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Recycling Advisory Service

# Assessing the Impacts of Increasing the Range of Material Types Collected at the Kerbside

**DRAFT REPORT** Written by:

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# 1. Introduction

Kerbside collections have evolved over the recent years and many WCAs that initially targeted only a limited range of materials have started to target a wider range of materials. Anecdotal evidence from these authorities suggests that by increasing the range of materials targeted the capture of all the targeted materials improves, i.e. as more materials are targeted overall kerbside collection performance improves.

The purpose of this report is to investigate this phenomenon and to provide empirical evidence of any increases in overall performance, (assuming they exist), changes in householder participation and capture, and information on any other consequences, for example, resource requirements and scheme operations. Beyond the scope of this report is a quantitative evaluation of the costs and benefits of including the additional materials.

The report comprises case studies of the experiences in selected Waste Collection Authorities (WCAs) that have added new materials to their existing multi-material collections complemented with findings from desk research on the impacts.

## 2. Methodology

To evaluate the case studies it is necessary to separate the impacts from the causes. For example, plastics are often noted to have a positive impact on the performance for an existing collection. However, are these effects really linked to plastic (because householders really feel recycling becomes worthwhile if this material is targeted) or is it simply because this is the material that has most often been excluded at the initial introduction of the collection and is thus most frequently added later? Another example might be the extent to which the changes are related to the collection container provided to the householders i.e. is it large enough for the additional materials (as this will influence the ability of the householders to participate), or was it changed at the same time as the new materials were added, the new container actually being the cause of any change in household behaviour.

To evaluate the impacts of adding materials to existing collections the information from the case studies are evaluated against the following hypotheses:

1. Additional capture of all materials will result when the range of materials targeted in kerbside collection is expanded.
2. The changes in capture are solely due to the targeting of the additional materials.
3. The changes in capture are independent of which material/s is/are added to the collection.

The scope of the study is limited to the examination of up to four case studies and evidently this will only start to provide an indication of the validity of these hypotheses. A statistical evaluation is impossible; however, the study will provide an empirical basis for what has until now mainly been anecdotal hearsay.

There are two strands to the research that will be carried out simultaneously. The first strand comprises the case study research. The second strand comprises desk based research of third party work on this topic.

### ***Case studies***

With the scope limited to four case studies it is necessary to prioritise the aspects that should be covered by them in order to optimise their contribution to the report. To do this the case studies have been undertaken in a number of steps.

1. Identification of specific questions that the case studies will (ideally) address e.g. which materials, type of system, etc. These will form some of the criteria for selecting the case studies.
2. Identification of data and information required from the case study authorities for quantitative evaluation of the impacts. Availability of this information will form further criteria for selecting the case studies.
3. Together with WRAP and the steering group, the case study authorities will be identified.
4. Data gathering from the case studies. This will take the form of questionnaires, telephone interviews and, if possible, a visit to each authority.
5. Concise and standardised reporting of the findings from the case studies.

The results from the case studies will be combined with the findings from the desk research and conclusions drawn against the hypotheses.

### ***Desk research of third party research on this topic***

The objective of this strand of work is to guide the information and data requirements in the first strand, to provide a broader context for the results of the case studies and, to some extent, provide a 'control' analysis against which to compare the findings from the case studies. Case studies, by their specific nature, can rarely cover all aspects of an issue and the lessons cannot always be directly transferred to other authorities. Information from a wider range of surveys as well as reports from additional collections will be used to 'fill in' some of the gaps left by the case studies to ensure as complete reporting of the impacts as possible.

The desk research will focus on qualitative issues rather quantitative ones due to the nature of the information that is generally available.

This element of the project is considered as secondary to the case studies and it is not intended to complete a fully exhaustive and comprehensive evaluation of all the possible material available.

### 3. Identification of specific questions to be addressed by the case studies

There are many issues that can be considered when examining the impact of adding materials to an existing kerbside collection which include:

1. mono-material vs multi-material expansion;
2. addition of the material to the same collection vs collecting the material in a separate collection;
3. impact of adding different materials e.g. glass vs plastic vs metal;
4. impact of adding different mixes of materials to a collection e.g. adding metals and plastic;
5. adding materials to a co-mingled collection vs to a kerbside sorted collection;
6. difference between adding just one material or adding several materials;
7. impact of other simultaneous changes or activities e.g. moving refuse to alternate week, changing the container provided to the householder;
8. difference in impacts between initially low performing collections vs those with a higher performing baseline;
9. the type of system e.g. container, collection frequency etc.;
10. influence of accompanying promotion campaign; and
11. the type of operator e.g. private contractor or DSO.

With a maximum of 4 case studies these issues have to be prioritised and this was done at a steering group meeting early on in the project. The priorities identified are:

1. **Evaluation of the impacts of adding materials to a multi-material collection and not to a mono-material collection (usually paper)**. The rationale behind this is that there are often significant other changes that occur at the same time as a change

from a mono-material collection, for example, in the system, collection frequency, overall priority on recycling, and it would be difficult to separate out the impact of adding the materials from these. Also, the impact on residents of moving from a mono-material to multi-material are likely to be much greater than simply adding a new material to a multi-material so the experiences will be limited in their application. Furthermore, it was felt that the real challenges facing authorities in meeting their targets were faced by those already collecting a wide range of materials and thus this should be the focus of the research.

2. **The type of material was of greater importance than the type of collection i.e. if it is co-mingled or kerbside sorted.** Although of potential interest with only 4 case studies it was felt more important to consider a wider range of materials than the same materials entering different systems.
3. **Less well publicised programmes should be chosen in favour of those whose performance had received considerable publicity already.** The performance of some collections, in particular those that have been operating for several years, has already been widely reported. It was felt that reporting on case studies of lesser known collections would give the opportunity to these authorities to demonstrate their achievements. It was also felt that the case studies might be of wider interest and perhaps relevance.
4. **The materials of greatest interest were glass, plastic and kitchen waste.** Glass and plastic have particular properties that have meant that they have frequently been excluded from multi-material collections. Similarly, kitchen waste is seen as a challenging material but one potentially necessary to divert from landfill because it is biodegradable. Attention is now turning to these materials as authorities find that they are necessary to collect both to meet their recycling targets and diversion obligations.
5. **The introduction of glass both into an existing collection and also in a separate mono-material collection running alongside the multi-material collection would be a useful comparison.** Collecting glass has often been resisted for a number of reasons. Because it is fragile it is considered potentially hazardous to collect in all collections and can be a contaminant in co-mingled collections. It constitutes a relatively large portion of the recyclable waste stream and collecting it at the kerbside may add substantially to the overall kerbside collection costs. Finally, its collection is well established in bring banks that is cheaper and gets around some of the other issues. However, for many reasons, attitudes to collecting glass at the kerbside are changing and its inclusion is being considered by several authorities in a bid to meet their targets as well as provide a comprehensive service to residents.

6. **Case studies should cover a substantial area and not be pilot trials.** Although pilot trials are valuable in the evaluation of different collections and collection scheme features, findings can be difficult to replicate over a wider area. The purpose of this report is to provide information on fully scaled up collections that are not operating on a trial basis so the findings are more easily transferable to other collection authorities. It was also felt by the steering group that there should be enough examples of district wide schemes for it to be unnecessary to consider pilot schemes.

It was agreed that the other issues should be drawn into the discussion of the findings where relevant. Although they were not prioritised they are still considered important factors, however beyond the scope of full investigation within this project.

## 4. Data and information required from the case studies

The objective of the study is to provide quantitative evidence of the impact of adding additional materials to existing collections. The type of data that provides this evidence are:

- the quantity of each material collected before and after the introduction of the new material; and
- the level of householder participation and set-out in the collections before and after the introduction of the new material.

However, to be able to analyse fully the impacts of the addition of the material/s alone has had, information is also required on the collection both before and after the addition of the material on:

- the collection method used (vehicles, containers, etc);
- collection frequency;
- change required in the operation e.g. purchase of new vehicles; and
- communications and promotion campaigns.

A full list of information requested from the case study authorities is presented in Appendix 1.

A further criterion in the selection of the case studies is the availability of information, and in particular quantitative information on the above topics.

## 5. Selection of the case study authorities

Having identified the criteria for selecting case studies, caution still needed to be exercised in the selection of the case study authorities to ensure that authorities were not identified because of a known outcome, and in particular one that supports the anecdotal evidence. However, a simple random selection of authorities was also impossible as this would involve first identifying all the authorities that fitted the criteria. To do this would require an extensive data gathering exercise that was beyond the scope of the project.

At a steering group meeting to discuss the selection of authorities it was agreed that the only practical route to selecting the case studies would be to use existing knowledge, and information that is publicly available, to draw up a short list authorities that match the agreed criteria. These authorities would be contacted and the final selection would be made by Eco Alternatives, the selection being determined on their ability to provide the information required.

At the steering group meeting an initial list of 16 authorities was presented, but of these 13 were immediately excluded because they did not meet the criteria agreed earlier in the meeting. Reasons for excluding them included expansion from paper to multi-material (9), already well reported collection (1), non-priority material (1), too many other changes or a knowledge the data would not be available following informal discussions (2).

An additional 7 possible authorities were identified at the meeting. These would cover:

- the inclusion of glass as a separate collection
- the inclusion of glass on the same vehicle
- the inclusion of plastic bottles
- the inclusion of kitchen waste

Following the meeting contact was made with the 10 short listed authorities and a further 9 were rejected. Reasons for rejection were that the schemes had not been running for long enough to have representative data (3), data were unavailable because of the scale of the

collection i.e. it did not cover the whole authority and round by round data had not been recorded (5), or the addition coincided with several other changes making it impossible to be sure about the impacts attributable to the addition of the materials alone (1).

A further 15 authorities were identified using public sources of information, and Officers contacted to discuss the possibility of using their collections as case studies. Of these 13 were rejected. The reasons were because they had not been operating long enough (8), because they did not have material or round specific data so trends for the authority were impossible to analyse (4) and the last one was rejected because it had not actually added new materials to its collection.

Out of a total of 35 authorities only 3 could be finally used as case studies. Many of the Officers contacted confirmed the anecdotal experience that the addition of the materials had had a positive effect on the collection as a whole; however, they were unable to substantiate this with quantitative evidence.

The difficulty in identifying suitable case studies surprised all members of the steering group. At the outset we knew that the restriction of the research to 4 case studies would limit the findings of the study and we had believed it would be difficult to select 4 authorities from the many possible cases. Eventually, the study has been limited by the availability of suitable data and we have had to be flexible in the application of the selection criteria.

The 3 case studies are:

- South Oxfordshire District Council (addition of plastic bottles to a collection of newspapers & magazines, cardboard and cans);
- Bracknell Forest Borough Council (addition of plastic bottles to a collection of newspapers & magazines and cans); and
- Durham City Council (addition of cans to a collection of newspaper & magazines and glass).

Although two of the case studies are for similar collections this provides the opportunity to examine any similarities between their experiences.

## 6. Case Study 1: South Oxfordshire District Council

### **Description of the collection**

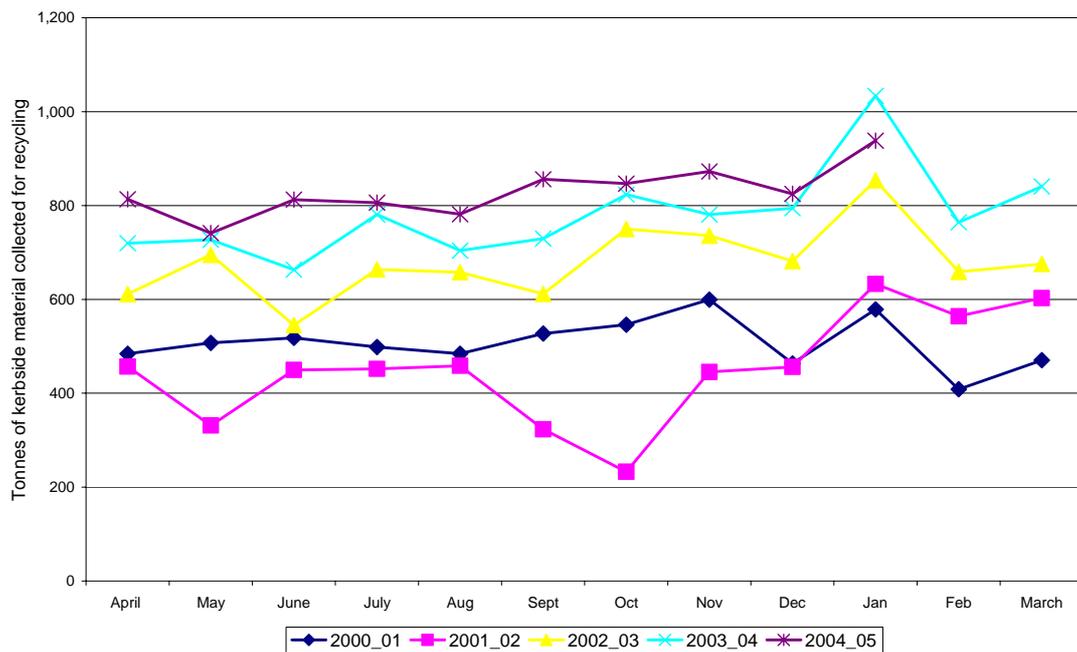
South Oxfordshire District Council (SODC) has offered all of its 55,000 households a multi material collection since 1994. When the collection was launched householders were able to separate out their newspapers & magazines, corrugated cardboard and cans. These were placed in a box that was collected weekly. The materials were taken to a Materials Recycling Facility (MRF) where they were sorted. With this scheme a kerbside recycling rate of approximately 16% was being achieved (this is not the BVPI rate).

At the end of 2001 the service was taken over by a new contractor and at the same time plastics were added to the materials targeted for collection. The plastics targeted included all dense plastics including margarine tubs, yogurt pots etc. and also carrier bags. All other aspects of the collection remained the same. There was no major promotion and communications campaign at the time of the change but subsequently there has been a concerted ongoing campaign to improve recycling. The current recycling rate for the kerbside collection is approximately 23%.

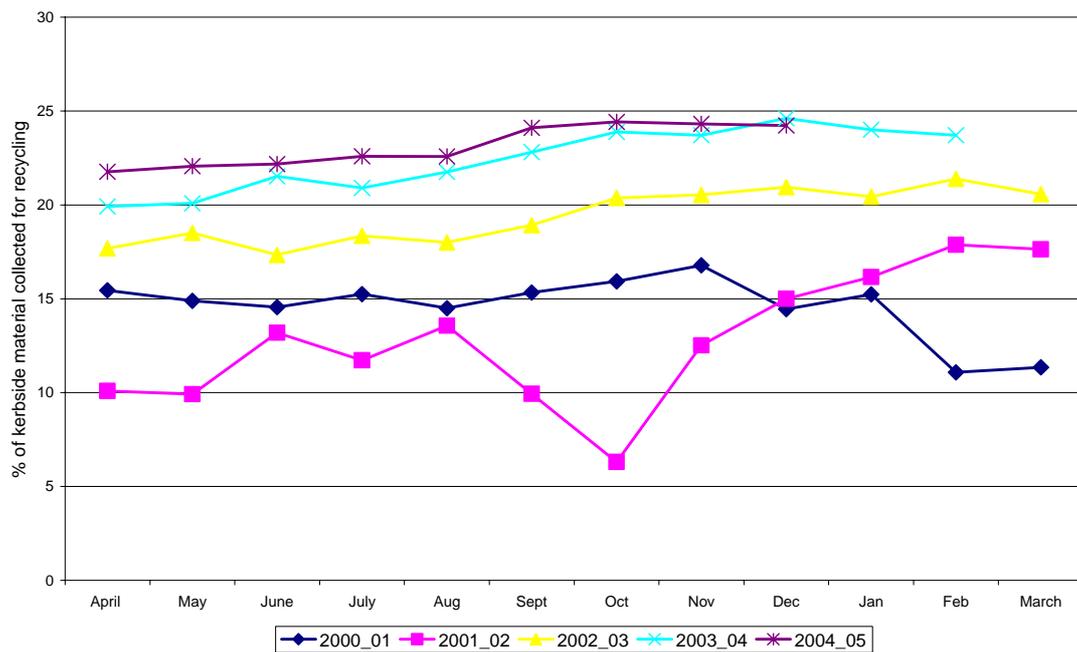
### **Quantity of materials collected**

The quantities collected in the kerbside recycling scheme since 2000 are presented in Figure 6.1. The same data are presented in Figure 6.2 as a percentage of the total quantity of refuse and recyclables collected from the kerbside (i.e. excluding bring banks, etc.).

**Figure 6.1: Quantities collected in the kerbside scheme since 2000**



**Figure 6.2: Kerbside recycling rate since 2000 (not the BVPI rate)**



From August 2000, from a more or less steady quantity of recyclables collected, there was a gradual increase in the quantities collected in the kerbside scheme. By the end of the year the percentage recycled had increased from approximately 15% to 17%. However, from December 2000 through to October 2001 there was a significant decrease in the quantities collected, the percentage recycled dropping to a low point of only approximately 6%. This primarily is a reflection of the poor levels of service (boxes frequently went uncollected)

before the current contractor took over the collection at the end of 2001. After this low point there is a step change in performance and by January 2002 recycling levels were back to those achieved during most of 2000. Since then there has been a steady and sustained increase in the quantities collected. Most recently the quantity recycled is starting to plateau.

Calculation of the percentage recycled smoothes out some of the monthly variation in the quantities collected indicating that the variation is not due to a change in the household behaviour in these months.

## **Promotion and communications activities**

When the contract was taken over at the end of 2001 and plastics were added to the collection, there was no concerted promotional activity, simply a press release and information included in the following year's council tax booklet (2002). The step change back to the levels of recycling achieved previously is considered to be primarily due to the improvement in the service. Taking decisive steps to improve the service provided residents with not only a better service but also the knowledge that the recycling collection was important enough to the council to take action to improve it. The improvements also stretched to the addition of a new material.

Only limited promotional activities were undertaken until the Spring of 2003 when funding from Defra enabled a more comprehensive and targeted campaign. Some ongoing promotional activities have included handing out new boxes to residents outside supermarkets, visiting village fetes, having regular coverage in the local press and providing an additional bag at Christmas for the extra recyclables. Overall, the objective of the communications campaign has been to show residents that the council is serious about recycling, making it as easy as possible for people to obtain a box and participate, and overall to make it a mainstream activity.

Participation monitoring was carried out in September 2002, September 2003, March 2004 and October 2004. These surveys showed participation increasing from 52% to 58% to 67%, remaining unchanged during 2004. The surveys were of the same households and were selected as being representative of the authority as a whole.

## **Impact of adding plastics**

Unfortunately, as the collection is of mixed recyclables the quantity of each material collected is unknown. However, composition analyses of the refuse and kerbside recyclables collection

carried out in 2003 and 2004 show that around 62% of the targeted paper, 25% of steel cans, 33% of aluminium cans and 34% of plastic are being collected. Contaminants included glass, plastic film and laminated paper. The lower capture for the containers compared to the paper is consistent with other research into the average quantities of different materials captured.

From the composition analyses the percentage of materials collected in the recycling box is approximately 21% in June 2003 rising to 24% in March 2004. These figures reflect the percentages calculated from the actual tonnages collected during the same period. Of this, plastic contributes approximately 1.8% rising to 2.4% in March 2004 of the 20% (i.e. approximately 8% to 10% of the recyclables collected are plastics.)

When the current contractor took over the collection and plastic was added, the kerbside recycling rate quickly rose between October 2001 and January 2002 to the level previously achieved of around 15%. In February 2002 it rose to approximately 17% and this level was maintained until August 2002 when it started to increase slowly to the current level of approximately 24%.

Clearly the service improvements are likely to have had the greatest impact on the performance of the collection and the subsequent promotional activities are reflected in the sustained performance improvements. However, it is possible that the addition of plastics to the collection has also contributed to the improved performance. To evaluate this, data from the composition analysis has been used together with the reported tonnes collected to calculate the additional monthly tonnages that would be expected solely from the addition of plastic. These are then compared with the actual monthly increases in tonnage. The results are presented in Table 6.1.

From the data in Table 6.1 it is possible to see that it is possible that up to 20% to 25% more of the materials originally targeted by the collection are being collected after the introduction of plastic and with the change in collection contractor. This change is greater than the increase in overall waste arisings so this alone cannot explain the increase in the materials collected.

With the data available it is impossible to know precisely the impact the introduction of plastic had on the collection in isolation from the change in contractor and promotional activities; however, it is likely that it did have some impact on the overall performance of the collection.

**Table 6.1: Estimated impact of the introduction of plastic on the quantities collected of the other targeted materials**

Month	Monthly expected increase in collected quantities if only due to plastic <sup>1</sup> (T)	Actual monthly increase in collected quantities <sup>2</sup> (T)	Estimated additional quantity attributable to non-plastic (T)	Estimated percentage increase in tonnes collected of non-plastic (%)	Percentage change in overall waste arising for kerbside collection (%)
April	49	127	78	16%	8%
May	56	188	132	26%	5%
June	44	27	-17	-3%	-13%
July	53	166	113	23%	7%
Aug	53	174	121	25%	7%
Sept	49	85	36	7%	-8%
Oct	60	204	144	26%	3%
Nov	59	136	77	13%	-3%
Dec	55	218	164	35%	1%

## Conclusions

The performance of the kerbside collection in SODC has steadily increased since the end of 2001 when plastics were added to the existing multi-material collection. At the same time there was a change in the contractor and subsequently there has been an ongoing promotion and communications campaign to inform residents and motivate them to participate in the collection. It is impossible to know precisely the contribution to the improved performance that the introduction of plastics has had on the collection of the other targeted materials, but there is some evidence that it may have resulted in an increase in the quantities collected.

This case study highlights the importance of a reliable service and an ongoing commitment by officers to motivate residents to value and participate in the kerbside collections. The addition of plastics may have helped to motivate some residents to participate but, beyond doubt, the increases in performance realised in the last couple of years in SODC would not have happened with the addition of plastics alone.

<sup>1</sup> This assumes that plastic will represent 8% of the materials collected in the green box, based on the composition analysis.

<sup>2</sup> Month 2002 compared to the same month in 2000. Data prior to April 2000 are unavailable.

# 7. Case study 2: Bracknell Forest Borough Council

## **Description of the collection**

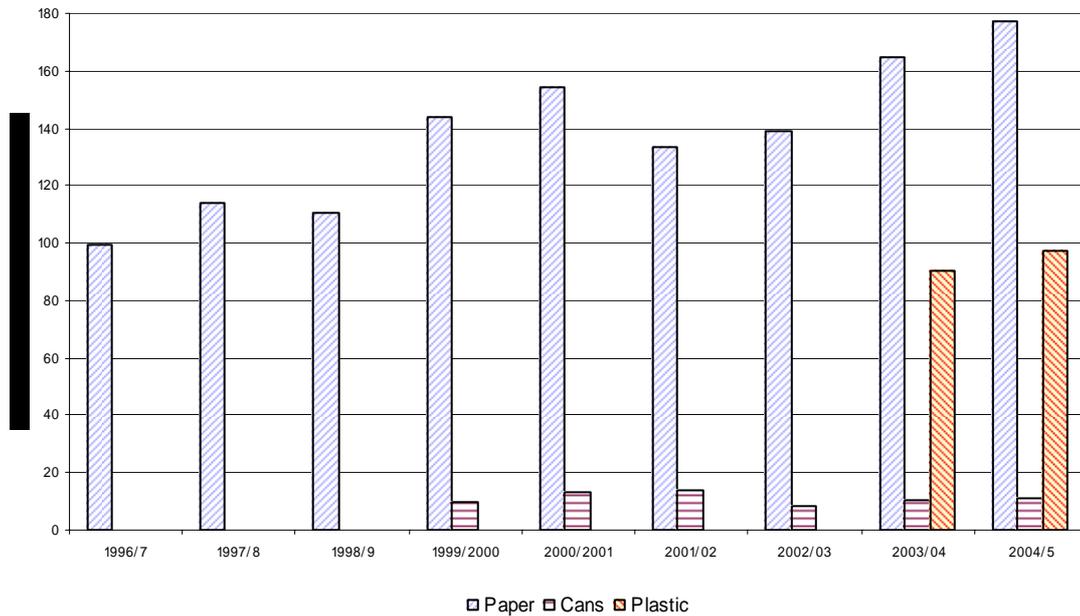
Bracknell Forest Borough Council (BFBC) has operated a kerbside collection since 1996. When it was launched residents were provided with a green box to collect newspapers and magazines. In 1999 food and drink cans were added to the collection serving all of the 44,000 households in the borough and simultaneously new residents were provided with 140L refuse bins in place of 240L bins.

The initial good performance of the collection slowly dropped and following the award of a new collection contract in mid 2001 a project team was set up in early 2002 to look at revitalising the kerbside scheme. A number of pilot trials were established to examine the impacts of a number of modifications, for example, moving to weekly collections and offering incentives. The most successful pilot was one that introduced plastics into the collection and as a result between January and May 2003 this was rolled out to all households. Subsequently, the recycling performance across the borough has increased.

## **Quantities of material collected**

The quantities of recyclables collected in the kerbside scheme since the kerbside collections were first introduced are presented in Figure 5.1.

**Figure 7.1: Average quantity collected per month for each material collected in BFBC**



The graph in Figure 7.1 shows that when cans were introduced to the paper collection during 1999 the average quantity of paper collected increased by an average of over 30 tonnes per month, an increase of approximately 30%. In the following year the average quantities collected of both cans and paper increased, paper by an average of approximately 7% and cans by approximately 50% (the cans figure is much higher than the paper as not all the households were served during the whole of 1999/2000).

These results clearly show that the performance of the collection improved when the cans were added.

The quantity of paper collected, and to a lesser extent cans, fell during 2001/02 and continued to fall during the following year. In 2002/03 the average quantity of paper collected each month had fallen to 90% of the amount collected 2 years earlier, and the average quantity of cans had fallen to approximately 60% in the same period. It was during this period that a new collection contract was awarded and a project team established to examine ways to improve the performance of the collection.

Plastics were added to the collection in 2003. The graph in Figure 7.1 shows that the monthly average quantity of paper collected subsequently during 2003/04 was more than the quantity collected before the down turn in performance by approximately 6%. In 2004/05 the quantity of paper continued to rise by an average of 8% on the previous year.

Figure 7.1 shows that when the plastics were added the quantity of cans rose by approximately 25% on the previous year and by a further 10% the following year; however, this is still only 80% of the quantity collected in 2001.

One explanation for this apparent reduction in long term performance could be because the cans and plastics are collected together and the quantities of each specific material have been estimated based on an average percentage split of the materials. The split used is 45% cans to 55% plastic. If the percentage of cans was closer to 60% then the average monthly tonnage of cans collected would be similar to that collected in 2001.

However, the split of materials leaving the MRF after sorting confirms that the split is correct. At the same time it is surprising to find a reduction in performance, and this does not concur with the experience of the Officers involved. Another explanation offered is that the recording of the cans tonnage was inaccurate under the old contract. There was a high turnover of staff and some keying errors were found at the time and corrected. Furthermore, the vehicle had to drive over the weighbridge twice in order to record the weights of paper and the cans and it is possible that this was not done rigorously.

With the light weight of cans even minor errors can have a major impact on the percentage differences in collection and this is the most likely explanation for the data. Officers are firmly of the view that the quantity of cans collected currently is at least as high as the quantity before the end of their previous contract.

From these data it is impossible to be conclusive on the impact the addition plastics has had on the collection of metal cans.

## **Promotion and communications activities**

The collection of plastic was rolled out to households between January and May 2003. Households were provided with a leaflet 'It's Fantastic we Collect Plastic' explaining that plastic bottles could now be collected together with the cans, newspapers and magazines. Households were also provided with a fridge magnet to remind them of their collection weeks as it was felt one reason for the drop in performance was because people couldn't remember which week to put out their boxes. They were also given a magazine that provided information on the disposal of all types of household waste.

A temporary information centre was established in a disused shop in the town centre where residents could obtain information on all types of recycling as well as their kerbside

collections and the mascot 'Milly', a giant recycled milk bottle was used to encourage people to visit the centre.

Overall, though, the extent of the promotional activities was not much more than is usually undertaken as a matter of course. On an ongoing basis, as well as leaflets etc. articles on recycling regularly appear in the periodic BFBC newspaper and an exhibition trailer and roadshow visits local events. Other activities, such as random lucky draw prizes awarded to households that regularly participate, are also used to reinforce the need to participate regularly in the collection.

## **Participation**

When the collection of plastic bottles was piloted, an area of BFBC was chosen in which participation in the green box scheme had fallen from 50-55% in 1999 to 11% in 2001. During the pilot, from July to October 2002, participation rose to 28%.

Before piloting the plastics collection a questionnaire survey was sent to 4000 households to examine the reasons why the performance of the collection had dropped and to identify methods to revitalise the collection. 70% of respondents indicated that adding plastics to the collection would encourage them to recycle more at the kerbside.

Since the collection of plastic was introduced borough wide the participation has been measured and stands at an average of 30% with best areas achieving rates of between 45% and 50%.

## **The impact of adding new materials**

The quantities of recyclables collected in the kerbside box in BFBC increased both when metals were added to the paper only collection and then when plastics were added. However, it is impossible to conclude that the increased tonnages were solely due to the addition of the new materials although Officers believe that the introduction of plastic bottles made some people think that recycling was worthwhile, the plastic being a bulky material. When surveyed some residents said "I can't be bothered to recycle just paper and cans but plastic bottles made it worthwhile as we have so many of them now...particularly milk and soft drink bottles".

However, the plastics were added following a period of poor service and a drop in interest by residents in the kerbside scheme. A concerted publicity programme was undertaken when

the plastics were introduced, and continues to the present time. Tonnages collected have continued to increase with the quantity collected in each month in 2004/05 being greater than that collected in the same month in 2003/04. This suggests that the ongoing promotion and education campaign is having an important impact on the recycling performance.

Officers believe that education always makes a big difference to the quantities collected and they find that after the distribution of a recycling calendar at 6 month intervals results in an increase in the quantity collected. Currently, boxes are being delivered to areas with a poor participation record with a message telling residents that they MUST now use the box for recycling. The results of this initiative have resulted in some roads going from almost 0% to 100% participation. Some residents have complained that they are simply too lazy to ring the Council and ask for a box so this activity has got around this problem.

As it is impossible to disassociate the performance relating to the promotional campaign and improved service from the addition of the plastics, it is only possible to conclude that combined, these have had the affect of improving the performance of the collection.

At the end of March 2005 a separate collection of cardboard and green waste will commence. The results of this change will be carefully monitored.

Finally, throughout the expansion of the kerbside scheme the tonnages of materials collected at the extensive network of bring sites have also increased from 145 tonnes in 2003/4 to 200 tonnes already this year (10 months).

## **Conclusions**

Since the introduction of their kerbside recycling scheme in 1996 BFBC have seen an increase in the overall performance, with an average of over 100% increase in the quantities collected each month in 2004/05 compared to 1996/97. However, there has not been a steady increase in performance over this period, the performance going up and down on a year on year basis, influenced by the service level, the promotional campaigns and the materials targeted.

The case study demonstrates the importance of providing a reliable service to householders as well as maintaining an ongoing promotion and education campaign to sustain a continuous improvement in performance. The response by households to the addition of new materials, reflected in the quantities of the plastic bottles collected as well as the increase in the paper, demonstrates that the addition of the new materials together with the communications

campaigns have managed to educate householders of the changes as well as motivate new households to start to participate. The increase in participation may, for some households, be a direct response to the addition of the plastic bottles, as this was stated as being something that would encourage them to use the collection.

## 8. Information from third party sources

The purpose of the literature review was to provide further, possibly more qualitative, evidence of the impacts of adding materials to existing collections and to provide some further background to the study. However, the review did not uncover a vast amount of other research on this topic. Bearing in mind the rather difficult exercise in identifying the case studies it is perhaps not surprising that there has been little other research in this area, the data rarely existing.

However, the research revealed two studies of particular relevance. The first is research carried out in Oadby and Wigston during 1999 and 2000 in which glass was added to the kerbside collection. Although in this trial a number of other changes were also made at the same time it is still worthwhile including it in this report. The second concerns the addition of materials to paper only collections in Chesterfield, North East Derbyshire and North Warwickshire.

Finally, data published on the internet from a long standing and high performing collection in which plastics were added in 2003 is analysed.

### **'From bags to boxes: Research into effective kerbside recycling in Oadby and Wigston borough, Leicester'<sup>3</sup>**

During 1999 and 2000 a project funded by the Landfill Tax credit scheme was undertaken in Leicester by Environ in association with SITA Environmental trust to investigate the impact of including glass in their kerbside collection and also switching from a fortnightly bag collection of co-mingled recyclables to a weekly box collection with kerbside sorting.

The main objectives of the trial were to discover if moving to a weekly box collection could:

- increase set-out rates;

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<sup>3</sup> From Bags to Boxes: Research into effective kerbside recycling in Oadby and Wigston borough, Leicester. Environ, 2001

- increase participation rates;
- increase the tonnage of recyclable materials collected through the kerbside recycling service;
- increase the diversion rate achieved by the kerbside recycling service; and
- provide information on how such a scheme could operate if introduced across the borough.

One trial and one control area were selected from the borough. Both areas were typical of the borough and had similar housing stock and number of households (1,417 and 1,359 respectively). Both had relatively high participation and set-out rates prior to the trial, but despite this, it was felt there was still scope to increase the performance in these areas.

The weekly box collection including glass was operated in the trial area for 12 weeks while the control area maintained its fortnightly bag collection that had been operating since 1992/93. Refuse was collected in black bags on the same day as the recyclables. In both instances the collections were promoted at the beginning of the trial period with similar written information describing the schemes, the materials that could be collected and the frequency of collection.

For two weeks before the trial, and then during the trial between October 1999 and January 2000, set-out, participation and tonnage of each material collected were monitored. As the base set-out and participation rates were not identical the percentage change in these activities were compared rather than the absolute values. Table 8.1 summarises the results.

**Table 8.1: Impact on set-out and participation of the new collection**

	Percentage change in set-out (%)		Percentage change in participation (%)	
	Control area	Trial area	Control area	Trial area
<b>Pre-trial (actual rates)</b>	57.5	45.9	68.95	59.77
<b>Weeks 1 – 4</b>	6.6	23.5	5.9	29.5
<b>Weeks 5 – 8</b>	-1.2	20.0	1.4	23.7
<b>Weeks 9 – 12</b>	-24.2	8.9	-12.6	9.3
<b>Weeks 13 -14</b>	-12.7	-	-*	-

\* participation was not measured as the collection was only monitored for 2 weeks

In the first 8 weeks there was an increase in the set-out and participation in the trial area, with the increase being slightly lower in the second 4 weeks. A similar trend is observed in the control area although the increase is not so large, and by the second 4 week period there is actually a drop in the average set-out compared to the collection before the trial and promotion. These results are consistent with results from an earlier study they carried out that showed that there is an initial increase in these rates after a promotional campaign but that there is a rapid drop of after 4 weeks. The dip in set-out and participation for both areas during weeks 9 – 12 coincides with the Christmas and New Year period.

These results show that the new scheme clearly had made an impact on the residents, encouraging more of them to recycle.

With respect to the tonnes collected, an average of an additional 1.899 tonnes per week were collected in the trial area compared to the quantity collected before the new collection was introduced. Of this, an average of 49% was glass and 51% paper, plastic and cans.

Disregarding the holiday period, the average increase for the first 8 weeks in the control area was approximately 47%. For the same period the average increase in the trial area due to glass was approximately 41% and thus the increase due to the materials already targeted by the collection was approximately 59%. This suggests that the changes to the collection were responsible for more than an additional 10% in the amount of materials collected excluding the glass. (These calculations are different from those presented in the report that do not remove the results from weeks 9 to 12. However, due to the holiday effect it is felt fairer to disregard these figures. Both analyses reveal that more of the non-glass materials are collected in the trial area than in the control area).

The researchers concluded that the introduction of the new collection receptacle, increasing the frequency of collection and introducing the glass had the combined positive effect on the levels of householder recycling. Furthermore, the trial reinforced previous research that promotion of an existing scheme can also have a positive effect on the householder participation.

Unfortunately, it is impossible to separate out the impact the addition of glass alone has on the collection. Research elsewhere suggests that changing from a fortnightly to a weekly collection by itself can increase the amount collected by as much as 30%<sup>4</sup>. However, the

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<sup>4</sup> Guildford BC Policy Panel 7 July 2003 Green box recycling service: proposed change from fortnightly to weekly collection

study reinforces the message that a well communicated, convenient system will encourage residents to participate.

Oadby and Wigston were contacted as part of this project. Although glass collection has been rolled out to half the borough a number of other changes have also taken place.

Unfortunately, data are unavailable on a round-by-round basis so it is impossible to evaluate if the findings from the pilot have been duplicated over a wider area.

### **Impact of changing from a paper only to a multi-material collection**

Research carried out by the University of Paisley<sup>5</sup> examined the impacts of moving from newspaper & magazine only collections to a multi-material collections (adding glass, cans and textiles) in Chesterfield, North East Derbyshire and North Warwickshire. The results are summarised in Table 8.1.

**Table 8.1: Quantity of paper collected before and after the switch to multi-material collection**

<b>kg/household/week</b>	<b>Average weight of paper collected before the introduction of multi-material collection</b>	<b>Average weight of paper collected after the introduction of multi-material collection</b>	<b>Increase in yield of paper after the introduction of multi-material collection</b>
<b>Chesterfield – weekly refuse</b>	0.68	1.79	> 1.5
<b>Chesterfield – fortnightly refuse</b>	-	2.9	
<b>North East Derbyshire</b>	1.31	2.38	1.1 to 1.4
<b>North Warwickshire</b>	0.63	2.31	2

The results provide evidence of significant increases in the quantity of paper collected when the collections moved to a multi-material ones. The results also show the dramatic impact moving to a fortnightly refuse collection can have on the quantity collected from recycling. As this is not the purpose of this report no further discussion will be made on this point.

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<sup>5</sup> Understanding Recycling Behaviour Volume 2, University of Paisely, 2004

In these case studies the contractor operating the collections, Cheshire Recycling (now Abitibi Recycling ), remained the same and the same level of service was provided. It is not clear over what period of time the average weights have been calculated and if account has been taken of the expected immediate increase following the change that would be expected after any promotional campaign. However, the results do provide evidence that the switch from paper only collection to multi-material collections has a positive outcome on the quantity of paper collected.

However, caution must be exercised in applying this conclusion in an authority where no collection is already operating. It would be misguided to believe that starting with paper and then moving to a multi-material collection would optimise the quantity of material collected.

The experience of another contractor, ECT Recycling, is that while the introduction of a multi-material collection in place of a paper only collection may have a positive effect on the collection of paper, collecting all the materials from the launch of the collection results in even higher tonnages being collected. As part of another project, one round day of an ECT weekly multi-material collection that had replaced a fortnightly paper collection was monitored over 2 consecutive weeks. The set-out the first week was 424 boxes and in the second week 433 boxes. In the first week, that corresponded to the day on which the paper would have been collected in the original collection, 108 of the boxes set-out contained only paper. This fell to 98 in the second week.

These results would suggest that approximately 25% of residents were not separating out the new materials. There could be many reasons for this and more detailed research would be necessary to take the conclusions further, but it does suggest that perhaps some had not realised the change had taken place to collect a broader range of materials. This is supported in part by the slightly greater number of paper-only boxes set out on the week that coincides with the collection day of the previous paper only collection.

Returning to the research carried out by the University of Paisley, it has a paragraph that could easily have been written for this report '...effective monitoring is essential.....in the course of the research it came as quite a surprise that many district authorities do not keep records of individual round to round performances, collection by collection. The research has demonstrated how long-term trends in recycling performances can be much stronger at this level of resolution compared with district-wide statistics'.

While it is perhaps comforting to know that it is not only the research for this project that has been stymied by the lack of available data, it also generates discomfort as it raises a broader

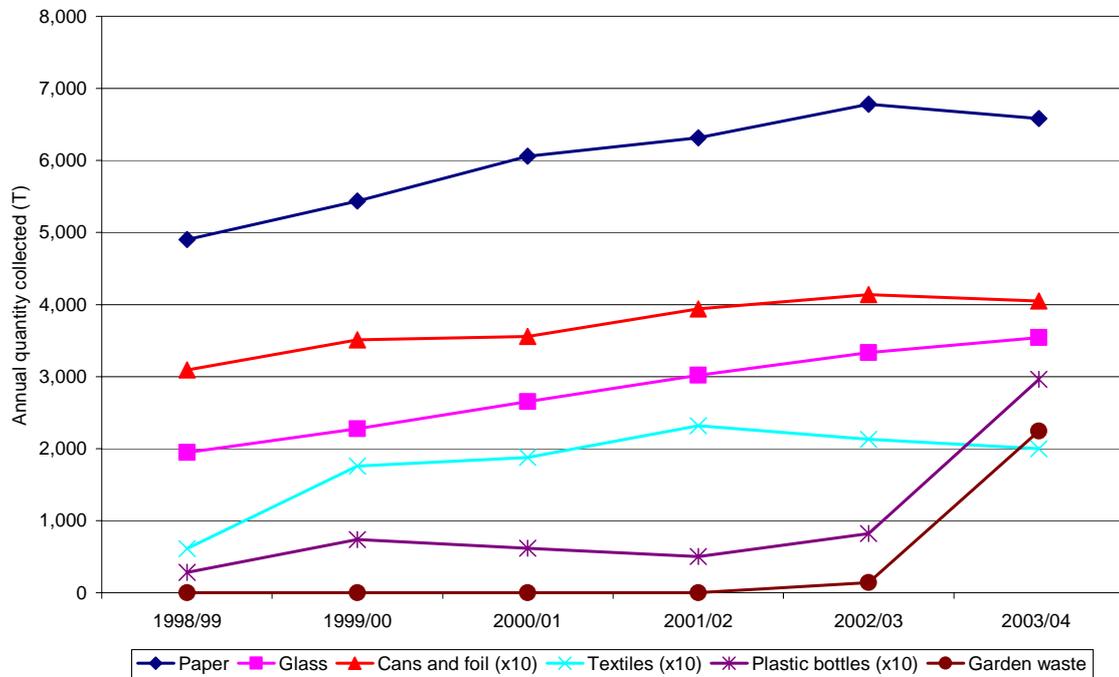
concern and issue. The incremental changes that are now required by some authorities to meet their targets will require focussed initiatives to target specific areas of poor participation and specific materials. Step changes, for example that can be achieved by adding a new material, will be exhausted. Although data collection has improved over recent years at a district wide level, Officers must now work with their contractors to ensure that detailed operational data are recorded, reported and analysed if they wish to operate high performing collections. (Almost without exception all vehicles are individually weighed and experience of working with local authorities has demonstrated that the data exist somewhere. The problem is often that they are not stored in an appropriate form to be analysed and are often not requested for this purpose).

### **Addition of plastic bottles to a well established collection**

Some kerbside collections have been operating for a long time and have a well established reputation as being high performing. It was decided that for the purposes of this report these collections should be avoided (see Chapter 3) however, publicly available data for one of them is analysed in Figure 8.2.

The authority introduced the collection of plastic bottles together with other recyclables during 2003, following a number of successful trials. At the same time it also introduced the separate collection of green waste through an opt-in charged system. Prior to this plastic bottles, if set-out, were collected which is why the data record some plastic bottles being collected prior to 2003.

**Figure 8.2: Quantities collected before and after the addition of plastic bottles and the introduction of a green waste collection (note the weights for cans, plastic**



**bottles and textiles have been multiplied by 10 to fit the scale of the graph)**

From the trends Figure 8.2, the addition of plastics and the inclusion of the green waste collection would appear not to have any impact on the quantities of the other materials collected. If anything, there is a slight downward trend in the quantities of paper and cans collected; however, for paper this trend is also reflected in the bring collections and is very slight so it could be due to factors completely independent of the collection.

From one example it is impossible to draw any conclusions that have widespread application; however, the results suggest that in this high performing collection residents are already recycling as many of the other materials that is possible within the constraints of their lifestyle and the collection service. So, while they are willing to start recycling the new materials, this does not influence their behaviour to the other materials.

## 9. Conclusions

The objective of the study was to test the following hypotheses:

1. Additional capture of all materials will result when the range of materials targeted in kerbside collection is expanded.
2. The changes in capture are solely due to the targeting of the additional materials.
3. The changes in capture are independent of which material/s is/are added to the collection.

Evidence from the case studies and the third party research for each of these will be considered in turn.

### **Additional capture of all materials will result when the range of materials targeted in kerbside collection is expanded.**

#### ***Case studies***

The results from the case studies in SODC and BFBC support this hypothesis, with quantitative evidence of tonnage being collected of most materials.

#### ***Third party sources***

The third party research does not entirely support this hypothesis. The research suggests that the hypothesis is true when moving from paper only collections to multi-material collections. The trial in Oaby and Wigston of the addition of glass also supports this hypothesis. However, the data from the high performing collection does not support the hypothesis.

### **The changes in capture are solely due to the targeting of the additional materials**

#### ***Case studies***

The evidence from the case studies does not support this hypothesis. In both cases there was a change in contractor and an improved service and also some additional promotional

work. These factors could have contributed to the overall improvement of the capture of materials, and indeed are believed to have done so by Officers.

### ***Third party sources***

The evidence from the third party research does not support this hypothesis, except perhaps in the change from a paper only collection to a multi-material collection. However, even in these cases there would have been a communication campaign, the details of which are unknown. The research in Oadby and Wigston attempts to exclude the impact of promotion, but as the collection frequency between the original collection and the trial changes from fortnightly to weekly this could have also contributed to the changes.

## **The changes in capture are independent of which material/s is/are added to the collection**

### ***Case studies***

As only case studies with the addition of plastic bottles were considered it is impossible to say whether they support this hypothesis or not.

### ***Third party sources***

The third party research supports this hypothesis in that changes were recorded for both glass and mixed materials. In the high performing collection neither plastic bottles nor garden waste appeared to have any impact.

## **Discussion**

The purpose of this research was to find quantifiable evidence to support the anecdotal evidence that the addition of new materials to an existing collection will improve the capture of all materials targeted by the collection. At the outset the research was limited by the scope of 4 case studies but during the course of the research it became clear that a more significant limiting factor is the availability of data. The discussions with Officers who had implemented changes supported (often enthusiastically) the anecdotal evidence, but the lack of empirical evidence meant that their experiences remain anecdotal.

This lack of empirical data raises a separate, but potentially a more important issue, that must be addressed in the short term if authorities are to meet their recycling targets and aspirations. There is sadly no 'quick fix' to recycling more (such as adding new materials to the collection!). Even though there is some evidence that targeting more materials in a collection that is not yet operating at its full potential will encourage householders to recycle

more and improve the overall performance, the case studies and third party research all concur that effective ongoing communication and education is the real key to achieving high performance. With many collections now operating district wide, significant changes in performance are likely to be achieved only with specifically targeted campaigns, for example on a particular material or area of housing. And for these to be possible a detailed understanding, based on empirical evidence, will be imperative.

From the research carried out for this report, it is impossible to conclude that the addition of materials to a multi-material collection will, in isolation, always result in an increase in the capture of the other materials. Other factors such as the level and quality of service, collection frequency and performance already being achieved will influence the size of any impact. However, in collections that are not operating optimally and which are not yet targeting the full range of materials perceived to be recyclable by residents, it is likely that targeting more materials will have a positive effect on the overall performance of the collection as long it is supported with the appropriate education campaign and a convenient and reliable service.

# Appendix I: Data and information requested from the case study authorities

## ***Status before the addition of the extra material***

General description of the collections system, including:

- materials targeted
- collection frequency
- household container
- vehicle used for the collection
- crewing
- number of households served
- number of collection vehicles
- number of collection rounds
- length of operation of the recycling collection scheme
- number of loads collected on average per vehicle each day
- description of communications campaigns/ongoing promotion
- qualitative opinion on the performance of the collection

Performance of the collection, including:

- tonnes of each material collected (weekly/monthly)
- estimated participation
- estimated set-out

## ***Status after the addition of the new material/s***

Information as above, plus:

- description of changes
- rationale behind change

- date/timing of the changes
- communications/promotion campaign at the time of the change
- qualitative opinion of the performance of the collection and reasons for any changes, or not, in performance following the addition of the new material

