

Chapter 6

Monitoring quantities diverted



Monitoring how much waste is recycled and composted, or how much waste is prevented, is important when assessing the effectiveness of recycling, composting and waste reduction services. This chapter describes how to measure tonnage data and how to use this information to identify potential improvements in services.

WRAP helps individuals, businesses and local authorities to reduce waste and recycle more, making better use of resources and helping to tackle climate change.

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Written by: WRAP, updated in association with Resource Futures



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Monitoring quantities diverted

6.1 Introduction

Monitoring the amount of material collected for recycling or composting, and determining how much waste is prevented through waste reduction schemes, is important in assessing how services or schemes are performing. This chapter describes how to assess quantities of waste collected and diverted from landfill, and how to use this information so that opportunities for improvements can be identified.

6.2 The role of tonnage data

Tonnage data are the most common form of data collected on waste quantities. Obtained via records such as weighbridge tickets, tonnage information is required by auditing bodies to assess the performance of waste services and is therefore collected as standard by all local authorities in the UK. It is reported through the online data reporting system, WasteDataFlow. This does not completely negate the need, though, to respond to requests from third parties for tonnage information, because there are time delays between submission of data and their release to such parties. It is for that reason that WRAP-funded authorities may be asked for tonnage data separately from their submission to WasteDataFlow.

6.3 I'm not a local authority – how do I get tonnage data?

Where local community or voluntary groups are involved in collections or communications activity, arrangements should be made with the relevant local authority to receive tonnage data. There is no standard staff role within a local authority that deals with data so, if you already have good contacts at the local authority, start with them. Otherwise try the Recycling Officer.

Where the activity being monitored takes place in an area that doesn't correspond to the whole of a local authority area, it may be possible to receive round-based data (see Section 6.5). If this isn't possible, tonnage data can be apportioned according to the number of households located in the area targeted, i.e. if the round covers 1000 households in total but the collection scheme only covers 600 of those households, you can take 60% (600/1000) of the tonnage data for that round. This is a less reliable approach than using round data because socio-demographic differences are not taken into account. It can also be difficult to count households in areas where there are flats and houses in multiple-occupancy. If you can't get data for the area you want to target then you should consider changing your scheme, campaign or initiative so it corresponds with an area for which data are available.

If what is being monitored is a particular site, then you should arrange to receive monitoring data relating to that site from the council or the organisation that manages or collects waste from the site. In the majority of cases this should be straightforward, but there are instances where recycle is collected on a milk-round basis and not individually weighed per site. You may need to discuss alternative arrangements with the council or the contractor if this is the case.

It is essential that tonnage data are available to monitor your schemes, so talk as soon as you can to the relevant local authorities.



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“It is essential that tonnage data are available to monitor your schemes.”

6.4 Totals or 'per household'?

One drawback with 'tonnage data' as a parameter is that it is so overarching that many factors other than service or scheme performance may have an influence. A key factor is the number of households located in an area. If this increases, you would expect the total quantity of recyclate collected to increase – but this has nothing to do with the performance of the scheme. The opposite applies of course if the number of households decreases.

Using a relative measure such as waste per household is a useful way of overcoming the influence of changing household or population numbers on tonnages. Using 'per household' rather than 'per head of population' is preferable because waste is predominantly produced by and collected from households rather than individuals. The quantity of garden waste, for example, is determined by the size of the garden rather than the number of people who live in the house while newspapers are generally bought for a household rather than by each person living within that household.

In areas that have flats and houses in multiple-occupancy, getting a reliable count of households may be difficult. In these cases, you should consider the reliability of 'per household' measures before adopting them.

When using 'per household' measures, you should also be careful to include only households that have access to the service that you are monitoring. For a kerbside service or scheme, this means including only the number of households that have been provided with the relevant container(s).

6.5 Round-based data

Most local authorities and their contractors organise their waste collection schedules in rounds. By 'round' we mean the area covered by one vehicle in one day using one crew. Rounds usually consist of 500–1500 properties.

Many local authorities collect and input the weighbridge tickets from collection vehicles on a daily basis, so collecting data per round should be possible. In some cases this may require further analysis because this information is not linked to rounds, only being allocated to a week or day specifically when a different vehicle is used on a round. If this is the case, you will need to arrange for further analysis to be done. For dry recyclables, it is very unlikely that the individual material weights, at the vehicle level, will be known, just the total tonnage per vehicle.

Round-based tonnage data can be much more useful in monitoring service or scheme performance than overall tonnage data because they allow you to identify areas of good and poor performance. Data monitoring systems may need slight adaptation to deal with round-based reporting. If service or scheme improvements are being implemented only in specific areas, the use of round-based data is essential so that the impact of those improvements can be determined.

If you have participation data (see Chapter 5) relating to rounds, you can then combine these with the tonnage data to calculate average kg produced by participating household.

For example, 60% participation for an authority with 35,000 households equates to 21,000 households using the service. The collection of say 600 tonnes of material in a month would equate to 28.6 kg per participating household per month ($600/21,000 \times 1000$).



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6.6 Site-based data

For some types of monitoring it is important that data are collected on a site-by-site basis, for example for bring sites and for household waste recycling centres (HWRCs). Most local authorities do this routinely. This enables assessments to be made of overall capture rates (see Chapter 7).

Difficulties may be experienced where recycling banks are emptied on a 'milk round' basis, i.e. lots of banks are emptied into the same vehicle. Normally this means that separate tonnages are either not available or have to be estimated by apportioning the total tonnage in the vehicle to the different banks. If a specific monitoring exercise is planned, you should explore the possibility of separate trial weighing of banks.

6.7 How do I use tonnage data to monitor the impact of a communications campaign?

The use of tonnage data is problematic for monitoring the impact of communications campaigns because so many factors other than the campaign messages may have played a part in changes detected. It is for this reason that it is good practice to gather participation/usage data as well as tonnage data (see Chapter 5). In particular, tonnage data are not an appropriate measure of the effect of a communications campaign if infrastructure changes have been made at the same time.

One local authority initiated an authority-wide awareness campaign, used doorstepping in poorly performing areas in the half of the borough with multi-material kerbside and, at the same time, introduced multi-material kerbside to the other half of the borough. Tonnage data were only available at borough level. As a result there was no way of determining the impact of the campaign (on the quantity of material collected separately) from the influence of the new service.

The combined recycling rate is a useful measure for monitoring the impact of a campaign, assuming no service or scheme change has taken place, since this takes account of increases or decreases in the residual waste as well as any increases in recycling. This measure also has the benefit of being audited.

One important consideration is how to use tonnage data where a campaign covers only part of a local authority area (e.g. targeted leafleting or doorstepping). In these instances, efforts should be made to ensure that the campaign area coincides with round boundaries so that tonnage data are available. In other words, you should change the coverage of your communication activity to ensure that it can be monitored.

Some campaigns focus on the provision of broad messages around behaviour that may lead to waste reduction such as 'unwanted mail'. The impact of this is impossible to measure using tonnage data because the changes are likely to be too small to show up in gross tonnage figures. Detailed research would be required that focused on a few individuals. This monitoring should focus on their purchasing decisions and the quantities of waste avoided, generalising the results to a whole area based on a survey of behaviour.

It is always important to remember the potential effect that seasonality may have on your tonnage data. The focus of the campaign in respect to the materials it is targeting combined with when it takes place is important. Obviously, there is a variable seasonal pattern to the tonnage of garden waste, but other materials have seasonal trends as well such as glass increasing in the summer months. Also, short-term increases in tonnage data can result from holiday periods, e.g.

CASE STUDY

Staffordshire Moorlands AWC roll-out

Staffordshire Moorlands implemented an AWC with new recycling services, moving from an existing three-fold collection service. An information pack was sent to residents along with a new blue lidded bin, and promotion was via roadshows, articles and promotions.

Overall tonnage of dry recyclables (kerbside and bring) collected increased by 29%. Garden waste collected increased by 40%, and committed recyclers increased by 4%.

"The monitoring undertaken during this project has helped to endorse the successes of the scheme and also provided a basis for responding to some of the negative press coverage we received."

For more information, see full case study in Annex 1.

"It is always important to remember the potential effect that seasonality may have on your tonnage data."

increased amounts recycled at Christmas. All these factors should be borne in mind when attempting to make inferences about the impact of a campaign based on tonnage data.

Ideally you will have tonnage data for the time period preceding the campaign, during the campaign and following the campaign, so that trends can be compared. You need to assess if your tonnage was gradually increasing or decreasing before the campaign, compared with tonnage data following the campaign. By plotting the tonnage data over time it is possible to detect trends. For instance an upwards slope in the trend line (left to right) indicates increasing tonnages, and conversely a downwards sloping line indicates decreasing tonnages. The following example explains this in more detail.

6.7.1 Example

Fortnightly dry recycling tonnages were collected from one round where door-to-door canvassing took place. The canvassed period (week 27 to week 33) is shown as the shaded cells in Table 6.1.

Table 6.1 Fortnightly tonnage data

Week	Tonnes collected	Week	Tonnes collected
11	2.40	31	3.24
13	2.68	33	3.10
15	2.99	35	3.41
17	2.64	37	3.21
19	2.95	39	3.41
21	2.92	41	3.09
23	2.55	43	3.45
25	2.83	45	3.41
27	2.94	47	3.74
29	2.88	49	3.28

It is difficult to conclude much by just looking at the data table. What we are interested in is whether there has been a change after the door-to-door canvassing, and whether this change can be attributed to the campaign. A headline comparison of tonnage data before and after the campaign can be made by taking the average tonnages for each period. Table 6.2 shows the data from the Table 6.1 for the eight collections before the door-to-door canvassing started, and the eight after it ended.

Table 6.2 Fortnightly tonnage data pre- and post-campaign

Week	Tonnes collected pre-campaign	Tonnes collected post-campaign
1	2.40	3.41
2	2.68	3.21
3	2.99	3.41
4	2.64	3.09
5	2.95	3.45
6	2.92	3.41
7	2.55	3.74
8	2.83	3.28
Average	2.75	3.38

It can be seen from Table 6.2 that there has been an average tonnage increase of nearly 24% (a difference of 0.65 tonnes from the pre-campaign figure of 2.75 tonnes). To check whether tonnages may have been increasing anyway, these data have been plotted with trend lines (Figure 6.1).

Figure 6.1 Tonnage data with trend lines pre- and post-campaign

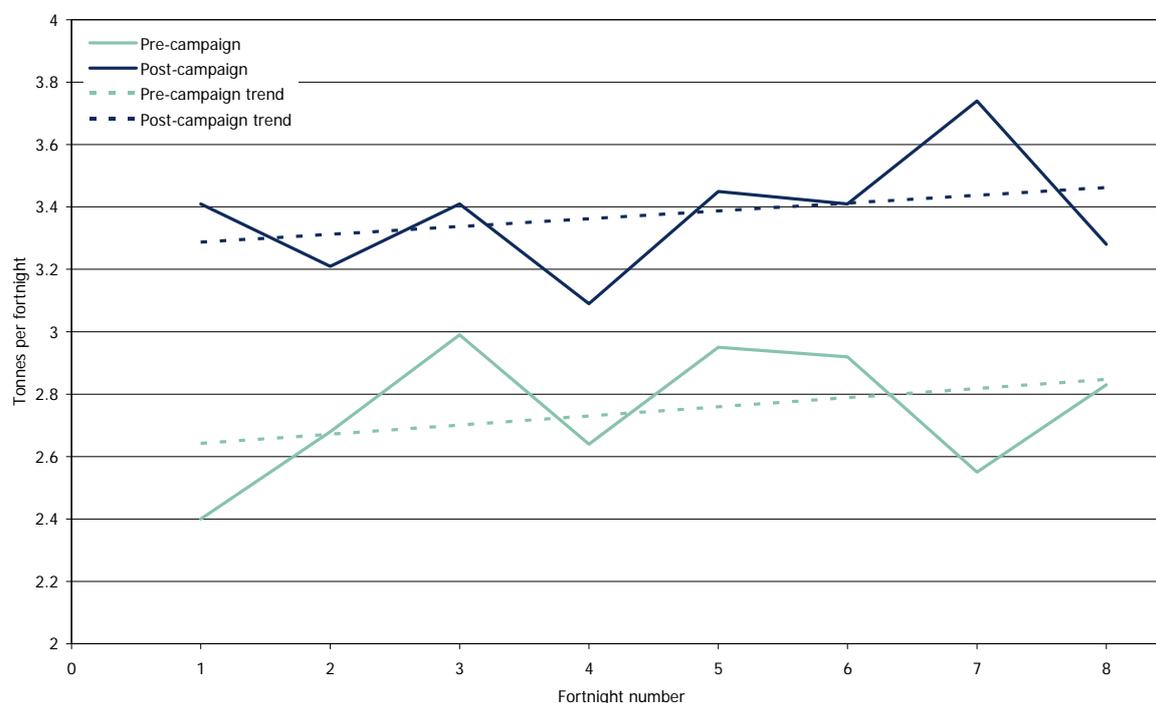


Figure 6.1 shows that there was a gradual increase in tonnages before the campaign (solid blue line). However, the slope of the trend line (green dotted line) shows that there was a larger increase during the post-campaign period. Since tonnages were increasing before the campaign, you can estimate how

much of the increase is due to the campaign by extrapolating the pre-campaign line to the middle of the post-campaign period (as shown in Figure 6.2).

Figure 6.2 Tonnage data with trend lines with extrapolated pre-campaign line

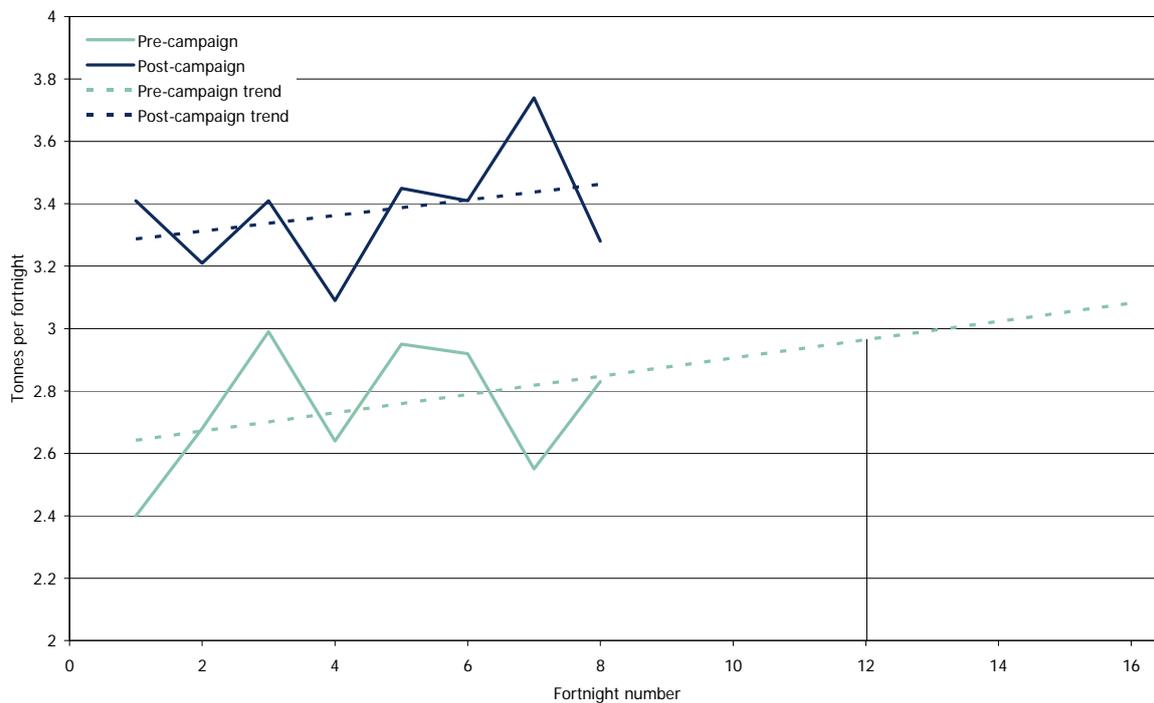


Figure 6.2 shows the change that has been achieved as a result of the communications campaign. Without the campaign, the tonnage increase would have been 2.96 tonnes (the tonnage value on the trend line at the mid-point of the post-campaign period i.e., fortnight 12). In fact it went up to an average of 3.38 tonnes per fortnight (Table 6.2). Therefore, there has been an extra 0.42 tonnes per fortnight in the campaign period, or an increase of 14.2%. It would be reasonable to attribute this to the campaign so long as you have checked for any other possible factors.

There is a potential problem with this example because seasonal variation could be the reason for the increase. Data from the previous year should be checked and compared. Year-on-year data, compared in the same way as the above, may also give an indication of post-campaign changes, but trends would have to be carefully examined if any change is to be attributed to the campaign.

6.8 I have chipped bins – will this help me?

Many local authorities have wheeled bins with chips installed in them that can be read, and the weight recorded as they are tipped. This can give very valuable data, which should be a first port of call for data gathering where suitable.

6.9 How do I measure quantities for recycling collections from flats

Some local authorities collect food waste and recycling from flats on the same rounds as collections from other sources such as schools and on street bring

banks. This makes it difficult to identify how much material is being collected from flats.

Options for overcoming this include:

- Use of vehicle on-board weighing equipment to record the weights of communal (bring) containers as they are collected.
- Visual assessment of the fill levels of recycling containers. The collection crew in the London Borough of Ealing note down the fullness of each communal recycling bin before they are emptied. This is then converted into weights using the known fullness of a bin and conversion factors established from container weighing exercises. This method is explained in more detail in Section 6.9.1.
- Dedicated collections of recycling can be made from specific sites / areas using one vehicle. After collecting material from the site the vehicle goes to the weighbridge and the tonnage for that specific site / area is recorded. Be aware that it can be difficult to ensure that the material is from a single site only as collection crews can collect recycling from other sources outside the targeted area.
- Use of scales to weigh containers. Some sets of scales can be heavy so may need two or more people to move them and a van to transport them.
- Arranging waste audits to provide a snapshot of the waste and recycling stream. These are a good way of understating how much of each material is being recycled (capture rates) but can be costly depending on the extent and frequency of analysis (i.e. single season or four season survey). If you intend to conduct a weighing and/or waste auditing exercise even as a one-off exercise you must inform residents and allow them the option of not taking part.

When comparing data, officers should be careful to compare like for like. For example, research suggests that the amount of materials captured through a flats recycling collection scheme should not be compared to a kerbside scheme, as residents living in flats tend to produce less recyclable materials and different types of materials than kerbside properties

If recycling is collected door to door from flats you can use the same methods described for kerbside properties in this chapter.

For further information about recycling collections from flats see WRAP's Recycling Collections for Flats Guidance available from the WRAP website (http://www.wrap.org.uk/local_authorities/research_guidance/collections_recycling_recycling_collections_for_flats/index.html).

6.9.1 Estimating tonnage using visual assessment

Step 1 If you do not already have established factors to convert a visual assessment of bin fullness to a weight then you will need to undertake a container weighing exercise. This will help you to establish average weights for a known fullness of a bin e.g. one quarter full, half full, three quarters full and completely full. These can then be used to convert your visual assessment of bin fullness to an estimated bin weight.

To obtain these average weights you should weigh several full bins for each size bin and each combination of materials. An example is provided below for a communal bin with a capacity of 1100 litres that accepts paper and cardboard.

Bin #	Materials accepted in bin	Bin capacity (litres)	Full bin weight (kg)
1	Paper & cardboard	1100	152
2	Paper & cardboard	1100	148
3	Paper & cardboard	1100	151
Average	Paper & cardboard	1100	150

Step 2 Based on the average full bin weight you can then estimate the weight if the bin was one quarter full, half full and three quarters full. See the table below for an example.

Materials accepted in bin	Bin capacity (litres)	Weight $\frac{1}{4}$ full (kg)	Weight $\frac{1}{2}$ full (kg)	Weight $\frac{3}{4}$ full (kg)	Average full bin weight (kg)
		= full bin weight x 0.25	= full bin weight x 0.5	= full bin weight x 0.75	
Paper & cardboard	1100	38	75	113	150

Step 3 Once you have established conversion factors you can use them to convert your visual assessment of bin fullness at the time of collection to a bin weight. The easiest way to do this is to set up a table to record your visual estimates of bin fullness for each bin at a given site at the time of collection. An example of such a table is given below.

Site:			Collection date:			
Bin #	Materials accepted in bin	Bin capacity (litres)	$\frac{1}{4}$ full (kg)	$\frac{1}{2}$ full (kg)	$\frac{3}{4}$ full (kg)	Completely full (kg)
1	Paper & cardboard	1100		✓		
2	Paper & cardboard	1100				✓
3	Plastic bottles & cans	240			✓	
4	Glass	1100	✓			

Step 4 With your visual assessment of bin fullness completed you can use your established conversion factors to generate estimated weights for each bin. In the example below the total weight of paper and card collected from site A is estimated at 225kg.

Site:			Collection date:				
Bin #	Materials accepted in bin	Bin capacity (litres)	¼ full (kg)	½ full (kg)	¾ full (kg)	Completely full (kg)	Average weight for fullness (kg)
1	Paper & cardboard	1100		✓			75
2	Paper & cardboard	1100				✓	150
Total	Paper & cardboard						225

Step 5 To convert the total weight of material collected to a figure of kilograms per household per week use the following formula:

$$\frac{\text{Total weight of material collected per week (kg)}}{\text{Total number of households served by collection}}$$

If we assume that the 225kg of paper and cardboard was collected via a weekly collection of communal bins serving a block of 150 flats (households) then the equation would be as follows:

$$\frac{225\text{kg}}{150 \text{ households}} = 1.5 \text{ kg/hh/wk}$$

6.10 How do I measure quantities for waste reduction schemes?

Waste reduction schemes should result in quantities of waste failing to appear in the residual waste stream. They are therefore difficult to measure. In Chapter 9 methods are suggested for measuring the impact of waste prevention initiatives such as home composting, community composting, grass cycling, 'Love Food Hate Waste', reuse in the community, reducing unwanted mail and using washable nappies.

Home composting is classified as waste reduction because it means that garden and food waste that might otherwise appear in the local authority waste stream is kept in the confines of the household. Some local authorities have asked householders to weigh the waste put into home compost bins to measure the impact of such activities. Apart from this being a time-consuming task for the householder, the data that results may be quite unrepresentative simply because it is likely to be the committed composters who agree to take part.

WRAP is currently finalising a model that will be capable of providing an estimate for every local authority in the UK of the quantity of waste composted at home by its residents. This model is based on socio-demographics and garden sizes. In the meantime, see Chapter 9 for WRAP's current advice on quantifying the impact of home composting.

Further information on waste reduction is available in WRAP's new Waste Prevention Toolkit (http://www.wrap.org.uk/applications/waste_prevention_toolkit/restricted.rm).

6.11 How do I monitor tonnages for furniture and WEEE reuse schemes?

Some local authorities or community groups know the total quantity of furniture and WEEE (waste electrical and electronic equipment) that is diverted into reuse schemes either from bulky waste collection schemes or from household waste recycling centres. They will also know the total quantity of bulky waste collected through schemes. What is rarely known is the total quantity of reusable waste arising by type of item. This is important from a scheme performance perspective. To assist in this, The Furniture Resource Network (FRN) has compiled standard weight measurements of various household furniture items (see www.frn.org.uk/statistics.asp). See also Chapter 7 for further details.

For local authorities that provide a bulky waste collection service by prior arrangement, the best way to generate data on the weight of items is to use administrative data to make an estimate. Some local authorities have sensibly set up their databases in such a way that these data can be pulled off routinely. If yours is not set up in this way, you might want to think about this for the future. The set of steps below assumes that items are listed in the database when the request is made. It also assumes the worst-case database set up; it may be that you can avoid some of these steps if yours is more user-friendly. Also refer to Defra's bulky waste toolkit, *Bulky Waste Collections: Maximising Re-Use & Recycling – a step-by-step guide*, available from the Waste Improvement Network website (www.win.org.uk).

6.11.1 Estimating tonnage

- Step 1** Get your request list for the most recent year in an electronic form, preferably a spreadsheet such as Microsoft® Excel.
- Step 2** If there are more than 1000 entries, you need to take a sample so that you end up with 1000 or so collection requests over the course of one year. Arrange them in descending date order and then:
- Divide the total number of requests (not items) by 1000.
e.g. 12,543 requests / 1000 = 12.5
 - Round down to the nearest whole number. This is known as the 'sampling interval'.
e.g. 12.5 = 12
 - Ask a colleague to choose a number between 1 and the number you have derived.
e.g. Bob Smith chooses 4, a number between 1 and 12
 - Go to the fourth request and select it as part of your sample. This is your randomly selected starting point.
 - Then select every 12th request starting from request 4 to form part of your sample (the easiest way is to simply delete the requests in between, for example, requests 5 and 15).
 - The number of requests you end up with will normally be more than 1000 because you have rounded the sampling interval down. This is normal and all requests should be kept in the sample.
e.g. selecting every 12th from 12,543 results in 1045 requests.
- Step 3** For each request, separate out the items listed into separate columns. You may be able to do this automatically in Excel using the 'text to columns' command – seek advice. Otherwise this will be a laborious task of cutting and pasting text. At this stage you might decide you should have asked a consultant to do this for you!

CASE STUDY

Tonnage estimates from Crewe Christian Concern furniture reuse project

In order to be able to claim reuse credits from the local authority, Crewe Christian Concern needed to record tonnage figures for the amount of material being diverted by the project back into the community for reuse.

To do so, it worked with the local authority's Recycling Officer to develop a system for recording all items handled by the project. Each item was recorded on collection from householders donating the goods. Items sold via sales to the public or provided via social services to those in need were also recorded.

The Furniture Resource Network's standard weights for household goods were used to calculate how many tonnes of reusable household waste were diverted by the project.

Step 4 Make sure that any numbers are in separate columns to the text. For example, three chairs should appear as '3' in the fourth column and 'chairs' in the third column. This is so that you can automate as much of the calculation process as possible. Repeat this for all the requests. You should end up with something that looks like the table below but with more item numbers and more than 1000 requests.

Request #	Date	Item	No. of items
Request 4	3/1/08	Office chairs	3
Request 4	3/1/08	Double mattress	1
Request 4	3/1/08	Wardrobe	1
Request 16	5/1/08	Carpet	1
Request 28	7/1/08	TV	1
Request 28	7/1/08	Pouffe	2



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Step 5 For each type of item, apply a typical weight in the spreadsheet. The Furniture Re-use Network's average weights list is the approved national list used by the government, local authorities and funders (see www.frn.org.uk/statistics.asp). Some of the organisations that carry out waste analysis have their own lists and, for more obscure items, it is a case of 'best guesses'. See the example below, noting that it is the weight of the individual item that needs entering and not the weight of the number of items listed in the spreadsheet. The easiest way to do this is to use filters in Excel so that you can see all similar items at once and paste en masse.

Request #	Date	Item	No. of items	Typical item weight (kg)
Request 4	3/1/08	Office chairs	3	12
Request 4	3/1/08	Double mattress	1	40
Request 4	3/1/08	Wardrobe	1	37
Request 16	5/1/08	Carpet	1	25
Request 28	7/1/08	TV large CRT	1	17
Request 28	7/1/08	Pouffe	2	5

Step 6 Enter a calculating column for each item that multiplies the weight by the number of items. Seek advice on using spreadsheets if you don't know how to do this.

Request #	Date	Item	No. of items	Typical item weight (kg)	Total weight (kg)
Request 4	3/1/08	Office chairs	3	12	36
Request 4	3/1/08	Double mattress	1	40	40
Request 4	3/1/08	Wardrobe	1	37	37
Request 16	5/1/08	Carpet	1	25	25
Request 28	7/1/08	TV large CRT	1	17	17
Request 28	7/1/08	Pouffe	2	5	10

Step 7 Convert this to total tonnage collected by the bulky waste collections.

- Group each type of item together on the spreadsheet, making sure that the words are spelt identically (i.e. all 'chair' and no 'chairs');

Item	No. of items	Typical item weight (kg)	Total weight (kg)
Dining chair	3	7	21
Dining chair	1	7	7
Dining chair	10	7	70
Dining chair	3	7	21
Dining chair	5	7	35

- Use Excel's sub-totals function to sum the total quantity of each item in kg.
e.g. total dining chairs = 144kg
- Use the same approach to get the total waste in the spreadsheet in kg.
e.g. 312kg
- Convert the individual item weights to fractions of the total weight in the spreadsheet.
e.g. $144\text{kg} / 512\text{kg} = 0.281$ for chairs
- Apply the fractions to the total quantity of bulky waste collected to derive tonnages for each item.
e.g. $2000 \text{ tonnes total bulky waste collected in } 2008 \times 0.281 = 562$ tonnes of dining chairs.

6.11.2 Assessing quality of items

Although the approach outlined above will tell you the total quantity of each type of item collected in the bulky waste, it won't tell you the quality. For this you will need to do an assessment of potential reusability of items. This can be based on several test samples of bulky waste (see Defra's local authority toolkit, *Bulky Waste Collections: Maximising Re-Use & Recycling*, for guidance on undertaking bulky waste audits) or you could use the standard figures provided by the



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Furniture Re-use Network (see its publication, *Bulky Basics*, for more details)
http://www.frn.org.uk/bulky_waste.asp.

It should be borne in mind that what is reusable in practice is different to what is reusable in theory, and will depend on the affluence of your local area as well as the nature of your service. Leaving bulky waste items outdoors for collection is bound to affect quality and reduce the number of reusable items. Generate some general rules about the proportion of each type of bulky item that is reusable and apply this to your figures. When you compare this figure with what is actually diverted for reuse currently, you will have a good idea of how well your services or schemes are performing.

Although bulky waste collection services provide access to reusable items, the best quality items generally often come through HWRCs.

6.12 Summary of chapter

This chapter has:

- explained the importance of monitoring quantities of materials collected for recycling or composting (Section 6.1);
- discussed the role of tonnage data, how and why this information is collected (Section 6.2);
- outlined how groups other than local authorities can access tonnage data (Section 6.3);
- looked at the merits of using 'per household' data (Section 6.4);
- recommended that round-based and site-based data are collected (Sections 6.5 and 6.6);
- looked specifically at the issues associated with using tonnage data to monitor communications campaigns (Section 6.7);
- commented on the use of chipped bins to monitor tonnages (Section 6.8);
- explained how to measure quantities for recycling collections from flats (Section 6.9);
- reviewed approaches for quantifying the tonnage impact of reuse and reduction schemes (Sections 6.10 to 6.12); and
- discussed the importance of understanding the quality as well as quantity of material available for reuse (Section 6.13).

6.13 Where do you want to go next?

Chapter 1 provides an **introduction** and helps you decide which chapters you need to look at.

Chapter 2 explains how to set **monitoring aims, objectives and KPIs**. It then explains how to use the results of monitoring to **improve a service or scheme or to measure the effects of a communications campaign**.

Chapter 3 gives details for consideration when **sampling and profiling**

Chapter 4 deals with monitoring **awareness, claimed behaviour and satisfaction**.

Chapter 5 deals with monitoring **service / scheme usage and participation**

Chapter 7 explains how to measure **capture rates**.

Chapter 8 considers monitoring of **contamination levels**.

Chapter 9 looks at approaches to measuring **waste reduction**.

Chapter 10 deals with monitoring **communications campaigns**.

**Waste & Resources
Action Programme**

The Old Academy
21 Horse Fair
Banbury, Oxon
OX16 0AH

Tel: 01295 819 900
Fax: 01295 819 911
E-mail: info@wrap.org.uk

Helpline freephone
0808 100 2040

www.wrap.org.uk/local_authorities

