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Creating markets for recycled resources

UK Plastic bottle recycling survey 2005

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UK Plastic bottle recycling survey 2005

Executive summary

WRAP commissioned Recoup to undertake a national UK household plastic bottle recycling survey. This is the eleventh such annual survey undertaken by Recoup. The results are based on responses and information from all 477 local authorities within the UK. Work on the survey commenced in November 2004 and culminated in the publication of this report in March 2005.

To gain a more accurate idea of the actual tonnage collected during 2004 calculations have been made to take into account the likely gradual increase in tonnage collected throughout the year. It is therefore estimated that 36,350 tonnes of plastic bottles were collected during 2004, equating to an actual recycling rate of 7.9% for that year.

Collections are now performing at an annualised rate of 48,397 tonnes per annum, which equates to 10.5% of bottles in the household wastestream. This is double the quantity collected in 2003, with a significant increase through both kerbside and bring collections.

Of the UK's 477 local authorities, 73% now offer recycling collection facilities for plastic bottles, ranging from one or two bring sites through to comprehensive kerbside coverage. 348 local authority recycling managers confirmed plastic bottle collection facilities within their council area. This reveals an 18% increase in scheme numbers, with a net increase of 53 schemes since the end of 2003. This therefore means that 27% of UK local authorities do not currently offer a recyclables collection service to their charge-payers that includes plastic bottles.

8.4 million households in the UK now have the opportunity to participate in kerbside recycling collections that include plastic bottles, equating to 34% of all UK homes. A breakdown by country shows that 35% of households in England, 30% in Wales, 23% in Scotland and 48% in Northern Ireland have a kerbside system that includes plastic bottles.

The growth in plastic bottle recycling facilities can be attributed to a number of factors including:

- Increasing pressure for local authorities to provide effective recycling programmes in order to meet recycling targets
- An increase in Government funding
- Increased recognition that plastic bottle recycling facilities can be provided cost effectively
- Improved baling/handling infrastructure
- Strong public demand for the service locally
- Rising landfill tax on residual waste
- Increased confidence in markets for collected plastic bottles

Plastic bottle recycling is not a key driver for local authorities considering their recycling strategy. This is because bottles are low weight high volume items and existing recycling targets are weight-based. Despite these challenges, the increase in Government funding for new recycling infrastructure to hit statutory targets combined with strong public demand and the opportunity to introduce collection affordably, are enabling many local authorities to provide comprehensive recycling collections for a wide range of materials, including plastic bottles.

Collection scheme design is critical to ensure that the successful expansion of recycling schemes remains affordable. It is also important for local authorities to factor in cost savings in residual waste management when budgeting for recycling. Local authorities already incur significant costs collecting plastic bottles within the conventional wastestream and it is important that this is recognised and taken into consideration so that refuse and recyclables collections can be organised to enable valuable materials such as plastic bottles to be diverted from landfill to new product manufacture.

An increasing number of local authorities are now recognising that plastic bottles can be collected for recycling cost effectively. Fifty-three of the local authorities that responded to the survey indicated that it costs them little or no extra to collect their plastic bottles for recycling compared to collecting them for landfill/other disposal route.

The four most important reasons given by local authorities for not including plastic bottles in their recycling schemes were, in order of priority:

- Cost: A scheme has been costed and viewed as too expensive
- Focussing on heavier materials to hit weight based recycling targets
- The use of kerbside sort vehicles with limited compartments prohibits the inclusion of plastic bottles
- No local baling/handling facility

Many factors will influence the current and future collection of plastic bottles for recycling. The survey revealed that the provision of plastic bottle recycling within kerbside collections is set to exceed 10.9 million households during 2006, representing 44% of UK households. In addition to this, 5,000 bring sites are expected to be operational by the end of 2006.

Despite the increasing coverage of recycling facilities, existing schemes capture just 10.5% of plastic bottles consumed in the household wastestream. Therefore there is a real need to focus on good practice and the removal of scheme inefficiencies to optimise current systems, in addition to working towards the removal of barriers to, and encouraging the implementation of, new schemes. There is a clear indication that a greater improvement in recovery rates can be achieved through the improvement of scheme performance, rather than extending plastic bottle recycling scheme coverage.

Survey results demonstrate that it is important to:

- Move emphasis towards kerbside systems which, on average, outperform bring schemes by 4:1;
- Provide local authorities with the information required to achieve sustainable, cost effective plastic bottle recycling;
- Review baling/handling infrastructure in the UK and assess the potential to encourage expansion where necessary;
- Communicate to members of the public which plastic items are suitable for recycling and why plastics other than bottles should not currently be placed in recycling receptacles;
- Encourage the provision of suitable alternatives to households such as tenement properties which are currently unable to participate in kerbside schemes. Work in this area is being taken forward, with an increasing number of local authorities trialing recycling schemes from this type of property.

The information within this document covers all the main elements of household plastic bottle collection systems. It provides current performance data across the UK for both bring and kerbside schemes together with analysis of key operational parameters, costs, local authority perceptions and predictions on future growth.

We would like to thank all recycling scheme managers who have taken the time to respond and have enabled us to compile this document.

UK Plastic bottle recycling survey 2005

Introduction and methodology

Introduction

WRAP commissioned Recoup to undertake a survey of local authority domestic plastic bottle recycling schemes and to use this data to produce a survey report.

The purpose of this report is to enable WRAP to access data which will support its Plastics programme by:

- Providing an up-to-date status of the current level of plastic bottle recycling in the UK
- Assessing the progress made against WRAP's plastics target relating to plastic bottle recycling

Recoup has particular specialist competencies to deliver this project, as it is primarily focussed on post-consumer plastics recycling issues. Recoup has undertaken ten previous UK plastic bottle recycling surveys, including the one produced on behalf of WRAP in 2004.

Methodology

Work on the survey commenced in November 2004 and culminated in the publication of this report in March 2005.

Recycling managers from all 477 UK local authorities were contacted by e-mail to request participation in the survey. Recycling managers were encouraged to enter data directly into an electronic form accessible over the Internet, although postal/fax back forms were also made available on request.

E-mail reminders were sent to local authorities that did not respond to the initial invitation to participate in the survey. Local authorities that did not respond to the reminder were interviewed by telephone. Data supplied by local authorities over the Internet was entered automatically into the database whilst data supplied by postal/fax back forms, or through telephone interviews was entered into the database by Recoup.

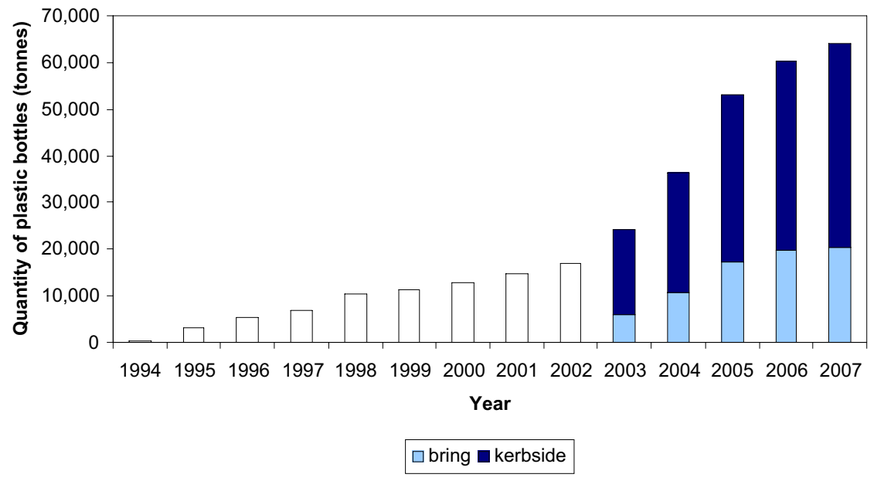
Data was reviewed and any apparent anomalies verified by telephone with the relevant local authority before analysis. This included comparisons with earlier survey data and other information available to Recoup. Supporting and cross-reference information was also obtained from local authority websites, the Audit Commission and other sources to assist this process and later analysis.

Plastic bottle recycling activity

To gain a more accurate idea of the actual tonnage collected during 2004 calculations have been made to take into account the likely gradual increase in tonnage collected throughout the year. It is therefore estimated that 36,350 tonnes of plastic bottles were collected during 2004 (Figure 1). This is equivalent to 727 million plastic bottles, with a volume of 1,211,683 cubic metres. It represents an increase of 50% on the quantity collected in 2003, resulting from an increase through both kerbside and bring collection schemes.

At the end of 2004, plastic bottle collection levels in the UK had risen to an estimated annualised rate of 48,397 tonnes per annum. This is equivalent to 967 million plastic bottles, with a volume of 1,613,233 cubic metres. The annualised rate is based on data provided by local authorities at the end of 2004/start of 2005.

Figure 1: Household plastic bottle recovery in the UK



Approximately 32,725 tonnes per annum (68%) of the bottles are being recovered through kerbside collections, with the remaining 15,672 tonnes per annum (32%) being recovered through bring schemes. Responses from Local Authorities indicate a continuing growth in kerbside plastic bottle collections through 2005 to 2007, with a lesser growth in bring schemes. Based on current Local Authority declarations, it is forecast that almost 65,703 tonnes per annum of plastic bottles will be collected by 2007.

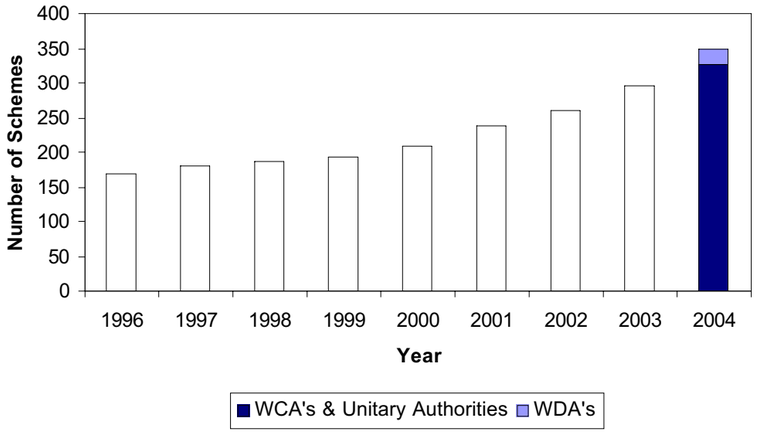
The total quantity of plastic bottles entering the UK household wastestream is c. 460,000 tonnes per annum[1] (although it is probable that this has increased between 3% and 6% year on year since 2003). The annualised recycling rate for plastic bottles from household sources is therefore 10.5% per annum. The actual recycling rate for plastic bottles for 2004 has been calculated as 7.4%. While this is a significant increase on 2003, which showed a recovery rate of 5.5%, this rate remains relatively low compared to other major European countries and North America - indicating that there is clear potential for combined growth.

[1] Recoup and Wastewatch (2003) *Plastics in the UK Economy,* Wastewatch

Plastic bottle recycling schemes

Of the UK's 477 local authorities, 73% now offer recyclables collection facilities for plastic bottles, with 348 local authority recycling managers confirming plastic bottle collection facilities within their council area (Figure 2). This reveals an 18% increase in scheme numbers with a net increase of 53 schemes since the end of 2003. This therefore means that 27% of UK local authorities do not currently offer a recyclables collection service to their charge-payers that includes plastic bottles.

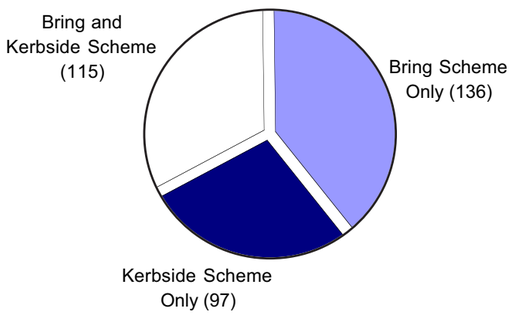
Figure 2: Number of UK local authorities that provide a plastic bottle recycling service



The two main approaches to the collection of plastic bottles in the UK are bring banks and kerbside collections. Bring schemes (plastic bottle banks) are available in 251 (53%) local authority areas. There are now 3,926 sites where plastic bottles are collected through a network of 5,455 bottle banks. Kerbside collections including plastic bottles now occur in 212 (44%) local authority areas. A total of 8.4 million households (34%) can have their recyclables, including plastic bottles, collected from the kerbside.

In many cases, a combination of bring and kerbside collections are provided within a single local authority area to address local circumstances (Figure 3). 115 (33%) local authorities operate both bring and kerbside schemes within their council boundaries.

Figure 3: Type of plastic bottle recycling scheme



Bring and kerbside scheme performance is reported in more detail later within this report.

Collection infrastructure

Collection infrastructure for plastic bottles has grown in the UK since our last survey. Tables 1 and 2 show the current plastic bottle recycling activity by country.

England have 169 bring schemes and 133 kerbside schemes that include plastic bottles. These are spread across 238 local authority areas with 64 of those areas running both kerbside and bring collections. Overall, these schemes cover 60% of all English councils and generate the highest tonnage of bottles.

Wales have 13 local authorities with plastic bottle collection facilities, including 11 bring schemes and 7 kerbside schemes. This corresponds to 59% of Welsh local authorities.

Scotland have 65% of their councils collecting plastic bottles for recycling through 16 bring schemes and 12 kerbside schemes. Seven of those authorities run both scheme types.

Northern Ireland plastic bottle recycling comprises of 18 bring schemes and 13 kerbside schemes. This represents almost 90% of all local authorities in Northern Ireland, the highest ratio of the four countries.

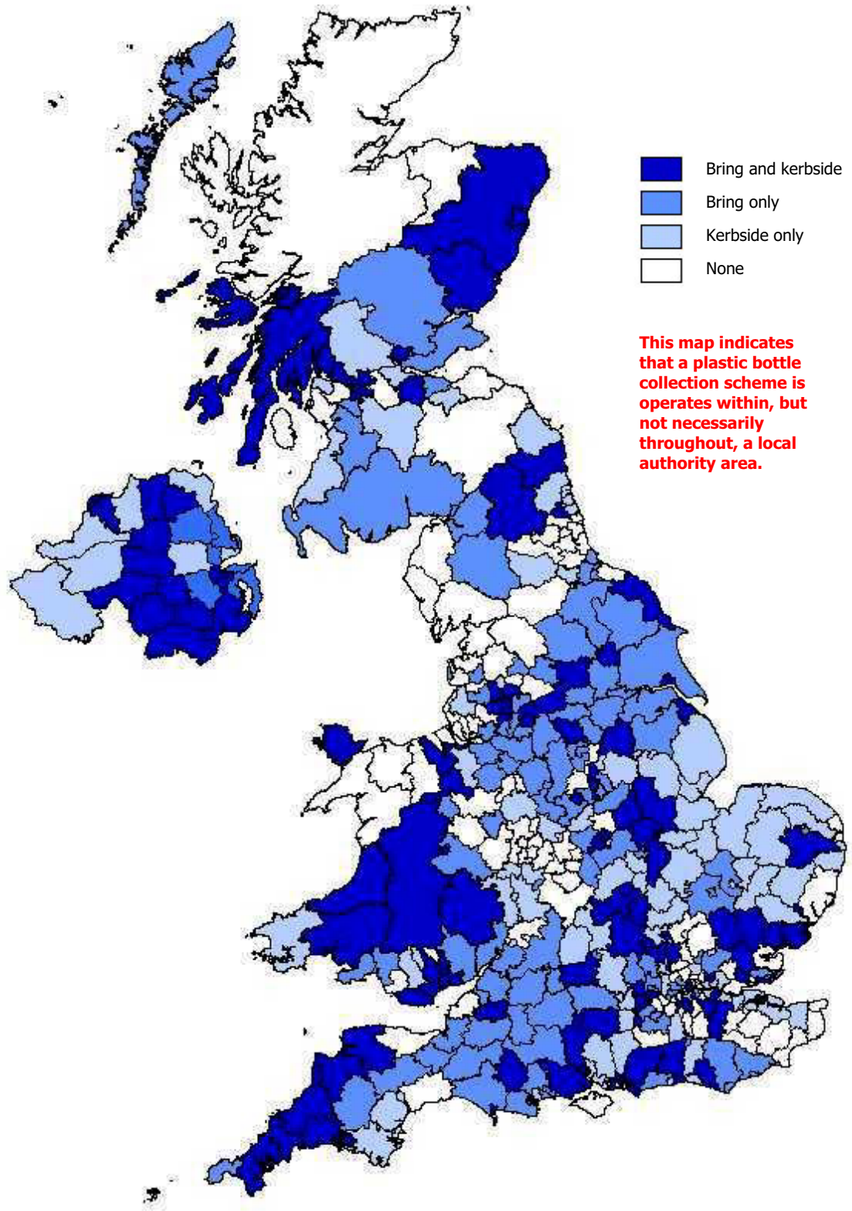
Table 1: Plastic bottle recycling activity by country

Country	Total No. Councils	Councils with plastic bottle collections	%	No. Councils with bring & kerbside plastic bottle collections	%	No. Councils with bring plastic bottle collection only	%	No. Councils with kerbside plastic bottle collection only	%
England	397	282	71	82	21	119	30	81	20
Wales	22	17	77	11	50	3	14	3	14
Scotland	32	23	72	9	28	8	25	6	19
Northern Ireland	26	26	100	13	50	6	23	7	27
Total	**477**	**295**		**84**		**130**		**81**	

Table 2: Plastic bottle recycling infrastructure by country

Country	Plastic bottle bring sites	Average household per available site	Total number of households offeredkerbside collection including plastic bottles	% of all households
England	3,322	6,208	7,260,362	35
Wales	142	8,514	363,319	30
Scotland	324	6,766	506,657	23
Northern Ireland	138	4,541	299,052	48

Figure 4: Geographical spread of plastic bottle recycling schemes across the UK

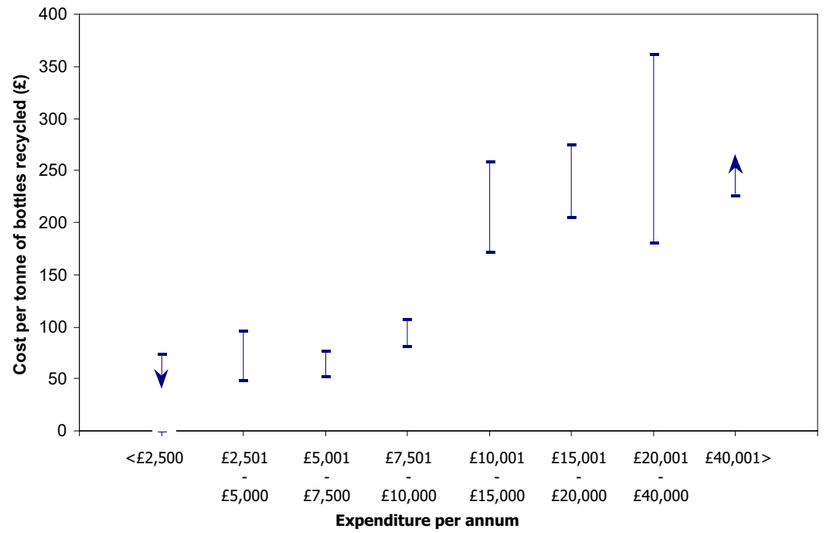


Digital Map Data C (2005) The DataStore & Bartholomew Ltd

Council expenditure on plastic bottle recycling

Local authority recycling managers were asked to indicate their current annual expenditure on plastic bottle recycling through their bring schemes, choosing from a series of cost bands. 186 (74% of those with bring schemes) provided a response to this question, with 88 also providing tonnage data, used to analyse the relationship between declared cost and tonnage collected (Figure 5).

Figure 5: Reported plastic bottle recycling scheme costs



The reported costs for bring scheme systems were between £50 and £350 per tonne of bottles recycled. This is consistent with case studies[2] that suggest average direct costs of £150 - £250 per tonne would be typical. Issues such as locality, household density, contractor availability, collection method and material market value will all influence the overall cost per tonne of plastic bottle recycling. This data suggests that where bring schemes are incurring direct costs above £300 per tonne there may be inefficiencies in the system that could be beneficially resolved.

It can prove difficult for local authorities to separate out the cost of plastic bottle recycling through kerbside collections, as these are typically collected alongside other materials. Recycling managers were therefore asked for their views on including plastic bottles in recyclables collections and the benefits and value of doing so. These issues are discussed in a later section of this report addressing perceptions of plastic bottle recycling.

[2] Recoup (2003) Bring scheme case studies including; Greater Manchester, Derby, Bromley and Sevenoaks, www.recoup.org

Bring collection schemes

There are now 251 separate UK local authority areas with plastic bottle bring sites. There are 3,926 sites in total with 5,455 plastic bottle banks. This represents a 15.4% increase in the number of sites available since 2003, and an increase of 10.5% in the number of banks.

Possible reasons for a greater increase in the proportion of bring sites compared to the proportion of banks include:
ß Local authorities spreading existing banks out among an increased number of sites to gain improved coverage
- A removal of some existing banks due to the roll-out of kerbside collections that include plastic bottles
- A move toward using a fewer number of larger banks
- An under declaration of the number of bring banks in use

There are a range of different container types used in plastic bottle bring schemes. They have generally been added as a separate bank to existing bring sites for other materials, although in a small number of cases, plastic bottles are collected with cans and subsequently sorted at a central facility.

Figure 6 shows that the proportion of larger banks has increased with a greater proportion of 1100 litre wheelbins and a smaller proportion of 240 and 360 litre banks in use. The proportion of 8 cubic yard banks and triple net cages in use has also increased. This means that, in addition to an increase in the number of banks recorded since the previous survey, the actual space available for the collection of plastic bottles per bank is likely to have increased. The larger banks, because of their additional capacity, achieve a higher average recovery per container than the smaller banks (Figure 7).

Figure 6: Containers used for plastic bottle bring schemes

1100 L	1.1 m^3	
360 L	0.36 m^3	
240 L	0.24 m^3	**Wheelbins**
10 cubic yard	7.65 m^3	
8 cubic yard	6.12 m^3	**Banks**
Triple	10.6 m^3	
Single	3.54 m^3	**Cages**
Skip		
Other		

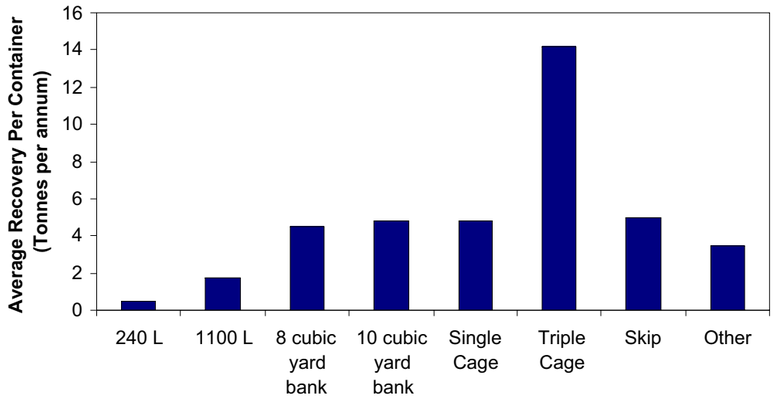
Bring schemes are calculated to have produced some 10,820 tonnes per annum of recyclable plastic bottles in 2004 (15,672 tonnes per annum - 32% of the total supply - if annualised from data provided at end 2004/start 2005). This is an 81% increase since 2003, when some 6,000 tonnes of plastic bottles was reported as generated.

Data collected for 2003 showed that the rate of growth of tonnage collected through bring systems was significantly lower than the growth in kerbside collection. It was predicted that the proportion of bottles collected through bring schemes would continue to decline as a result of the strong growth in kerbside collections. This appears not to be the case, as the growth in plastic bottles collected through bring schemes has increased significantly. Potential reasons for this increase include greater available local authority funding, increased public awareness and public demand for plastic recycling facilities. It is also possible that there was

The average annual recovery per site has increased from 1.75 tonnes of plastic bottles in 2003 to 2.7 tonnes for 2004 (4 tonnes if annualised from data provided at end 2004/start 2005). Individual site performance will vary quite widely depending on the number and type of sites, and the catchment population. Based on previous surveys undertaken by Recoup, large supermarket car parks and household waste recycling centres accounted for 56% of bring site locations. These can typically generate 4-16 tonnes per annum of plastic bottles per site.

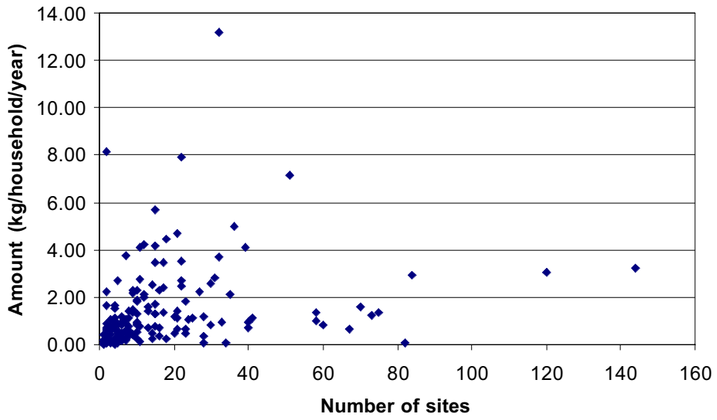
Information on the type of bring sites operated by local authorities was not requested as part of this year's survey, but an increase in these larger sites may help to explain the increased tonnage per site. In the extreme case of one or two large retail sites that offered a collection in an area without any other facilities, collections of up to 30 tonnes per annum have been achieved. Container capacity and servicing frequencies should be planned accordingly. Anecdotal reports from local authorities indicate that bring sites for plastic bottles remain very popular with members of the public.

Figure 7: Bring scheme recovery performance by container type



The number of sites has been plotted against recovery per household for more than 150 bring scheme datasets (Figure 8) to demonstrate the variation in performance. As can be seen 71% of local authorities operate fewer than 20 bring sites and 76% recover less than 2kg per household per annum.

Figure 8: Bring scheme performance analysis



The lack of a significant correlation between the number of sites and the quantity of plastic bottles collected suggests that other factors such as type of site, local demographics and promotion also affect recovery rates.

Kerbside collection schemes

There are now 212 kerbside schemes including plastic bottles in the UK, representing 8.4 million households. The coverage of households has seen a 55% increase since the end of 2003 and is equivalent to 1 in 3 UK households now having the opportunity to include plastic bottles in their local kerbside collection programme.

Participation in these schemes is essentially voluntary, so not all households within a scheme will participate. The reported participation for schemes is between 15 - 100 % (an average of 62%). It is calculated that the average capture rate of plastic bottles through current kerbside collection programmes is 22% - indicating the potential to achieve much greater levels of collection from current kerbside infrastructure.

Understanding the mechanisms that influence kerbside systems is fundamental if effective practice is to be identified. This is especially crucial for plastic bottle recycling, with a number of variables influencing a scheme's economic efficiency and recovery performance.

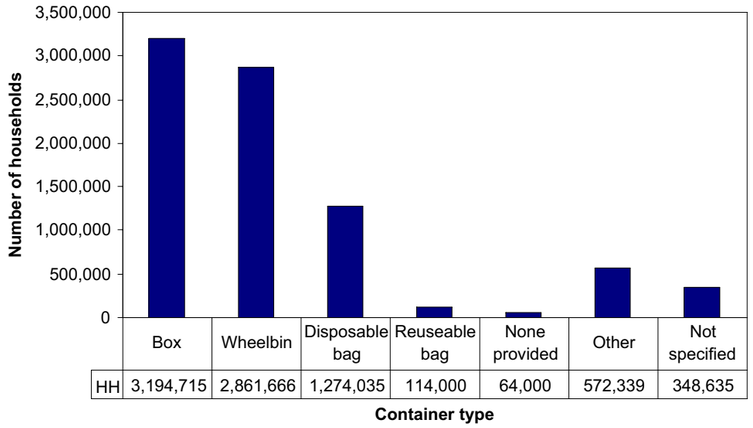
As in previous surveys, each variable has been isolated to assess its prevalence and influence on plastic bottle recovery; thus enabling the analysis of the range of opportunities for the recycling of plastic bottles from the kerbside. Each local authority will have unique features within their kerbside scheme, yet common elements such as frequency of collection, relation to residual refuse collection and container type can be compared and analysed.

Statistical analysis of the data has been undertaken to establish 95% confidence intervals for quoted average performance data, which provides useful predictive data for many types of scheme.

Container type

As can be seen (Figure 9), boxes and wheelbins are the most popular container type used for the collection of dry recyclables. The box has historically been the container of choice for kerbside collections however the number of households being provided with wheelbins for the collection of their dry recyclables is on the increase.

Figure 9: Containers used for kerbside schemes including plastic bottles



The percentage of households that have a plastics kerbside collection and are supplied with wheelbins has increased from 27% in 2003 to 33%, while the percentage supplied with boxes has remained at 38%. Boxes typically have a 55 litre capacity and wheelbins generally have either a 120 or 240 litre capacity. It is common practice to use different coloured containers to distinguish which materials the householder should place in each receptacle.

It is the additional capacity of the wheelbin, together with servicing benefits where on-vehicle sorting is not required, that has encouraged recycling managers to adopt it. The additional capacity provided by the wheelbin is of particular importance when high volume items, such as plastic bottles, are included in a dry recyclables collection.

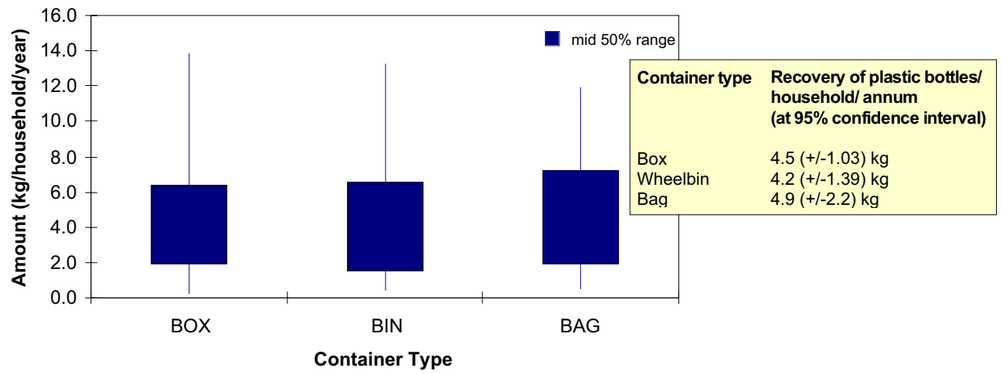
The third major container option in use is the bag. These can either be supplied to the householder, or the householder can be encouraged to use carrier bags. Approximately 1.4 million householders have a separate collection of dry recyclables including plastic bottles through this option. As with boxes and wheelbins, different coloured bags can be provided for different materials. Clear or tinted bags are frequently used as this assists with quality control at the kerbside, enabling collection crews to identify heavily contaminated bags. Perforated bags are sometimes used, as they can be opened more quickly and efficiently. Kerbside collection bags can be separately baled and sold for recycling following use.

The three main container types achieve an average recovery of 3.9 kg of plastic bottles per household per annum. This is an increase of only 0.3kg from the previous survey. There are variations in scheme performance for each container type, but the average recovery is approximately the same for each.

The performance of individual schemes varies significantly for each container type in use (Figure 10). The highest performing kerbside schemes achieved in excess of 13 kg per household per annum of plastic bottles from households covered. The lowest performing kerbside schemes generated less than 1 kg per household per annum.

The data was analysed to identify average performance with 95% confidence interval for each dataset[3] (Figure 10). These are represented in "Box and Whisker" plots. The extremes of the lines represent the maximum and minimum performances from any individual scheme. The upper and lower limits of the box show the range, which represents the middle 50% of individual scheme performances.

Figure 10: Kerbside plastic bottle recovery performance by container type



It should be noted that container type does not influence collection levels. There are other influences on the recovery, such as the quantity of other materials collected, promotion and frequency of service. Although not reflected in the plastic bottle survey data, it seems reasonable to expect that the higher capacity of wheelbin and bag systems will facilitate improved overall recycling rates, compared to single box systems. As single box systems limit the quantity of recyclables that a household can store.

Frequency of collection

The frequency with which the container is collected is a major factor in recycling schemes. This also has a controlling influence on the type of container, as capacity becomes an issue. Weekly or fortnightly collections are the most common, although some collections are every four weeks, or on a set day each month. An increasing number of local authorities are also moving to alternate weekly collections, where refuse is collected in week 1 and dry recyclables are collected in week 2.

A fortnightly collection service of recyclables is particularly popular (Table 3), as it reduces servicing costs per household compared to weekly collections. In addition to this, previous survey results had shown little difference in performance

[3] i.e. There is a 95% probability that the average will fall within the confidence range

between weekly and fortnightly collections. This year's survey however shows a distinct difference in performance, with schemes on a weekly collection achieving a higher performance than schemes on a fortnightly collection (Figure 11), although at a potentially higher cost per tonne of material collected.

As can be seen, weekly collections are averaging 6 kg per household per annum, compared to fortnightly collections, which are averaging 3.6 kg per household per annum. The performance of schemes with weekly collections has increased from 3.7 kg in 2003 to 6 kg per household per annum, whereas schemes with fortnightly collections have decreased performance slightly, from 3.9 kg to 3.6 kg per household per annum. It does not seem unreasonable to expect weekly collections to perform better than less frequent collections, as householders that receive fortnightly collections have to remember the week as well as the day of the collection.

Table 3: Frequency of kerbside collection

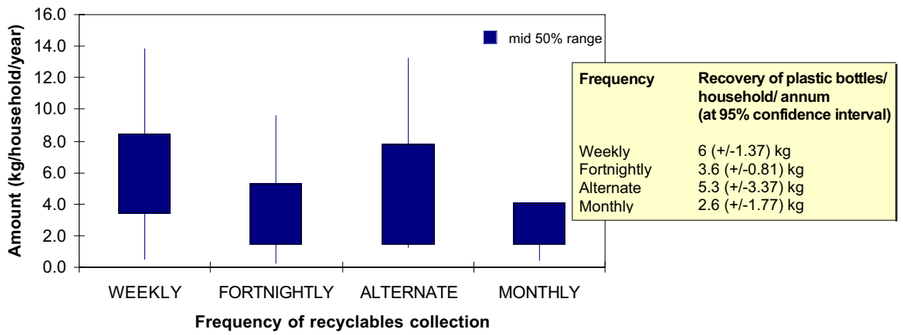
	Box	Wheelbin	Bag	None	Other	Not specified	TOTAL
Weekly	1,000,687	143,900	739,604	0	177,400	73,300	2,134,891
Fortnightly	2,146,390	993,104	568,434	0	383,644	98,191	4,189,763
Alternate	32,638	1,237,162	0	0	6,295	55,144	1,331,239
Monthly	0	363,500	0	0	0	0	363,500
Other	15,000	124,000	45,893	64,000	5,000	0	253,893
Not specified	0	0	34,104	0	0	122,000	156,104
TOTAL	3,194,715	2,861,666	1,388,035	64,000	572,339	348,635	8,429,390

Monthly collections are least popular and have the lowest performance. As can be seen (Table 3) wheelbins tend to be required if collections are undertaken monthly to ensure that sufficient capacity is available to store the dry recyclables.

At first glance, alternate weekly collections appear to achieve a relatively high performance, with an average of 5.3 kg per household per annum (Figure 11). The confidence intervals suggest that this average performance could be as high as 8.67 kg however, or as low as 1.93 kg. As a greater number of alternate weekly schemes become established, the dataset on which these calculations are based will increase and narrow the confidence intervals to provide a more accurate measure of performance. It should be noted however that all of the alternate weekly collections achieved performances of more than 1 kg per household per annum.

Alternate weekly collections are growing in popularity among local authorities, with the number of Councils operating such systems having more than doubled since 2003. Such systems maximise the efficient use of resources and minimise service costs of refuse and recycling operations. Last years survey also demonstrated that they generate better recovery of all recyclables per household - some 15% more collected per household per annum than the average from weekly collections.

Figure 11: Kerbside bottle recovery performance by frequency of collection



The container capacity has an obvious relationship with collection frequency. Table 3 shows that a greater proportion of box schemes operate a weekly or fortnightly collection, while wheelbins tend to have a collection frequency of fortnightly or lower, due to large capacity. Bag systems are the only containment method where weekly collections are most popular, although the versatility of bags also allows them to be collected at less frequent intervals, since there is no issue with limited capacity providing householders can easily restock their supply of 'recycling bags' that is and find a space to store them once full.

Relationship to refuse collection

The majority of local authorities operate recyclables collections on the same day as the residual refuse collection, using a separate vehicle (Figure 12). The reasoning behind this is that it is easier for householders to remember one collection day for everything, than to remember a separate collection day for dry recyclables in addition to the collection day for residual refuse. There appears to be little obvious difference in terms of performance, however (Figure 13).

Figure 12: Dry recyclables kerbside scheme relationship to residual refuse collection

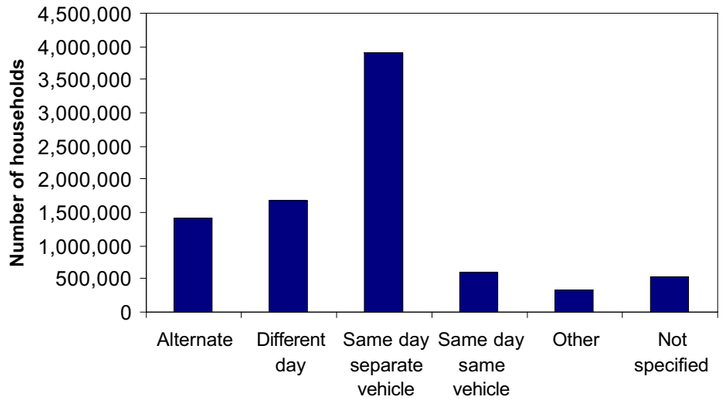
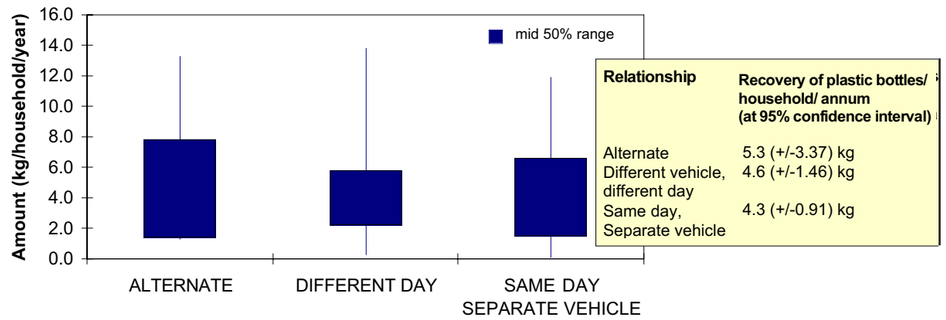


Figure 13: Kerbside bottle recovery performance by relationship to refuse collection



Those schemes that operate recyclables collections on a different day to residual refuse collections show a similar performance to those schemes that operate recyclables collections on the same day as residual refuse. As explained in the previous section, although alternate weekly collections appear to achieve a higher performance, because of the wider confidence interval, it is difficult to draw any definitive conclusions based on this current dataset.

UK Plastic bottle recycling survey 2005

Perceptions of plastic bottle recycling

Local authority perceptions of plastic bottle recycling are helpful to establish potential operational challenges, benefits and barriers to implementation. This information is useful for local authorities considering the introduction of a plastic bottle collection. It is also useful to organisations wishing to encourage plastic bottle recycling, helping to identify key messages and areas where action may be required.

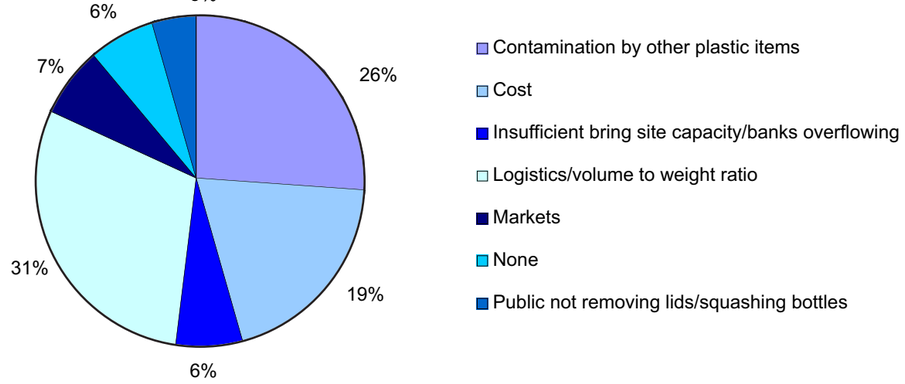
This section of the questionnaire was split into two parts, one with questions for recycling managers currently operating plastic bottle recycling schemes and the other for those not currently collecting plastic bottles for recycling.

Operational challenges of plastic bottle recycling

Local authority recycling managers currently operating plastic bottle recycling schemes were asked the question 'What are the biggest operational challenges you face in running your plastic bottle collection programme?' 200 responded; the responses were then grouped into the categories represented in Figure 14.

As can be seen, there were three main responses to this question:
- Logistics/volume to weight ratio
- Cost
- Contamination by other plastic items

Figure 14: Operational challenges of plastic bottle recycling



Plastic bottles are a low weight, high volume item and therefore rapidly fill collection vehicles. Many local authorities equate this to transporting air, hence the responses relating to the need to encourage householders to remove bottle caps and squash the bottles before placing them in the receptacle.

Rapid filling of collection vehicles often leads to more frequent trips to the drop-off point during collection rounds. This is particularly true for kerbside sort vehicles where plastic bottles are confined to one compartment, which may have a tendency to fill before compartments in which other recyclables are placed, leading to inefficiencies in collection rounds.

The cost of recycling plastic bottles is linked to their low weight and high volume and also to their market value.

What many local authorities fail to realise is that they are already paying to transport and dispose of plastic bottles as residual refuse and by doing so realise no material value whatsoever from them. 'Linked thinking' needs to be encouraged to enable local authorities to balance the expense of recycling with the potential cost savings in residual waste management.

The design of the scheme will also impact on the cost of collection. For example, alternate weekly collections, where dry recyclables are collected on week 1 and residual refuse is collected on week 2 maximise the use of existing resources, thereby minimising cost.

Contamination of plastic bottles by other types of plastic items can be a serious challenge for local authorities to overcome. At present, there is a very limited export market, but no reprocessing capacity in the UK for mixed plastics. Members of the public frequently fail to understand that not all plastic is the same and when presented with the opportunity to recycle their plastic bottles they find it difficult to understand why they can't recycle all of their plastics.

In fact, there are numerous plastic polymer types, all with different properties. In order to recycle plastic items into high value products it is necessary to separate the items into distinct polymer types and to recycle these separately. It is relatively simple to do this with plastic bottles as they are made from a limited number of polymer types, which are easy to distinguish and separate. Other plastic items can be made from a wider variety of polymers and it is less easy to distinguish and separate these.

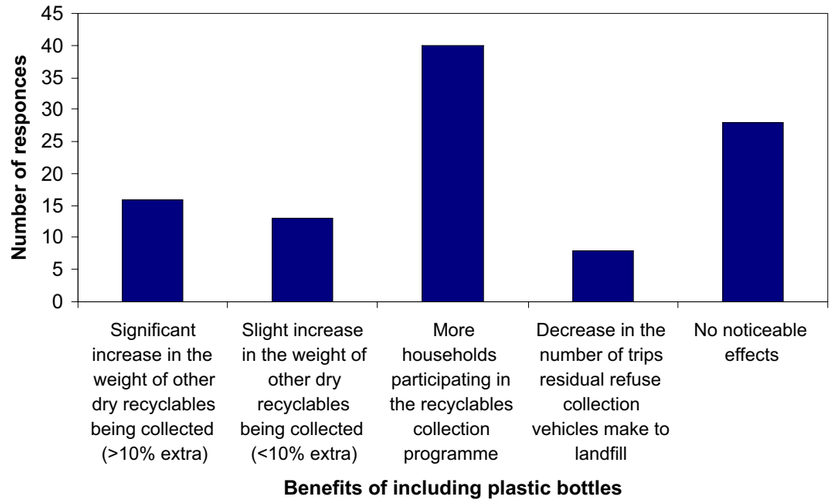
Until a market is developed for mixed plastics in the UK, well structured, targeted educational and promotional campaigns are the most effective method of meeting this challenge.

Benefits of including plastic bottles in a recycling scheme

Local authority recycling managers operating plastic bottle collection schemes were asked to select one or more of the following statements as a benefit of including plastic bottles in their recycling scheme:
- Significant increase in the weight of other dry recyclables being collected (>10% extra)
- Slight increase in the weight of other dry recyclables being collected (<10% extra)
- More households participating in the recyclables collection programme
- Decrease in the number of trips residual refuse collection vehicles make to landfill
- No noticeable effects

78 responded. As can be seen (Figure 15), 40 respondents indicated that including plastic bottles in their recyclables collection scheme had increased public participation in the scheme overall. This demonstrates that there is a strong public demand for plastic recycling facilities and that enabling these facilities provides a valued additional service to members of the public.

Figure 15: Benefits of including plastic bottles in a recycling scheme



It seems reasonable to assume that with a greater number participating in a given recycling scheme, that scheme will achieve a higher performance. Those members of the public encouraged to participate by the provision of plastic bottle recycling facilities will also recycle other items that they were previously throwing out with the residual refuse.

It is also evident that some local authorities are making the link between recycling and residual waste management and are ensuring that, as greater volumes of material are recycled, appropriate changes are made to residual waste management to ensure maximum efficiency is maintained. This can include decreasing the number of trips residual refuse collection vehicles make to landfill, as indicated here, but could also involve rearranging collection routes, or even decreasing the number of vehicles required for the collection of residual refuse.

Value of plastic bottle recycling

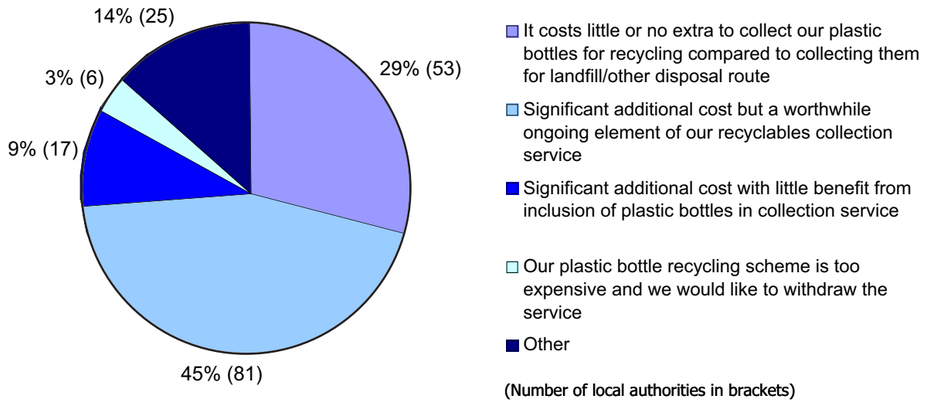
The third question asked of Local Authority Recycling Mangers that operate a plastic bottle recycling scheme was 'Overall, how would you rate the value of your current plastic bottle collection scheme?' They were requested to select just one of the following options:

- It costs little or no extra to collect our plastic bottles for recycling compared to collecting them for landfill/other disposal route
- Significant additional cost but a worthwhile ongoing element of our recyclables collection service
- Significant additional cost with little benefit from inclusion of plastic bottles in collection service
- Our plastic bottle recycling scheme is too expensive and we would like to withdraw the service
- Other

183 responses were given. As shown in Figure 16 below, the response to plastic recycling was very positive, with 29% indicating that it costs little or no extra to collect plastic bottles for recycling compared to collecting them for landfill/other disposal route. This demonstrates that plastic bottle recycling can be achieved cost effectively. It is interesting to note that of the local authorities operating alternate weekly collections of dry recyclables (including plastic bottles) and residual refuse, 69% of those that responded stated that it costs them little or no extra to collect plastic bottles for recycling, indicating that this is a particularly cost effective collection system.

A further 45% indicated that, while they collected plastics at a significant additional cost, it was a worthwhile ongoing element of their recyclables collection service. Only 9% indicated there was little additional benefit from the inclusion of plastic bottles and 3% wished to withdraw the service.

Figure 16: Value of plastic bottle recycling



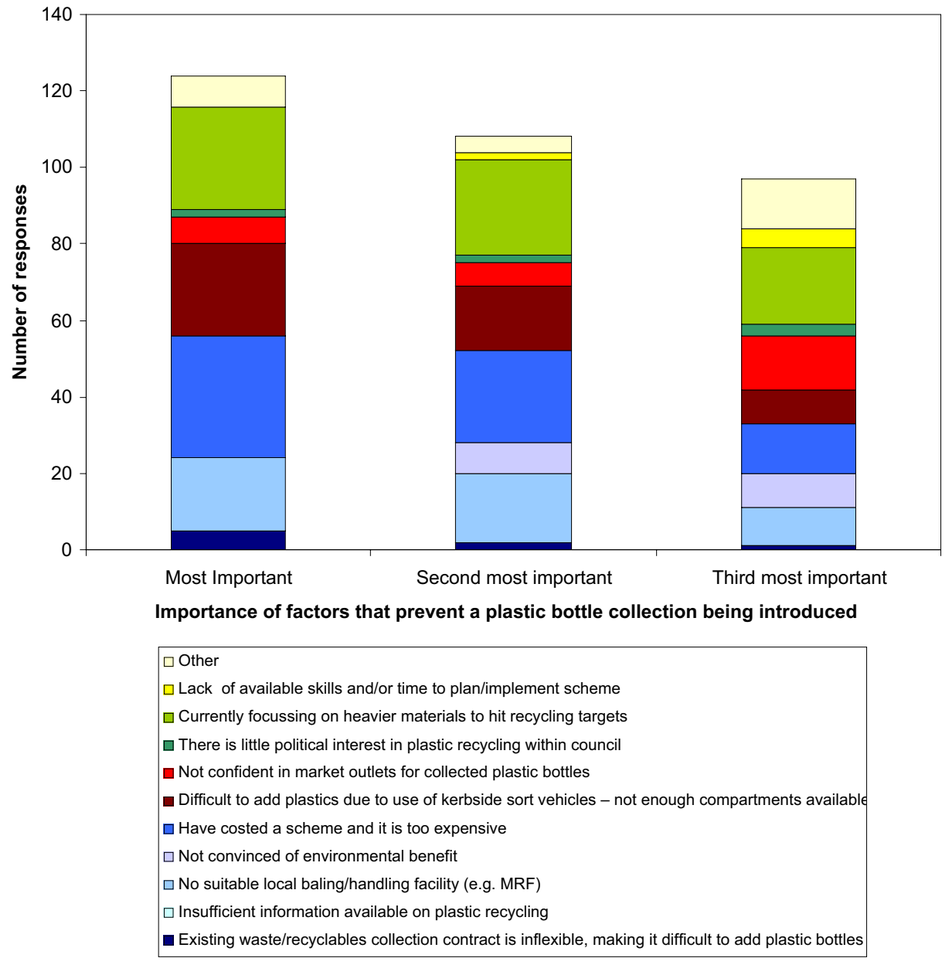
Factors that prevent a plastic bottle collection scheme being established

Recycling managers not currently operating a plastic bottle recycling scheme were asked to rank the three most important factors for this, from the following options:

- Existing waste/recyclables collection contract is inflexible, making it difficult to add plastic bottles
- Insufficient information available on plastic recycling
- No suitable local baling/handling facility (e.g. MRF)
- Not convinced of environmental benefit
- Have costed scheme and it is too expensive
- Difficult to add plastics due to use of kerbside sort vehicles - not enough compartments available
- Not confident in market outlets for collected plastic bottles
- There is little political interest in plastic recycling within council
- Currently focussing on heavier materials to hit recycling targets
- Lack of available skills and/or time to plan/implement scheme
- Other

124 responses were received and the results are shown in Figure 17, below.

Figure 17: Factors that prevent a plastic bottle collection scheme being introduced



The four most important reasons given for not recycling plastic bottles were, in order of priority:

- Cost: A scheme has been costed and viewed as too expensive (26%)
- Focussing on heavier materials to hit weight based recycling targets (22%)
- The use of kerbside sort vehicles with limited compartments prohibits the inclusion of plastic bottles (19%)
- No local baling/handling facility (15%)

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These same four reasons were also ranked one through to four, by other local authorities, as the second in importance.

Cost and emphasis on heavier materials were again ranked highly as the third most important reason for not recycling plastic bottles. The remaining to reasons indicated by 15% and 13% of local authorities respectively were:

- Lack of confidence in market outlets
- Other

Other reasons included issues such as lack of space at bring sites, lack of capacity in existing bulking facility, and availability of a local energy from waste incinerator.

The following can be concluded:

- Further work is required to demonstrate how plastic bottles can be recycled cost effectively
- Weight based recycling targets are restricting the expansion of plastic bottles and potentially other lightweight high volume items from being recycled. These valuable items therefore continue to take up limited landfill space
- Consideration of the implications of adding plastic bottles to selected collection and handling infrastructure at a later date is important to ensure future collections can be implemented efficiently
- Existing baling/handling infrastructure in the UK requires assessment and potential expansionl

Planned developments

The potential growth of the UK plastic bottle recycling infrastructure can be assessed through feedback from recycling managers. The reported planned developments can be used to analyse growth within both bring and kerbside systems (Figures 18 & 19). The continual year on year growth of plastic recycling schemes is strengthened by the availability of increased Government funding for recycling, improved technologies and statutory or national targets.

There are currently 8.4 million households receiving a kerbside collection of recyclables in the UK. This is a 55% increase since the end of 2003 and represents 34% of UK households. The provision of bottle recycling within kerbside collections is set to exceed 10.9 million households during 2006. This will represent 44% of UK households.

Figure 18: UK kerbside scheme coverage over time including planned growth

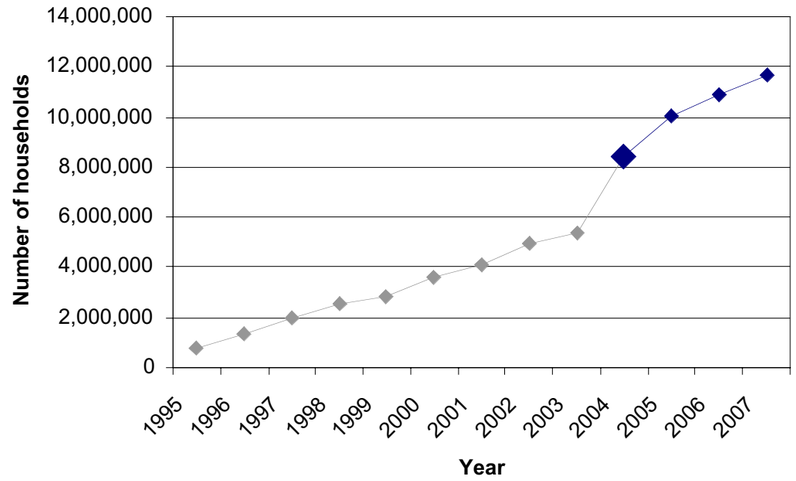
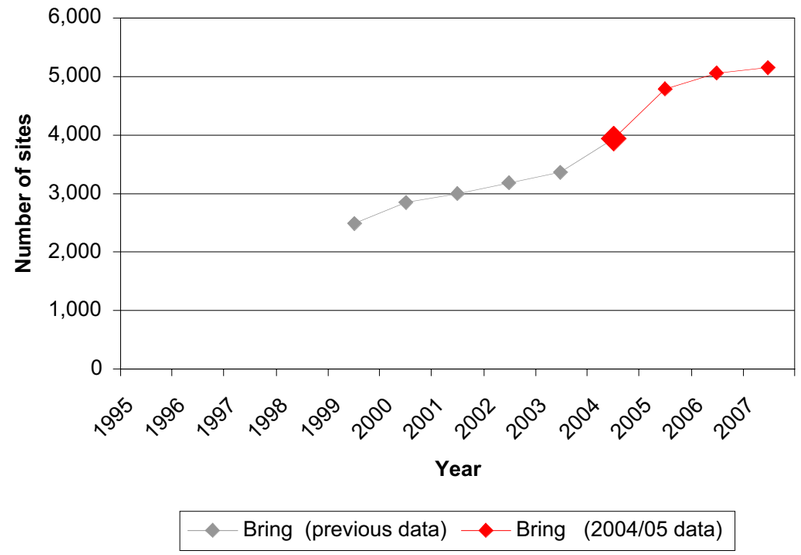


Figure 19: UK bring scheme coverage over time including planned growth



It is anticipated that actual plastic bottle recycling activity will be greater than the reported projections[4].

The number of bring sites has also risen to 3,926 sites across the UK, a 15.5% increase since the end of 2003. The plans again suggest a continued rise in bring facilities over the next year as new sites and schemes are developed, with a total of approximately 5,000 sites expected to be operational by the end of 2006.

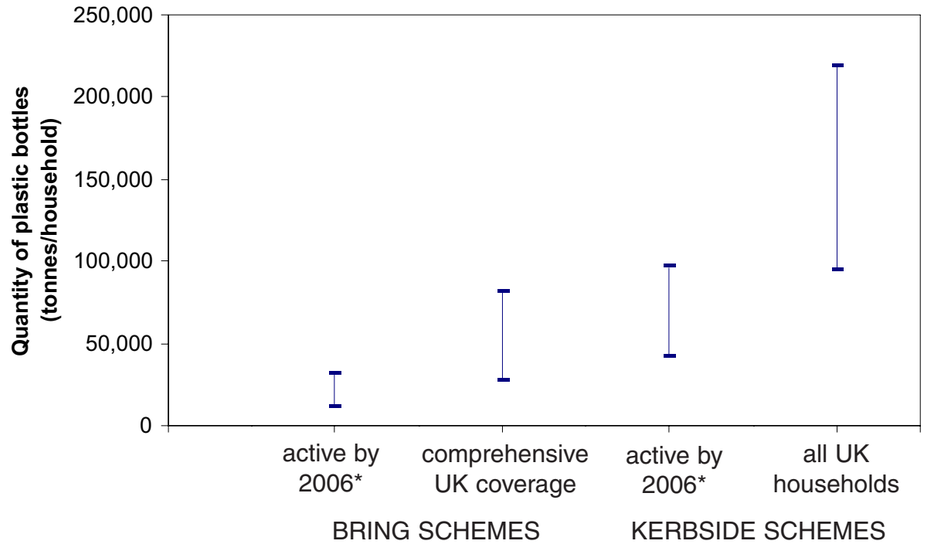
Both kerbside and bring system infrastructure will be improved during 2005, and this is reflected in the enhanced tonnage recovery estimates (Figure 1).

[4] Scheme coverage and recovery level predictions for plastic bottles within the previous four WRAP and Recoup UK plastic bottle recycling surveys have typically outperformed reported expectations by at least 5-10%.

The potential of plastic bottle recycling

It has already been identified that there are wide variations in performance of current collection schemes, and that there is the potential to significantly improve performance of the existing infrastructure. Figure 20 highlights the potential collection levels that could be realistically achieved by the adoption of bring and kerbside schemes across the UK based on current levels of performance. This highlights the importance of a comprehensive infrastructure for plastic bottle recycling and reinforces the advantage of extensive, well promoted kerbside collections in improving recycling and maximising recycling opportunities.

Figure 20: Potential scenarios for UK plastic bottle recycling



From Figure 20 it can be assumed that approximately 52,000 tonnes of plastic bottles will be collected through the current planned activities by the end of 2006. The majority of this material will be recovered through the kerbside systems. If both schemes achieved good performance levels with bring activity recovering 3.3kg per household per annum , and kerbside collecting 8.8kg per household per annum[5], a total recovery of 129,152 tonnes of bottles may be achievable from the planned infrastructure. The performance level will also be dependant on greater communications and improved convenience for the householder. At this level of performance, planned activity could generate up to 28% recycling of plastic bottles in the UK household waste stream by the end of 2006.

[5] The average of the top performing quarter of respondents

Conclusions

Many factors will influence the current and future collection of plastic bottles for recycling. Currently 73% of local authorities operate some form of collection scheme for plastic bottles, ranging from one or two bring sites through to comprehensive kerbside coverage. These schemes between them however are currently capturing 10.5% of bottles consumed through the household wastestream.

There is a clear need therefore to focus on good practice and the removal of scheme inefficiencies to optimise current systems, in addition to working towards the removal of barriers to, and encouraging the implementation of, new schemes. There is an indication that a greater improvement in recovery rates can be achieved through the improvement of scheme performance, rather than extending plastic bottle recycling scheme coverage.

Survey results demonstrate that it is important to:

- Move emphasis towards kerbside systems, which on average outperform bring schemes by 4:1
- Increase the performance of existing kerbside schemes
- Provide local authorities with the information required to achieve sustainable, cost effective plastic bottle recycling
- Review baling/handling infrastructure in the UK and assess the potential to encourage expansion where necessary
- Communicate to members of the public which plastic items are suitable for recycling and why plastics other than bottles should not currently be placed in recycling receptacles
- Encourage the provision of suitable alternatives to households unable to participate in kerbside such as tenement properties - work in this area is being taken forward, with a greater number of local authorities trialing recycling schemes from this type of property