

WR1204

Household Waste Prevention

Evidence Review:

L3 m6-1 (D) – Approaches to monitoring and  
evaluating household waste prevention

A report for Defra's  
Waste and Resources Evidence Programme

**October 2009**

This research was commissioned and funded by Defra. The views expressed reflect the research findings and the authors' interpretation. The inclusion of or reference to any particular policy in this report should not be taken to imply that it has, or will be, endorsed by Defra

## Table of Contents

1.1	Why monitoring and evaluation?	1
1.2	Evidence reviewed	2
1.3	Household waste prevention - the context	2
1.4	Topline summary	3
1.5	Key findings	6
1.6	Monitoring and evaluation approaches – in practice	7
1.7	Barriers to progressing (and using) monitoring and evaluation of household waste prevention	12
1.8	Opportunities for progressing (and using) monitoring and evaluation of household waste prevention	15
1.9	Researchers' recommendations	17
1.10	References	17

© Brook Lyndhurst 2009

This report has been produced by Brook Lyndhurst Ltd under/as part of a contract placed by Defra. Any views expressed in it are not necessarily those of Defra. Brook Lyndhurst warrants that all reasonable skill and care has been used in preparing this report. Notwithstanding this warranty, Brook Lyndhurst shall not be under any liability for loss of profit, business, revenues or any special indirect or consequential damage of any nature whatsoever or loss of anticipated saving or for any increased costs sustained by the client or his or her servants or agents arising in any way whether directly or indirectly as a result of reliance on this report or of any error or defect in this report.

## L3 m6-1 (D) Approaches to monitoring & evaluating household waste prevention

This module provides insight into the different monitoring and evaluation approaches used and what lessons have been learnt with respect to household waste prevention. The main topics covered are:

- Monitoring and evaluation approaches – in practice
- Barriers to progressing (and using) monitoring and evaluation of household waste prevention
- Opportunities for progressing (and using) monitoring and evaluation of household waste prevention

Modules providing further insight or detail in relation to monitoring and evaluation are listed below:

L1 m1 Executive Report	L2 m1 Technical Report L2 m2 Policy context L2 m6 Monitoring & evaluation of household waste prevention	L3 m3/3 (D) Impacts of public campaigns and interventions L3 m5/2 (D) International review
------------------------	---	---

(D) denotes a briefing paper providing more background detail

This module closely links to that on 'Impact & Delivery of Household Waste Prevention Intervention Campaigns' (L3 m3/3 (D)) which describes different intervention and campaign approaches and their impact on household waste prevention (in terms of behaviour change and tonnage data).

### 1.1 Why monitoring and evaluation?

Waste prevention is at the top of the 'waste hierarchy': there is general consensus that it is the preferred option, and should take precedence over recycling, and particularly over the treatment and disposal of residual wastes. Local authorities have legally binding targets for the diversion of biodegradable municipal wastes from landfill, and face severe financial penalties if they fail to meet those targets. So if local decision makers are to invest in schemes to promote household waste prevention, and are to rely on that achieving measurable diversion from landfill, it is not enough to rely on waste prevention as being the 'preferable option'. Rather, it is imperative that robust and reliable methods are in place to monitor and evaluate the success of the waste prevention initiatives, so that their contribution can be demonstrated.

Monitoring and evaluation requires data collection, and all of the methods reviewed here have their own challenges. Any attempt by local authorities to collect information on the weight of waste generated by individual householders could be seen as potentially 'sensitive' (e.g. 'intrusive' or 'interfering') from a public relations viewpoint.

The aim of monitoring and evaluating household waste prevention is thus to enable policy makers, local authorities and practitioners to:

- collect robust and high quality data;
- ensure robust decisions are made about where to prioritise resources; and
- ensure that waste prevention is being effective and is delivering behaviour change.

At the same time, monitoring and evaluation of household waste prevention needs to be approached in a way that both addresses the challenges and manages the potential sensitivities. The evidence reviewed here focused almost exclusively on measuring the tonnage impact of household waste prevention; this

will in future need to be complemented by quantitative measurement of both the carbon and the cost impacts, and also by an assessment of the qualitative impacts which are not amenable to measurement.

## 1.2 Evidence reviewed

A selection of evidence sources was subjected to detailed review to understand the range of approaches used to monitor and evaluate waste prevention intervention campaigns (see Table 1 in Section 1.3 and the list of references). The sources reviewed cover a broad range of projects from long-term, rigorous research projects (up to three years in some cases), commissioned by Defra WREP, to medium-term (up to a year), and one-off, short-term campaigns (up to one week). In particular, the WREP portfolio of projects and a handful of others provide instructive examples of methodologies and approaches which have been tested, and where the approaches used are recorded in detail - notably Project REDUCE (Waste Watch, 2006, 2007a, 2007b, WR0105), Dorset pilot project (Dorset County Council et al, 2008, WR0116), Small Changes Big Difference (Hampshire County Council & Brook Lyndhurst, 2008, WR0117) and GAP EcoTeams (GAP et al, 2008, WR0114). It is the WREP sources which provide the most substantive and up-to-date evidence base on monitoring and evaluating approaches. Other UK and international examples have been found and cited. However, there were few international examples where the monitoring and evaluation approach adopted was presented in sufficient detail or in such a way so as to derive whether it was effective or otherwise. For further information on international examples see L3 m5/2 (D) and further information on impact data see L3 m5/2(D).

The monitoring and evaluation approaches identified and reported on in this module are:

- **Self-weighing, monitoring or reporting** through working with volunteer households;
- **Use of collection round data** to accurately measure waste arisings, e.g. via tonnage data;
- **Use of control and pilot groups** to compare performance in an area targeted with an intervention (compared to one where there is no intervention);
- **Attitude and behaviour surveys** which are based on 'declared' participation, attitudes and behaviours;
- **Participation surveys** (or participation monitoring) to gauge the reach of the initiative intervention;
- **Compositional analysis** to understand the impacts of initiative across different waste materials;
- **Conversion factors, estimates and modelling** using proxies and ratio models to provide figures on consumption and waste generation;
- **A 'hybrid' approach** using a combination of any one or more of the above approaches.

## 1.3 Household waste prevention - the context

Waste prevention is at the top of the waste hierarchy; however, it is notoriously difficult to measure. The problem is simply expressed – how do you measure something that isn't there? The key problems and barriers are:

- *We can't see it* – participation cannot be observed visually as it can be in recycling.
- *We can't know if it has happened even if the amount of waste collected falls* – it is difficult to attribute the changes to reduction separately from recycling, or to account for possible diversion to other channels (e.g. HWRCs, third sector reuse).
- *Even where we can classify changes as waste prevention, we can't know whether this is either accidental or maintainable* – for example, if a consumer buys a light-weighted bottle this week, because they like the brand, they may or may not the next.

Waste prevention, therefore, “can only be measured indirectly as a counterfactual (i.e. as the amount of waste that probably would have been generated in the absence of a waste prevention policy)”<sup>1</sup>. In developing suitable methodologies all of the above factors need to be addressed in the research design (Hampshire County Council & Brook Lyndhurst, 2008, WR0117).

WRAP’s Monitoring and Evaluation Guide (WRAP, 2006) explains that monitoring and evaluation are two distinct activities with monitoring being impartial and factual while evaluation tends to highlight more qualitative/interpretative impacts (i.e. telling the story of the impacts behind the monitoring data).

‘Monitoring’ means regularly measuring what is going on with your schemes, which is essential to ensure that they are being effective. There are two approaches – measure before and after to work out the difference, or measure what has replaced it. The purpose of monitoring is usually to track progress against targets. Data are gathered as a baseline and monitoring and evaluation are undertaken on a regular and ongoing basis. ‘Evaluation’ means drawing conclusions from the monitoring data on how well the schemes, initiatives or campaigns are performing.

Quantitative or qualitative measures can be used, but both are recommended in order to get a full picture of the impact on waste arisings.

There are two kinds of data gathering identified by Waste Watch (2006, WR0105):

- Outcome data to assess behaviour change and resulting impact on waste arisings, i.e. tonnage reduction; and
- Output data on project deliverables, used as a proxy for impact, e.g. number of registrations to the Mail Preference Service.

WRAP (2006), however, uses different terms for data gathering in its good practice guidance which is designed to provide practical advice to local authorities:

- Inputs (e.g. activities such as number of leaflets distributed, number of hits on the website);
- Outcomes (e.g. number of residents more aware of the scheme); and
- Impacts (i.e. number of residents participating in the scheme).

## 1.4 Topline summary

There were no generally ‘accepted’ monitoring and evaluation approaches which could be applied more widely to household waste prevention, nor was there ‘off the shelf’ guidance. However, a range of approaches were found to be used (see Table 1) - most notably, combining pre and post surveys, self-weighting (and elements of tracking waste arisings via collection data). Using a suite of well-planned monitoring approaches, comprising surveys, waste tonnage data, and monitoring campaigns, is recommended by WRAP’s current monitoring and evaluation guidance and is further reinforced by the literature.

**Duration** - Approaches range from short term to longer term interventions (1 week to 3 years). Short term evaluations provide no indication of sustained behavioural change. However, longer term approaches reveal sustained change can occur. Both short and long term evaluations provide a number of lessons and show reductions in household waste arisings:

---

<sup>1</sup> As quoted and cited in (Waste Watch, 2006, WR0105): OECD, Towards waste prevention performance indicators, September 2004, p. 67.

- Less than 1 year - ranging from 1 week to 4 months, the projects reviewed have achieved a reduction of household waste arisings of between 2.5kg/hh/wk (food waste only) and up to 8.8kg/hh/wk (Maldon Waste Away Challenge, Tucker & Douglas, 2006a, WR0112). The 'Watch Your Waste Week' campaign achieved a reduction of 5.97kg/hh - it is not known whether these changes have been sustained beyond the intervention (NLWA, 2009).
- More than 1 year - ranging from 1 year to 3 years, projects have sustained a more modest, but stable, reduction of household waste arisings of between 0.5kg/hh/wk and 2kg/hh/wk.

**Data** – Pilot trials and large-scale projects tend to have more rigorous monitoring regimes and as a result tend to have better data (Waste Watch, 2006, WR0105). The evidence sources reveal that the data quality (good and bad) is comparable with small-scale projects.

**Number of participants** - The number of participants has varied considerably and, in a number of cases, the sample sizes were considered too small to be representative. Drop-out rates, for individual or group approaches can be significant (up to 50% in one case). This makes it difficult (if not impossible) to unravel and compare how data has been derived and evaluated.

**Costs and resources** - There was no indication of the budget or resources deployed specifically for monitoring and evaluation. Waste Watch (2006, WR0105) recommends that interventions or campaigns need to consider a specific budget for monitoring and evaluation. The evidence reviewed suggests that costs and resources are likely to be variable, i.e. dependent upon the depth / intensity of evaluations, and timeframe (ranging from 1 week – in one case - to up to 3 years in another). In three cases (Brook Lyndhurst, 2006, WR0504; Hampshire County Council & Brook Lyndhurst, 2008, WR0117 and Dorset County Council et al, 2008, WR0116), the monitoring and evaluation was found to be costly. However, it is not possible to assess this on a cost-benefit basis due to insufficient information. Larger-scale projects later found that they had resource constraints and in one case could not complete the evaluation to the extent they had originally proposed due to budget cuts (Changeworks, 2008).

Table 1 gives an outline of the types of monitoring and evaluation approaches reviewed and lists the evidence sources that adopted a particular approach (or approaches).

Monitoring and evaluation approaches	Context applied	Sources from the evidence base
<b>Self-weighing,</b> monitoring or reporting	Working with volunteer households to prevent waste. Households weigh, or observe, or audit the amount of waste they produce and record this using diaries or feedback sheets.	<ul style="list-style-type: none"> <li>• Waste Free Households, RoWan (Wickens, 2005)</li> <li>• EcoTeams (GAP 2008a and 2008b (WR0114))</li> <li>• North London Watch your Waste Week (NLWA, 2009)</li> <li>• Love Food Champions (WRAP and the Women's Institute, 2008)</li> <li>• What not to Waste, Western Riverside (Waste Watch 2006 (WR0105))</li> <li>• Small Changes Big Difference (Hampshire County Council &amp; Brook Lyndhurst, 2008 (WR0117))</li> </ul>
<b>Use of collection round data</b> to accurately measure waste arisings	Uses a mix of monitoring techniques, e.g. tracking waste arisings via waste tonnage / collection round data and surveys, upon which to evaluate impact of campaigns.	<ul style="list-style-type: none"> <li>• The Waste Wise Armadale Project (Changeworks, 2008)</li> <li>• Household Waste Prevention Activity (Dorset County Council et al, 2008 (WR0116))</li> </ul>

<p><b>Use of control and pilot groups</b></p>	<p>Control and pilot approaches compare performance in an area targeted with an intervention with a comparable area where no intervention happens.</p>	<ul style="list-style-type: none"> <li>• Only two of the sources undertook pilot &amp; control research (Dorset County Council et al, 2008 (WR0116) and Changeworks, 2008); a third considered the option but discounted it as impractical for the particular delivery model (Hampshire County Council &amp; Brook Lyndhurst, 2008 (WR0117))</li> </ul>
<p><b>Attitude and behaviour surveys</b> including metrics, interviews and focus groups (<i>outcome focused</i>)</p>	<p>Before, during and after surveys which are based on <u>declared</u> participation, attitudes, behaviours. At times attitudes and behaviours are also captured through diaries. Surveys are typically used to estimate <i>how many</i> people do a particular action; focus groups are used to uncover <i>why</i> they act and/or their <i>response</i> to campaign material.</p>	<ul style="list-style-type: none"> <li>• Waste Free Households, RoWan (Wickens, 2005)</li> <li>• EcoTeams (GAP 2008a and 2008b (WR0114))</li> <li>• The Waste Wise Armadale Project (Changeworks, 2008)</li> <li>• Household Waste Prevention Activity (Dorset County Council et al, 2008 (WR0116))</li> <li>• Test the Water Campaign (Waste Watch 2007b (WR0105))</li> <li>• North London Watch your Waste Week (NLWA, 2009)</li> <li>• Love Food Champions (WRAP and the Women’s Institute, 2008)</li> <li>• What not to Waste, Western Riverside (Waste Watch 2006 (WR0105))</li> <li>• Small Changes Big Difference (Hampshire County Council &amp; Brook Lyndhurst, 2008 (WR0117))</li> <li>• WRAP’s ‘Committed Food Waste Reducer’ metric (WRAP 2009)</li> </ul>
<p><b>Participation surveys (or participation monitoring)</b> including enquiries to help lines, web statistics, number of registrants, publications disseminated, etc. (<i>output focused</i>)</p>	<p>To gauge the reach of the initiative proposed – at times this can be either actual (e.g. web hits) or claimed participation. Also monitors the uptake of incentives, e.g. nappy vouchers, sale of home compost bins, or registrations to the Mail Preference Service.</p>	<ul style="list-style-type: none"> <li>• Household Waste Prevention Activity (Dorset County Council et al, 2008 (WR0116))</li> <li>• WRAP home composting work (WRAP, 2007c)</li> </ul>
<p><b>Compositional analysis</b></p>	<p>To understand the impacts of initiative across different waste materials.</p>	<ul style="list-style-type: none"> <li>• WRAP home composting work (WRAP, 2007c)</li> <li>• Waste Aware Scotland Prevention Programme (Waste Aware Scotland, undated)</li> <li>• Small Changes Big Difference (Hampshire County Council &amp; Brook Lyndhurst, 2008 (WR0117)) (small scale trial of method)</li> </ul>
<p><b>Conversion factors, estimates and modelling</b></p>	<p>Using conversion factors, proxies and ratio model to derive detailed figures on consumption and waste generation.</p>	<ul style="list-style-type: none"> <li>• Potentials for the prevention of municipal solid waste, Vienna case study (Salhofer et al, 2008)</li> <li>• FRN average weights database (FRN, 2009)</li> <li>• North London Watch your Waste Week (NLWA, 2009)</li> <li>• Love Food Champions (WRAP and the Women’s Institute, 2008)</li> </ul>

<p><b>Hybrid</b> - a combination of any one or more of the above approaches</p>	<p>Uses a mix of monitoring and evaluation techniques.</p>	<ul style="list-style-type: none"> <li>• North London Watch your Waste Week (NLWA, 2009)</li> <li>• What not to Waste, Western Riverside (Waste Watch 2006 (WR0105))</li> <li>• Small Changes Big Difference (Hampshire County Council &amp; Brook Lyndhurst, 2008 (WR0117))</li> <li>• A Good Practice Guide to Monitoring and Evaluation (WRAP, 2006)</li> </ul>
---	--	--

Table 1 Evidence Sources Reviewed and Approaches Used

## 1.5 Key findings

The key findings from the evidence reviewed on monitoring and evaluation approaches were:

- Self-weighing and diary data are widely used as an alternative to waste collection round data. Self-weighing can be used effectively in small group activities (e.g. WRAP & the Women’s Institute, 2008, GAP et al, 2008, WR0114) if carried out properly, (i.e. with regular data collection and processing). However, it is a labour intensive process and its use on a larger scale may lack robustness due to inconsistent data (e.g. different start / stop times for the participants), new entrants and incomplete diaries, so that data quality can be poor (Hampshire County Council & Brook Lyndhurst, 2008, WR0117).
- Any weight data used, resources permitting, needs to be complemented by qualitative and survey evidence – in a behaviour change project, knowing why is just as important as knowing how things have changed.
- Surveys in most cases worked well, however various issues need to be taken into account:
  - Good sample design, including large sample sizes;
  - The risk of small samples in some engagement models;
  - Self selecting and unrepresentative samples;
  - Self reporting bias, including a tendency to over-estimate waste reduction impacts.

Key findings from Waste Watch (2006, WR0105) assessed the possibility of producing a common set of indicators which could be used in a range of situations to measure the relative and absolute impact of waste prevention initiatives. The study found that:

- There were no accepted monitoring and evaluation methodologies;
- Few projects budget explicitly for monitoring and evaluation;
- Many of the initiatives were monitored using ‘output’ focused techniques (e.g. number of publications disseminated, number of individuals contacted, etc.) and therefore few reported tonnage impacts;
- It was impossible to identify a set of waste prevention indicators that could be used across the board.

Similar findings were reported by Brook Lyndhurst (2006, WR0504). However, the Defra WREP portfolio (and some more recent interventions and campaigns) have added new evidence on how to measure impact.



## 1.6 Monitoring and evaluation approaches – in practice

The evidence review identified a range of approaches for monitoring and evaluating household waste prevention. The individual approaches, outlined in Table 1, are discussed in more detail below.

**Self-weighing, monitoring or reporting** – requires close interaction with individuals or small groups to support self-weighing of their waste. This approach can have an important role in putting people ‘in touch’ with their own waste and provides a visible reminder of their commitment to reduce it. The process is often enjoyed by the participants. These approaches range from evaluating short term campaigns, i.e. of 1 week to 4 months, to longer term interventions and campaigns, i.e. a period of 2.5 years. In terms of robustness and achieving consistent data and evidence of weight reductions, such approaches can experience the following:

- A high drop-out rate (as high as 50% in one project during the course of the intervention).
- The data submitted by participating households needs critical analysis due to the impact of different start up times and drop outs during a project. Love Food Champions is a good example of where the results from only those who completed diaries for the whole intervention were used, i.e. 38 households provided both before and after measurements.
- Inconsistent and incomplete forms being returned, i.e. participants forget to weigh their waste.
- Whilst experiencing a dropout rate in terms of weighing and measuring, many participants were found to remain active, e.g. attending workshops, which makes it difficult to measure precisely the impact.
- Working with individuals and small groups is resource and time intensive.
- Self-weighing can be ineffective in generating robust statistical evidence of weight-based reductions (Hampshire County Council & Brook Lyndhurst, 2008, WR0117). However, due to the ‘invisibility’ of waste prevention, particularly the many small, in-home activities, means that participation can only be monitored through self-reports by participants.
- Community-led projects (waste prevention and recycling) were found to be more likely to estimate (rather than measure) waste diverted. Research in 2005 found that fewer than 1 in 3 projects monitored residual waste arisings (Brook Lyndhurst, 2006, WR0504).

In general, self-weighing approaches require close interaction with the householder with sample sizes generally being small, e.g. involving a maximum of 124 participants, but more usually 50 or 60. Such approaches are combined with surveys, interviews or focus groups. Approaches have reported the following reductions in household waste arisings:

- GAP (2008) has calculated that EcoTeams, achieves a reduction in total household waste arisings of 0.62kg/hh/wk.
- RoWAN (Wickens, 2005), a 13 month project monitored 50 households (objective was 100), achieved a 22% reduction of total household waste arisings equivalent to 1.87kg/hh/wk.
- What not to Waste (Waste Watch, 2007a, WR0105), a 6 week challenge, monitoring 14 participants claims a 34% reduction in total household waste arisings equivalent to 4.3kg/hh/wk.
- Love Food Champions (WRAP & the Women’s Institute, 2008), a 4 month project monitoring between 40-80 participants, achieved a 50% reduction in their food waste equivalent to 2.5kg/hh/wk.
- North London Watch Your Waste Week (NLWA, 2009), a one-week campaign recruited 124 participants to weigh (or visually estimate) their waste, achieved a 50% reduction in household waste arisings equivalent to 5.97kg/hh (it is not clear whether this included recycling or not).

Further detail on the impacts derived from waste prevention intervention campaigns can be found in [L3 m3/3\(D\)](#).

**Use of collection round data** – Use of collection round data allows accurate measurement and comparison of changes in waste arisings. Collection round data can only be used to monitor waste arisings in a specific geographical location. However, not all monitoring is geographically based. For example, Hampshire County Council and Brook Lyndhurst (2008, WR0117) Small Change Big Difference project was based on delivering to dispersed 'communities of interest' and, therefore, collection round data was not a monitoring option available. The way in which local authorities collate and use collection round data for Waste Data Flow (the UK-wide municipal solid waste management data collection and reporting system) does not provide the level of detail or quality required to monitor waste prevention (Dorset County Council et al, 2008, WR0116).

**Use of control and pilot groups** - There were two monitoring and evaluation examples using a control and pilot group environment (Dorset County Council et al, 2008, WR0116 and Changeworks, 2008). Both used collection round data (in addition to surveys) to monitor and evaluate a coordinated programme of waste prevention campaigns. Using control and pilot groups requires a number of considerations, namely:

- Long-term and careful planning is required.
- There should be no changes to service provision during the monitoring period (in the control area).
- Population samples should be closely matched.
- Waste management service provision should be closely matched.
- Accurate and sufficiently detailed waste tonnage data is required.
- A good understanding of external influencing factors is needed (and be mindful of those that cannot be influenced).
- A long-term view (in terms of strategic design and resource) to provide sufficient time for time series data to be gathered and for interventions to become established, i.e. more than 1 year is essential (also identified by Waste Watch, 2006, WR0105).

The two approaches demonstrated a sustained reduction in total household waste arisings (with increases in recycling taken into account), but at more moderate levels (compared to the small group approaches). These moderate levels are due to the collective impact which is based on significantly larger sample sizes (circa 1,500 households) including non-participating households.

- Armadale (Changeworks, 2008) achieved a reduction, in its target area of 1150 households, of 6.1% equivalent to 0.98kg/hh/week reduction in total household waste arisings.
- Dorset County Council et al (2008, WR0116) achieved a reduction, in its target area of 1,577 households of 2% equivalent to 0.5kg/hh/wk in total household waste arisings.

The two examples are very different in terms of timeframe (and methodology) but reveal interesting similarities. In Armadale (Changeworks, 2008), the monitoring was undertaken over two eight week periods – each monitoring period was one year apart to evaluate before and after campaign intervention. In Dorset County Council et al (2008, WR0116) the monitoring was undertaken consistently over a 3-year period. Both examples stress the importance of careful planning to (a) identify areas of similar populations, (b) define suitable collection rounds or 'beats' with similar collection systems, and (c) identify and use waste collection data of sufficient quality and time series.

Both approaches took into account residual, dry recyclate and green waste collection systems. Dorset County Council et al (2008, WR0116) carefully selected a control and pilot where good quality data exists and where there were no changes predicted to the collection systems, e.g. introduction of garden waste, whereas Armadale (Changeworks, 2008) had to take into account changes in both data reporting systems and variations to collection systems. As a result, Armadale (Changeworks, 2008) had to evaluate considerable fluctuations in the data and work with incomplete data sets which were gathered in a

relatively short period of time. Dorset County Council et al (2008, WR0116) had the advantage of a longer timeframe to determine and 'iron out' most fluctuations and any data anomalies. Both approaches experienced difficulties in using ACORN ('A Classification of Residential Neighbourhoods' - a socio-demographic segmentation tool) to match populations such that the higher level groupings had to be used. This was because using the more detailed 'Type' level was found to be impractical due to the large sample sizes required.

Sample sizes varied considerably between the two projects, i.e. Dorset County Council et al (2008, WR0116) undertook a baseline survey in 2005 plus two follow-up surveys in 2006 and 2007. Each survey consisted of 3000 respondents - a total of 9,000 survey responses were gathered by the end of the project. Armadale (Changeworks, 2008), on the other hand, conducted two surveys with a substantially smaller sample size - a baseline with 428 residents and a follow up survey with 160 residents.

A number of challenging considerations had to be taken into account by both approaches, e.g. changes to collection regimes, installation of new bring banks, missed collections (due to inclement weather), vehicle breakdowns, county-wide and national campaigns, media, unoccupied new homes.

In practice, a control and pilot approach is difficult to achieve; if it could be achieved, then the longer timeframe required means that it lends itself to providing accurate data on tonnage reductions, a broad range of targeted campaign activities, and an integrated mix of monitoring and evaluation approaches. However, WRAP's guidance does not advocate the use of control and pilots.

**Attitude and behaviour surveys** - are used to set a baseline (pre-campaign / intervention) and are then used to evaluate changes in attitude or behaviour. Longer-term evaluations include an interim survey or series of focus groups. Whilst in some cases, surveys have been effective in identifying participation and notable shifts in reported behaviours, issues with sample sizes, for example, have hindered the representativeness and confidence in the evaluation. Researchers have, therefore, provided a number of caveats on the interpretation and robustness of survey results. On the other hand, substantial survey data has overwhelmed the evaluation teams and, as a result, much insight is lost because this cannot be analysed due to insufficient time, resources or skills.

Most notably, short term evaluations achieved the best comparisons between pre and post survey responses. Most attempts to link waste data to survey evaluations were poor, i.e. survey metrics to calculate diversion. This is likely to be due to poor survey design. However, Hampshire County Council and Brook Lyndhurst (2008, WR0117) did provide a useful check between survey data and participation in waste minimisation activities. WRAP's Love Food Hate Waste provides the only survey metric that calculates potential diversion from survey responses, i.e. a "committed food waste reducer" (CFWR) has the potential to divert 1.5 kg/hh/wk of food waste from landfill (which is 1.4565 kg LESS than someone who is not a CFWR) (WRAP, 2009).

All the monitoring and evaluation approaches, identified in this review, used surveys in one form or another as a tool for determining an attitudinal and / or 'declared' behavioural baseline and to evaluate changes or progress. In all examples a follow up survey, usually post campaign, was conducted. Surveys were found to provide a valuable baseline upon which an understanding of attitudes and behaviours is derived - albeit this is 'declared' and at times deemed subjective. Community-led work was much more likely to rely on self-completion surveys and participants' feedback, which was found to be of variable quality. More costly approaches such as face-to face surveys were less popular because of their cost (Brook Lyndhurst, 2006, WR0504). The survey outcomes provided the basis for evaluation and valuable input to campaign or intervention design. In only a few cases interim surveys were conducted where the intervention timeframe was more than a year (Dorset County Council et al, 2008, WR0116;

Hampshire County Council & Brook Lyndhurst, 2008, WR0117; and GAP, 2008 and GAP et al, 2008, WR0114).

In most cases the average number of survey respondents was in the order of 50–60 for which good quality data and information could be derived. However, the samples were deemed to be small to be sufficiently representative of the UK population. Qualitative research proved to be an essential source of data and information in response to the project delivery and communications on behavioural barriers and motivations.

Focus groups, in particular, seem to have worked very well and were found to be relatively easy to set up and cost effective. A popular recruitment route is via the local authority Citizen Panel (a group of volunteer households who are recruited to provide responses to surveys). Use of Citizen Panel's was found to bring both advantages and disadvantages as outlined in Table 2.

Advantages	Disadvantages
Cost effective	Limited geographical sample
Easy to access participants	Not representative of the population
Usually available to recruit	Participants are self-selecting and willing to provide information about their views

Table 2 Advantages and Disadvantages of Using Citizen Panel's

In all surveys and focus groups, there is an element of self-selection, i.e. those already motivated, or recruited via a Citizen Panel were thought more likely to respond. The Dorset County Council et al (2008, WR0116) and Changeworks (2008) surveys are probably the exception because their survey (or population) samples were pre-selected by the project team - based on pre-determined geographical locations and collection rounds.

**Participation surveys** are used to help monitor the number of responses. This is either claimed participation, e.g. response to home composting; or to gauge the reach of an intervention or campaign, e.g. enquiries to help lines, web statistics, number of registrants, publications disseminated, etc.

**Participation monitoring** helps to gauge the 'impact', of specific campaign activities, e.g. number of mail preference service registrations, number of home compost bins sold, number of nappy vouchers given out.

The most extensive participation work was undertaken by WRAP (2007c) to provide detailed estimates of 'new' and 'existing' home composting households. This work has involved a telephone survey of 20,000 households across Great Britain, a household questionnaire in Scotland, and a telephone survey of 6,000 home composters. This work was supported by compositional analysis.

Participation monitoring was conducted by Dorset County Council et al (2008, WR0116) to determine the number of waste reduction packs, reuse directories and jute bags disseminated. In addition, the individual visits by the doorstep team and the materials they disseminated were recorded. To provide an indication of the response by the public to targeted campaign activities, i.e. participation monitoring, the number of registrations to the Mail Preference Service and number of home compost bins sold were also monitored.

**Compositional analysis** – is undertaken to understand different waste materials and the impact of an intervention or campaign on reducing the waste materials. Waste composition analysis was undertaken by WRAP (2007c) to provide detailed estimates of 'new' and 'existing' home composting households. This

work involved two rounds of waste composition analysis and observational studies of compost bin use, land use in gardens, and follow-up work to assess change in behaviour. This work was supported by participation surveys.

Hampshire County Council and Brook Lyndhurst (2008, WR0117) conducted a small-scale composition analysis to investigate whether any changes occurred in types of waste material as a result of working with participants. A week's worth of residual and dry mixed recycling waste (that would usually be put out for kerbside collection) was taken from four participants. This exercise was then repeated 8 months later to see if there had been any changes in the composition of the waste.

**Conversion factors, estimates and modelling** - Uses conversion factors, proxies and ratio models to estimate figures on consumption and waste generation. If observational methods are used to record volume or proportion of waste generated by participants (e.g. quarter or half full, or number of carrier bags or rubbish sacks), conversion metrics are needed to turn this into an estimated weight (e.g. 0.55kg/litre for a kitchen caddy (WRAP & the Women's Institute, 2008), and 3.5kg for a typical plastic carrier bag, [NLWA, 2009]). In this context, participants are asked to measure different categories of waste materials, e.g. paper / card, plastic, glass etc and record what happens to them, e.g. landfill, recycle, compost, burn (Wickens, 2005). This approach was also used as a participant educational tool (Waste Watch, 2006, WR0105).

The North London Watch Your Waste Week (NLWA, 2009), asked residents to record the amount they had thrown away (the week before the campaign), and compare it with the amount they threw away during the campaign. Participants were given the option of either weighing their waste or estimating the proportion they threw away. Where proportions of waste were recorded, these were converted to weights by using typical weights for different collection methods, i.e.:

- A 1100 litre four wheeled bin weighs 110kg
- A 240 litre two-wheeled bin weighs 22 kg

The FRN (2009) has produced guidance data on **estimating** the average weights of a range of bulky goods, e.g. furniture, household items, carpets, bedding, and WEEE (large and small household appliances). Research currently undertaken by WRAP will produce tonnage estimates for collected and donated bulky goods (not private sales or informal 'passing on').

The potential for **modelling** the prevention of municipal solid waste is highlighted in Vienna (Salhofer et al., 2008). An extensive literature review of case studies identified two approaches used to calculate the potential reduction of waste (in kg/capita/yr):

1. For products with available detailed figures on consumption and waste generation, the effects were calculated using a ratio model.
2. Where implementation is reported from other regions, the effect was estimated by using participation figures taken from the literature. Plausible participation rates were then estimated for Vienna.

However, shortcomings in measuring the effects of waste prevention were identified. Basic market data necessary for evaluating waste prevention measures were missing (e.g. quantity of beverages sold in reusable and non-reusable packaging).

Potential for modelling is described in the OECD Strategic Waste Prevention reference manual (2000) whereby an indicative evaluation framework, based on the environmental, economic and social aspects of waste prevention, is provided. Performance evaluation is based on material flows according to their relative risk, e.g. hazardousness.

**Hybrid approaches** – Whilst there appear to be no accepted or standard methodologies for monitoring and evaluating household waste prevention (Waste Watch, 2006, WR0105), it is clear from analysing the evidence that some consensus appears to be emerging towards a 'hybrid approach'. A collective review of the evidence reveals a typical approach comprising:

- A baseline survey (and or interviews / focus groups);
- Householder monitoring – comprising either self-weighing or observation analysis;
- Local authority (or delivery organisation) monitoring – comprising waste composition analysis, waste audits or tracking waste arisings via collection data (this is less frequently done);
- A follow up survey
- (Sometimes) qualitative feedback (interviews / focus groups);
- Depending upon the timeframe and resources, interim surveys are also conducted.

As outlined earlier, using a suite of well-planned monitoring approaches is recommended by WRAP's current monitoring and evaluation guidance (WRAP, 2006) and is further reinforced by the literature. Waste Aware Scotland's Waste Prevention Programme has taken a 'hybrid' approach to monitoring and evaluating its programme (Waste Aware Scotland, undated). Each initiative has a specific monitoring and evaluation stream including attitudinal surveys, web statistics, composition analysis and participation surveys.

**Support for monitoring and evaluation** – seconding experienced personnel on a short term basis can support the development and delivery of the monitoring and evaluation process (Brook Lyndhurst, 2007, WR0501). Similar approaches have been adopted more widely by Defra to support, e.g. the Environmental Action Fund projects. Such an approach can quickly fill a gap in monitoring and evaluation skills and transfer expertise.

## 1.7 Barriers to progressing (and using) monitoring and evaluation of household waste prevention

The more general barriers to progressing monitoring and evaluation of household waste prevention discussed in the evidence are outlined below.

- Even where changes in waste arisings or behaviour can be reliably measured, it can be difficult to distinguish the impact of a waste prevention initiative from the impact of other, external factors (Waste Watch, 2006, WR0105; NLWA, 2009);
- Furthermore when a local authority is running a suite of several waste prevention initiatives in parallel it is difficult to separate out the impact of each component (Dorset County Council et al., 2008, WR0116);
- There can be problems associated with using collection round data: its quality and it being inappropriate for non-geographically based interventions;
- The need for longitudinal data for monitoring and evaluation can pose a problem. Two sources recommended that baseline data for at least a year should be gathered before a waste prevention initiative is launched and the evaluation should track progress over time to see if change is sustained (Waste Watch, 2006, WR0105 and Dorset County Council et al., 2008, WR0116). The timeframes of the evaluation projects reviewed ranged from one week (NLWA, 2009) to five years (Woodard & Harder, undated);
- It is often difficult to measure the impact of social enterprises and community waste sector when looking at their overall contribution to recycling and reuse. Data quality issues and a tendency of

many organisations to focus on social impacts rather than waste diversion are the main barriers (Hines et al., 2008d, WR0502);

- The lack of funds, lack of staff capacity, lack of skills (including data analysis), non-availability or unsuitability of data, or unexpected problems can hinder the effectiveness of evaluations (Waste Watch, 2006, WR0105; Hampshire County Council & Brook Lyndhurst, 2008, WR0117);
- Projects were also not always able to estimate the cost of monitoring, the resources required, or likely sample sizes before starting, meaning that monitoring had to be abandoned or revised (e.g. leading to having baseline data, with no or very small sample sizes in follow up). (Waste Watch, 2006, WR0105; Hampshire County Council & Brook Lyndhurst, 2008, WR0117).

The main barriers to using the monitoring and evaluation approaches, outlined in Table 1 and discussed in section 1.5, are summarised in Table 3 (overleaf).

Type	Barriers
<p><b>Self-weighing, monitoring or reporting</b></p>	<ul style="list-style-type: none"> <li>• Inconsistent data can be derived due to different start / stop times, new entrants, incomplete diaries, and lack of buy-in from participants for weighing waste</li> <li>• Can be in-effective in generating robust statistical evidence of weight-based reductions</li> <li>• Conversion factors are needed to translate measurements (from observational analysis) and this can reduce the robustness of the results</li> <li>• High drop-out rates are experienced as project progresses (up to 50% in one case)</li> <li>• Is a resource intensive approach, with regular data collection and processing required</li> <li>• There are risks of self-selecting samples</li> <li>• Sample sizes can be too small to be statistically robust</li> <li>• Some people don't want to weigh their waste</li> </ul>
<p><b>Use of collection round data</b> to accurately measure waste arisings</p>	<ul style="list-style-type: none"> <li>• Can only be used to monitor waste arisings in a specific geographical location</li> <li>• The way in which local authorities collate and use collection round data for Waste Data Flow does not provide the level of detail or quality required to monitor waste prevention</li> </ul>
<p><b>Use of control and pilot groups</b> to compare changes so that waste arisings can be accurately measured</p>	<ul style="list-style-type: none"> <li>• The data analysis can be distorted and compounded by considerable fluctuations due to external factors - difficult to identify and impossible (in some cases) to quantify</li> <li>• Detailed and careful planning is needed to ensure similar populations/collection systems where there are no future interventions or changes envisaged in the control. This can be time and resource intensive</li> <li>• Quality and detailed waste collection data is essential but challenging to derive because this is not held by many local authorities to the extent that it is needed for this type of approach</li> <li>• Difficulties can be experienced using ACORN to accurately match populations</li> <li>• This approach cannot be used if communities are not geographically defined</li> </ul>
<p><b>Attitude and behaviour surveys</b> including interviews and focus groups</p>	<ul style="list-style-type: none"> <li>• Sample sizes can be too small or respondent rates too low to be sufficiently representative or robust</li> <li>• If not carefully managed, evaluators can be swamped by too much survey data with little resource to evaluate responses effectively</li> <li>• Using a Citizen Panel can bias the sample. However, this route is often the most popular used by local authorities because it is quick and cost effective to run</li> <li>• Self-completion surveys can give potential for self-selection and bias</li> <li>• Focus groups are not suitable for collecting weight data</li> <li>• Comparative analysis between survey and waste data can be limited if survey questions are not carefully constructed</li> </ul>
<p><b>Hybrid approaches</b> – a combination of any one or more of the above approaches</p>	<ul style="list-style-type: none"> <li>• Requires careful planning and integration between evaluation of data monitoring, surveys and self-weighing / observation</li> <li>• Use of collection round data cannot be used to monitor the impact of waste prevention interventions on dispersed communities, i.e. not geographically based</li> </ul>

Table 3 Barriers to using household waste prevention monitoring and evaluation approaches



## 1.8 Opportunities for progressing (and using) monitoring and evaluation of household waste prevention

Sources in the review, and the present authors, concur that there is no further benefit to be obtained in trying to collate evidence from past waste prevention projects. The quality of data and reporting likely to be found does not justify the effort. A more promising way forward is to ensure that new campaigns and initiatives are being properly evaluated (by providing support if necessary) and that the evidence is captured and collated into a common resource as it is completed. The opportunities for monitoring and evaluating household waste prevention discussed in the evidence are outlined below.

- Develop good practice guidance for local authorities and other delivery organisations on how to use different monitoring and evaluations approaches that can be tailored to specific interventions, e.g. working closely with small groups of households will require skills in using self-weighing, observation (for which conversion metrics would be needed), and waste auditing approaches. The aim should be to start with a specific type of intervention and then 'design in' costed options of monitoring and evaluation (as part of the planning process).
- Provide the necessary skills for local authorities to manage and maintain good quality and sufficiently detailed tonnage data so that they can interrogate and use this for measuring household waste prevention effectively. This also applies to the ability to link compositional analysis and tonnage data on the one side and attitudinal survey data on the other.
- Create a recommended survey bank of waste prevention questions for use by local authorities and other delivery organisations.
- Investigate the cost implications for each approach to present a 'pick and mix' selection of approaches to operators.
- Consider the development of further waste prevention metrics (beyond WRAP's committed food waste reducer (CFWR) metric). There may be potential to review these latest evidence sources to identify baseline and measurement indicators, targeting potential, and tonnage reduction. See module [L3 m3/3 \(D\)](#) for further information.
- Undertake follow up evaluation on a selection of past projects (e.g. the short-term projects) to see if behavioural change / tonnage reductions have been sustained.
- Provide a clear steer to local authorities and other delivery organisations on reporting priorities for carbon, tonnages, volume and cost when it comes to evaluating waste prevention initiatives.
- Whilst Waste Watch (2006, WR0105) found it impossible to identify a set of waste prevention indicators that could be used across the board, it may be worth exploring the benefits of linking waste prevention on a national level to personal consumption expenditure rather than GDP as the Environmental Protection Agency does in the USA. Though this would undoubtedly be a significant undertaking, it would allow for measurement of impacts of changes in product groups or market activity - e.g. what is the impact of a change in packaging on waste arisings (Waste Watch, 2006, WR0105, p. 29 WR0105)?

WRAP are already addressing some of these opportunities, for example, WRAP is currently revising its monitoring and evaluation guidance which could be adapted to suit different project designs. Guidance is also being provided on how to develop strategic targets for waste prevention via the Waste Prevention Toolkit (WRAP, 2009b). The toolkit will be supported by a training programme for local authorities to help bridge the skills gaps outlined above. In its new guidance, WRAP has also developed a series of recommended waste prevention survey questions. The main opportunities for using the monitoring and evaluation approaches, outlined in Table 1 and discussed in Section 1.5, are summarised in Table 4.

Type	Opportunities
<p><b>Self-weighing, monitoring or reporting</b></p>	<ul style="list-style-type: none"> <li>• Effective in engaging and connecting participants - people have been found to value the 'personal' approach/direct contact – puts participants 'in touch' with their waste</li> <li>• Provides visible and immediate tonnage reduction</li> <li>• Provides motivational feedback to participants</li> <li>• Auditing is supported by education and promotion</li> <li>• Observational monitoring can provide alternative to weighing</li> <li>• Diaries tend to work better with regular feedback on performance</li> <li>• The 'invisibility' of waste prevention, particularly the many small, in-home activities, means that participation can only be monitored through self-reports by participants</li> </ul>
<p><b>Use of collection round data</b> to accurately measure waste arisings</p>	<ul style="list-style-type: none"> <li>• Allows accurate measurement and comparison of changes in waste arisings</li> </ul>
<p><b>Use of control and pilot groups</b> to compare changes so that waste arisings can be accurately measured</p>	<ul style="list-style-type: none"> <li>• Achieves measurable and sustained impact on tonnage reduction</li> <li>• Can provide sufficient timeframe and planning for a number of different evaluations to take place e.g. participation monitoring of Mail Preference Service, home compost bin sales, several inter-linked campaign activities and intervention tools to be measured</li> <li>• Enables large sample sizes which can provide representative populations which are likely to be more statistically robust</li> <li>• Allows for comparison between monitoring weight-based data and campaign outputs to be made (but evidence found this to be subjective in some cases)</li> <li>• Can help to reduce bias as target groups are pre-selected</li> </ul>
<p><b>Attitude and behaviour surveys</b> including interviews and focus groups</p>	<ul style="list-style-type: none"> <li>• Provides a baseline for monitoring change</li> <li>• Provides both quantitative and qualitative data and information for evaluation</li> <li>• Data can reveal participation and notable shifts in reported behaviours</li> <li>• Provides valuable input to design of campaigns, interventions, actions plans and targeted materials</li> <li>• Enables large-scale surveys to be conducted</li> <li>• Focus groups can provide good insight into attitudes and behaviours which can be relatively easy to design, deliver and are cost effective</li> </ul>
<p><b>Hybrid approaches</b> – a combination of any one or more of the above approaches</p>	<ul style="list-style-type: none"> <li>• Provides the context for built-in pre and post surveys with interim self-weighing or observation reporting</li> <li>• Enables mixed approaches to be used in both short and long-term monitoring and evaluations</li> <li>• Enables longer term studies to build in interim monitoring and evaluation, e.g. surveys and waste tonnage data</li> <li>• The results from one method can be used as a check on another (e.g. focus groups acting as check on survey data)</li> <li>• Enables compositional analysis of data to be introduced to the monitoring and evaluation process</li> </ul>

Table 4 Opportunities for using household waste prevention monitoring and evaluation approaches

## 1.9 Researchers' recommendations

The recommendations made by the authors of the work reviewed here were mostly focused on the project delivery process rather than on the monitoring and evaluation process itself. Therefore, there are few recommendations that can be drawn from the evidence review. Those that could be summarised below:

- Whilst WRAP's guidance does not advocate the use of control and pilots, Dorset County Council et al (2008, WR0116) noted that there are lessons to be learned from their use of a control and pilot approach for monitoring and evaluating household waste prevention, e.g. using good quality (and sufficiently detailed) collection round data; and undertaking long term evaluations to provide time series data from which accurate estimates of reductions in waste arisings can be derived.
- Accepted monitoring and evaluation methodologies are needed (Waste Watch, 2006, WR0105). The evidence sources reveal that there is some common ground in approaches which could provide the basis for good practice guidance for local authorities.
- Build monitoring and evaluation arrangements in at the beginning of the project, so that a baseline assessment can be conducted against which to measure (Brook Lyndhurst, 2006, WR0504).
- Waste analysis offers a more secure option if it can be resourced instead of using a self-weighing baseline (Hampshire County Council & Brook Lyndhurst, 2008, WR0117). Self-weighing was found throughout the literature to be an important motivator for behaviour change.
- Evaluations need to leave a longer gap between the end of the campaign and follow up evaluation work, which may improve the assessment methodology. This may also reduce the sense of fatigue that household experience when surveyed too closely (Changeworks, 2008).
- Longer term tonnage analysis may help to establish any long term campaign effects (Changeworks, 2008).
- Evaluations need to be balanced against the ease of use of different approaches (NLWA, 2009).

## 1.10 References

- Brook Lyndhurst and Waste Watch (2006) Establishing the behaviour change evidence base to inform community-based waste prevention and recycling. WR0504
- Brook Lyndhurst (2007) Replicating Success: Social Enterprises & the Waste Sector in London. WR0501.
- Changeworks (Fletcher, S.I., Tucker, P. Speirs, D.) (2008) The Waste Wise Armadale Project. Final report.
- Defra WREP. Published Defra WREP reports can be found via the Defra web-site  
<http://www.defra.gov.uk/environment/waste/index.htm>
- Dorset County Council, AEA, The Social Marketing Practice, Mike Read Associates and The University of Northampton (2008) Household Waste Prevention Activity in Dorset. Defra WR0116.
- FRN (2009), Average weights. <http://www.frn.org.uk/statistics.asp> Accessed online 11.05.2009.
- GAP (Global Action Plan) (2008a) EcoTeams Evaluation Report for Defra's EAF [unpublished].  
[http://randd.defra.gov.uk/Document.aspx?Document=EV02004\\_7823\\_FRP.pdf](http://randd.defra.gov.uk/Document.aspx?Document=EV02004_7823_FRP.pdf)
- GAP (Global Action Plan), Nye, M. and Burgess, J., School of Environmental Sciences, University of East Anglia (2008b) Promoting durable change in household waste and energy use behaviour. (WR0114)
- Hampshire County Council and Brook Lyndhurst (2008) Small Changes Big Difference Towards a Materials Resource Authority: Promoting Practical Waste Prevention and Exploring Options for Resource Management. WR0117.
- NLWA (North London Waste Authority) (2009) North London Watch Your Waste Week 4th to 12th October 2008.

- OECD (August 2000) Working Party on Pollution Prevention and Control. Strategic Waste Prevention – OECD Reference Manual, ENV/EPOC/PPC(2000)5/FINAL.
- Salhofer, S., Obersteiner, G., Schneider, F. and Lebersorger, S., (2008), Potentials for the prevention of municipal solid waste, Waste Management, 28, p. 245-259.
- SISTech (2008) Waste Wise Armadale Project Evaluation.
- Tucker, P. and Douglas, P. (Environmental Technology Group, University of Paisley) (2006a) Understanding Household Waste Prevention Behaviour. Technical Report No. 1: A Critical Review of the Literature. WR0112.
- Waste Aware Scotland (undated) Waste Aware Scotland Waste Prevention Programme.[Unpublished]
- Waste Watch (2006) Project REDUCE Monitoring & Evaluation - Developing tools to measure waste prevention. WR0105.
- Waste Watch (2007a) Project REDUCE Monitoring & Evaluation - Developing tools to measure waste prevention. Campaign evaluation report: 'What not to waste'. WR0105.
- Waste Watch (2007b) Project REDUCE Monitoring & Evaluation - Developing tools to measure waste prevention. Campaign evaluation report: 'Test the Water'. WR0105.
- Wickens, S. (RoWan - Ross-shire Waste Action Network) (2005) Waste Free Households project. Final report.
- Woodard, R. and Harder, M. (undated) Waste Prevention in the UK – A Review of Current Initiatives
- WRAP (2006), Improving the Performance of Waste Diversion Schemes, A Good Practice Guide to Monitoring and Evaluation.
- WRAP (Gray, S.) (2007c) Possible Method for Estimating the Landfill Diversion Attributable to Home Composting for use in LATS Calculations: a discussion paper by WRAP.
- WRAP and the Women's Institute (2008) Love Food Champions.
- WRAP (2009) Food Waste Prevention - Committed Food Waste Recycler (CFWR). Personal communication with WRAP via e-mail 6 May 2009
- WRAP (2009b) Waste Prevention Toolkit  
[http://www.wrap.org.uk/applications/waste\\_prevention\\_toolkit/restricted.rm](http://www.wrap.org.uk/applications/waste_prevention_toolkit/restricted.rm)

## **Basis of this report**

The material in this paper is derived from a large scale evidence review of household waste prevention conducted by Brook Lyndhurst, the Social Marketing Practice and the Resource Recovery Forum for Defra's Waste and Resources Evidence Programme.