simply did not understand the types of materials that could be included in the bins, which could be overcome by additional targeted communication.

Both groups were questioned about the communication materials used in promotion of the trials with the general consensus being that the material sent out was clear and easy to use. A point of interest is that both groups mentioned that the reference to the potential council tax increases associated with exceeding obligations under the LATS was an incentive to using the food waste collection service. This could be an important message to include in future communication materials if the food waste collection service is rolled-out across the borough.

When asked about the bins and caddies the general feeling from both groups was that the caddy was of adequate size to store within the kitchen. Views were varied on the colour of the caddy. One resident in Newport Pagnell complained that the handle had broken off her kitchen caddy when it was full and at maximum weight. This was not reported by any other residents in either trial area. The attendees were asked whether they lined their kitchen caddy. The responses are summarised in Figure 23.

Figure 23: Method of lining caddy



In both areas 80% of the residents line their caddies either with newspaper or kitchen towel. 20% of residents do not line their caddies at all. When asked whether they would pay for biodegradable liners 60% of the residents in Newport Pagnell said they would be willing to purchase liners. In contrast, in Bradwell Common 100% of the residents stated that they would not pay for liners and would rather use newspaper. This could be due to the collection of food waste only in Newport Pagnell and the perception that this is more dirty and smelly than co-mingled collections of food and garden waste in which the garden waste may help to absorb some of the wetter food waste and also helps to self clean the bin on emptying. Thus residents with food waste only collections are more likely to want to wrap or contain their food waste rather than putting it directly into the bin and may pay for proper liners to do so. None of the residents washed their caddy using a dishwasher even though the caddy was dishwasher-safe.

In Bradwell Common residents commented that they felt 'guilty' putting out the food waste bins when they contained only a small amount of waste. This practice should not have an overall effect on the amount of putrescible waste source segregated but will obviously affect the participation rate measured for the service.

A point to note is that both groups had experienced problems with the collection crews not returning the bins to the correct household. This issue should be addressed should food waste collection be expanded across the borough as it could discourage residents from participating in the service.

When asked to list the positive aspects of their food waste collection, both groups listed the same following features:

- ✓ Less odour from the residual waste bin
- ✓ Reduction in the volume of residual waste
- ✓ Fewer problems associated with attraction of vermin to the residual waste sacks (e.g. tearing open of sacks) as food waste now contained in a solid lidded bin rather than in the black sacks
- ✓ Environmentally friendly
- ✓ Service is easy to use

The residents in Newport Pagnell liked the fact that their 25 litre bin had a lockable lid whilst those in Bradwell Common suggested that they would like their wheeled bins to come with a lockable lid.

The negative aspects provided by each group were different. Attendees from Bradwell Common gave the following response:

- Odours arising from food and garden waste bin
- Stability of the wheeled bin
- Poor fit of lid on wheeled bin
- No liners provided for food waste caddy
- Would like to include card in organic waste collection to avoid tearing of the pink plastic sack currently used for collection of recyclables

In contrast, residents from Newport Pagnell gave the following responses:

- The bin is light when not full of waste and can be blown away
- It is a 'hassle' to empty the caddy, especially for people in flats that have several flights of stairs
- If the caddy is not emptied it can begin to smell

When questioned about suitable frequency for residual waste collection, and whether a fortnightly collection frequency would be sufficient, all of the residents in the Newport Pagnell focus group (separate food waste) stated that fortnightly collection would not be sufficient, whilst the majority of the residents in the Bradwell Common focus group (co-mingled food and garden waste) felt that the residual waste could be collected every fortnight since so much material was diverted to composting or recycling.

The residents were also asked whether they would prefer to have their food waste collected as per the alternative trial methodology. In Bradwell Common only 20% of the residents wanted to switch to separate food waste collection, whilst in Newport Pagnell 40% of the residents wanted to switch to co-mingled food and garden waste collection.

Top line results from each of the focus groups are presented in Appendix H.

3.7.4 Results of door-knocking exercise

As a result of the set out monitoring, and reporting of instances of contamination in the food waste bins, it was decided by MKC, ORA and Cory that door-knocking exercises and face to face communication with the residents would be carried out.

3.7.4.1 Poor participation door-knocking

Households in Bradwell Common and Newport Pagnell that had been identified as persistent non-participants in the food waste collections were targeted in a door knocking exercise on the 21st and 22nd August 2006.

A total of 35 households were targeted in Newport Pagnell of which 10 residents were spoken to. 15 households were targeted in Bradwell Common and of these 5 residents were spoken to. Where residents were out and therefore not spoken to, a letter was left providing information of the food waste collection service and encouraging them to participate (Appendix I)

The residents were questioned regarding their reasons for not participating in the scheme including whether or not they had been provided with a bin and information regarding the service. Of those residents spoken to 33% stated that they did not have a caddy or bin for the collection of food waste and gave this as their reason for not participating. In these cases arrangements were made for the delivery of new bins and caddies.

After the door knocking exercise the set out rate monitoring for the remaining eleven weeks of the trial indicated the following:

- In Newport Pagnell the 35 targeted households put out 35 food waste bins (of a maximum 385) giving a set out rate of 9%.
- In Bradwell Common the 15 targeted households put out 22 food and garden waste bins (of a maximum 165) giving a set out rate of 13%

The results suggest that whilst door-knocking and face to face communication with residents is expensive and resource intensive, if targeted accurately, it can increase the set out rate for recyclable collections and as such will have a positive effect on service performance.

3.7.4.2 Repeat contamination door-knocking

Thirteen households identified as being 'persistent contaminators' of their food and garden waste bins in Bradwell Common were identified and targeted for door knocking on the 1st August 2006. The door knocking was done for the following reasons:

- to explain why they were given tickets by the collection crew
- to find out why they contaminated the bin and to suggest ways to overcome this
- to explain why it was important NOT to contaminate the food/garden waste bin
- to explain that if they continued to contaminate their food waste bin they could be issued with a Section 46 notice (from the Environmental Protection Act 1990 that gives local authorities the power to specify the materials that residents should put in defined waste containers) or they could have the service removed

Of the 13 identified households, 5 residents were at home and were questioned about contamination. The reasons given for contamination were varied but included the possibility that neighbours and passers by were putting the wrong materials in the bin, or that housemates (in shared accommodation) were using the bins incorrectly. Where residents were out and not spoken to, a letter was left providing information of the food waste collection service, the materials suitable for collection and explaining the reasons for participating (Appendix J). The identified households were monitored again on the 8th and 15th of August and it was noted that 3 of the properties continued to contaminate their food and garden waste bins.

3.8 Collection logistics

To establish the opinion of the collection contractor to the two different methods of food waste collection Cory were asked a series of questions about the different aspects to the collections.

When asked about the bins used in each trial area Cory stated that the small bins used for the collection of food waste only caused no problems and were usually emptied into a larger slave bin to increase the speed of collection. This was noted as an effective part of the trial collection. They also stated that the larger wheeled bins used for the collection of co-mingled food and garden waste could get heavy on occasion but that the bin lift never failed to lift one.

Cory felt that the vehicles used to collect the food and co-mingled food and garden waste were appropriate although perhaps too large for the areas covered in the trial. Obviously this would be much less of an issue should the collections be rolled out to all households in the borough.

When asked about the enforcement system and the use of tickets to notify residents who were not using the scheme effectively, Cory stated that they noticed the same residents contaminating the food waste bins week after week, despite being provided with information regarding appropriate materials. They felt that more could be done to address repeat offenders. Cory also felt that if the food waste collections were rolled out to all areas, instances of contamination might be lower in rural villages where residents are ‘better at recycling’.

When asked about aspects of the collections that did not work well, Cory stated that the transport distance from the collection rounds to the in-vessel composting facility in High Wycombe was too long. This could be resolved should MKC develop a more local in-vessel composting facility.

When asked which collection method they preferred, Cory stated that the collection of the smaller food waste only bins as trialled in Newport Pagnell was better because with fewer bin lifts the collection rounds took less time.

4. Conclusions

The trial collections of food waste included measurement of tonnage collected, set out rate and participation rate monitoring, assessment of waste composition through two waste audits, modelling of collection costs, BVPI performance LATS implications and assessment of residents and collection contractor opinions relating to the schemes. Analysis of the gathered data allows the following conclusions to be made:

1) According to the tonnage data collected over the duration of the trials there was little difference in the amount of organic waste collected per household where food and garden waste were collected separately and where they were collected co-mingled in the same container. The trial collection of separate food and garden waste resulted in the collection of a slightly greater total tonnage of food and garden waste compared to the collection of co-mingled food and garden waste.

2) According to the waste data collected over the duration of the trials average arisings of residual waste put out per household per week in Newport Pagnell have decreased slightly since the collection of food waste was implemented whereas there has been an increase in Bradwell Common. In the control area of Furzton residual waste arisings per household per week have also decreased.

3) According to the waste data collected over the duration of the trials the average total waste set out per household per week appears to have increased in both of the trial areas provided with food waste collections but has decreased in the control area of Furzton. The increase in total waste arisings is perhaps to be expected in Bradwell Common where residents have been provided with a free, weekly collection of garden waste when previously they would have paid for a fortnightly collection of garden waste. However, an increase in total waste arisings per household per week is also seen in Newport Pagnell where food waste is collected separately and the chargeable fortnightly garden waste collection remained unchanged.

4) Participation in the separate collection of food waste in Newport Pagnell and the mixed collection of food and garden waste in Bradwell Common was broadly similar in the early stages of the trial but since April 2006 the participation rate was higher in Bradwell Common (co-mingled collection) than in Newport Pagnell (separate collection). If the monthly participation rates are averaged[11] over the whole year from November 2005 to October 2006 inclusive the participation rate for separately collected food waste is 54% and the rate for co-mingled food and garden waste is 60%.

5) Participation in the garden waste scheme started at a higher rate in Newport Pagnell than in Furzton in the early stages of the trial, but since April 2006 participation has been higher in Furzton.

6) There is little difference in the participation rates for dry recyclable collections in each trial area.

7) According to the two summer waste audits carried out before and during the food waste trials:
    a. The capture rate of food waste (i.e. the amount of waste separated for separate collection relative to the total available per household) was higher where it is collected co-mingled with garden waste than where it was collected separately according to the results of the trial waste audits. However this is based on data derived from two summer audits and therefore may be different at other times of year.
    b. The amount of food waste in the residual waste has decreased in both trial areas. The largest decrease is of 50% in Bradwell Common. In the control area it has decreased by only 8%.
    c. There is no contamination of the food waste only bin in Newport Pagnell and minimal contamination in the food and garden waste bin in Bradwell Common at 0.2% (by weight) of non-combustable materials.

[11] Strictly speaking calculating averages of percentage values is incorrect. However here it was considered the only sensible way of summarising the percentage participation calculated for each month. If the original data had been used from each month it would have resulted in a single set out event over the course of a year being interpreted as participation.

8) Roll out of separate food waste collections would give the greatest increase in annual costs compared to the current estimated cost (of garden waste only collections) of £550,000 per year to between £2.6 and £3.0 million per year. Implementation of co-mingled food and garden waste collections would result in an increase in annual costs to between £1.9 and £2.0 million per year.

9) Both food waste collection scenarios have reduced costs where waste is treated at a "theoretical" facility in Milton Keynes rather than at the in-vessel composting facility used to process the waste in the trials, located outside the borough at High Wycombe.

10) The greatest increase in BVPI performance will be achieved through the implementation of separate food waste collection. This will give an increase of around 10 percentage points to 43.9% in comparison to a do-nothing scenario.

11) Implementation of co-mingled food and garden waste collections will give an increase in BVPI performance of just over 6 percentage points to 40.3% in comparison to the do-nothing scenario.

12) Food waste collection using either collection method will result in greater savings in the purchase of LATS allowances and revenue from the sale of allowances in comparison to the do-nothing scenario. Separate food waste collection gives the greatest savings in purchase of LATS allowances of £7M when compared with the do-nothing scenario up to 2016-2017.

13) Despite the savings in spend on LATS allowances and the revenue generated by the sale of excess allowances in the early years associated with the collection of food waste, the additional cost of collection, transport and processing of the food waste far outweigh these savings. There is *no cost benefit* of food waste collection by either collection method in relation to LATS obligations according to the modelling undertaken and based on the assumptions detailed.

14) Residents in both trial areas felt that the communication material was clear and easy to use. Both groups mentioned that the reference to potential council tax increases associated with exceeding LATS obligations was an incentive to participate in the food waste collections.

15) When questioned at the focus group about a suitable frequency for residual waste collection given the free trial service for food or food and garden waste collection, residents in Newport Pagnell that were provided with separate food waste collections stated that fortnightly collection would not be sufficient whilst the majority of the residents in Bradwell Common who had received co-mingled collection of food and garden waste felt that the residual waste could be collected fortnightly.

16) Overall, it appears that the method of food waste collection, either separately or co-mingled in the same container as garden waste, does not impact greatly on the tonnage of organic waste collected per household per year. However, when the cost of collection, transfer and treatment of the waste is taken into account, the modelling work indicates that co-mingled collections provide a cheaper option for food waste collection. This of course is dependant on the assumptions used in the modelling being accurate. It is important to recognise that changes in the assumptions used relating to sensitive variables could have a significant impact on the outputs from the modelling work and thus alter the results. Sensitive variables could include:

    a. Participation rate
    b. Capture rate
    c. Frequency of organic collection (i.e. weekly or fortnightly)
    d. Cost for the treatment of organic waste
    e. Costs associated with collection staff – driver and loader
    f. Bins collected per day
    g. Price of LATS allowances
    h. Annual costs of food and garden waste collections

17) What is not taken account of in this piece of work is the potential impact that alternate week collections of residual waste and co-mingled food and garden waste or dry recyclables might have on performance and cost. In addition there is the potential to combine separate collections of food waste with other materials such as dry recyclables to make collection more cost effective.

Recommendations

With respect to the above conclusions ORA make the following recommendations:

1. To make the collections of food waste more cost effective, MKC should address the collection service costs and seek to reduce them where possible. It is recommended that the following scenarios are investigated further:
    a. Reducing the frequency of co-mingled food and garden waste collections from weekly (as piloted in the trials) to fortnightly. This would appear plausible based on the results from set-out rate monitoring.
    b. Combining the collections of food waste only on the same vehicles as other materials such as dry recyclables which would result in collections becoming more cost effective.
    c. Reducing the frequency of residual waste collection to fortnightly and considering alternating the collection of residual waste with the collections of organic waste (this would mean reducing the proposed collection frequency for food waste collections from weekly to fortnightly) or dry recyclables. This would result in savings in collection costs and may also have a capping effect on total waste arisings.
    d. Development of a local ABPR compliant treatment facility within close proximity to the collection rounds as transporting the waste to a facility outside the borough has been shown to add significant costs to the service.

2. MKC should consider undertaking further modelling of the service costs associated with each food waste collection option. This should include modelling variations in parameters that could impact significantly on costs such as reduced collection frequency for co-mingled food and garden waste from weekly to fortnightly.

3. MKC should undertake further modelling of the LATS implications associated with each food waste collection option. This should include modelling variations in parameters likely to have a significant impact including the trade price of LATS allowances, and the participation rate associated with the services.

4. MKC should consider the level of true diversion achieved through the collection of food waste using either method. The results of the waste audits would suggest that the source segregated garden waste is not actually being diverted from the residual waste stream and is being drawn into the overall waste arisings from another source.

5. Should MKC move towards rolling out either trial method borough-wide, the lessons learnt and issues raised in this pilot should be remembered and solutions developed in plenty of time. In particular:
   a) Adequate resources to manage resident queries especially in the start up phase.
   b) An improved crew ticketing system to ensure that both contractor and council know exactly who had been ticketed, when, what the result is and any follow up that takes place.
   c) Suitable resources and standard operating procedures to address key issues such as persistent contamination, elderly or disabled residents who want to use the scheme, residents who categorically don't want to use the scheme, contingency treatment plant options in the case of emergency.
   d) A clear strategy on how food waste recycling will be extended to flat dwellers and others where large bins may pose problems.
   e) A clear strategy on how to identify empty dwellings prior to any roll out would save resources. Use of new homeowner packs which include details of recycling opportunities may also be beneficial in this respect.
   f) A clearly defined communications strategy with sufficient resources to ensure that the printed material provided is relevant (especially if

different collection methods are used in different areas), accessible (addressing the needs of ethnic minorities) and attractive.

g) Designing communication materials to include detailed instructions on how the 25 litre bin can be locked by residents to ensure that food waste is stored securely.

h) Resources should also be budgeted for to allow targeted door-knocking for what ever reason – poor participation, contamination, trouble shooting e.g. with odour and fly problems in the summer etc.

i) Given that a key issue raised by residents at the focus groups was annoyance over not having their own bins returned to them after emptying MKC should address the issue of forwarding. Residents in certain areas of both trials forward their waste into groups of bins/ boxes with their neighbours which makes it harder for the collection crews to return the bin to the correct household and prevents accurate participation data to be gathered

6. A key benefit of the trial has been the resource allocation for intensive tonnage and participation monitoring as well as auditing. Whilst it will be impossible to continue at a similar level on a borough-wide scale, a rolling programme of periodic monitoring would be essential to gauge the success and continuing performance of any roll out.