

WR1204

Household Waste Prevention

Evidence Review:

L1 m1 – Executive Report

A report for Defra's
Waste and Resources Evidence Programme

October 2009

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1 Introduction, approach and method

In Autumn 2008, Defra commissioned a review to consolidate the policy-relevant evidence base applying to **household waste prevention**.

The review adopted Defra's definition of 'evidence'¹:

"We can say that evidence is any information that Defra can use to turn its policy goals into something concrete, achievable and manageable. It can take many forms: research, analysis of stakeholder opinion, economic and statistical modelling, public perceptions and beliefs, anecdotal evidence, and cost/benefit analyses; as well as a judgement of the quality of the methods that are used to gather and synthesise the information.

*Evidence for policy has three components. First is **hard data** (facts, trends, survey information) but the second component is the **analytical reasoning** that sets the hard data in context. Third, an evidence base comprises **stakeholder opinion** on an issue or set of issues. The reason for this tripartite approach is: if there is any weakness in the hard data on which you are basing a policy option, then you will need to fall back upon the analysis that underpins the data. If there is any weakness in the analysis, or any risk that others could bring an alternative interpretation to the table, then you need to go back to your stakeholder base in order to understand the different interpretations that could give rise to different analyses of the same set of data."*

With this in mind, the review encompassed evidence from Defra, WRAP and the EA²; as well as academic research and grey literature from UK and international sources. Stakeholders were also engaged in the evidence review process, drawing their knowledge into the evidence base. The research was undertaken by Brook Lyndhurst, the Social Marketing Practice and the Resource Recovery Forum. The research team was supported by a Defra-appointed steering group and an expert panel approved by Defra.

The evidence review addressed a set of key questions:

- What is the extent to which household waste prevention behaviours are practised?
- What are the barriers and opportunities to encourage participation?
- What are the options available to householders?
- What are the options for stakeholders?
- What are the infrastructure considerations and technical solutions?
- What is the impact of different policy options and measures on waste prevention?

In addressing these questions, the review sought to assemble the evidence that could be useful to the formulation of future policy; and to identify gaps in that evidence. The review is not a statement of policy; and the inclusion of or reference to any given policy measure should not be taken to imply that it has, or will be, endorsed by Defra as an option for England. Future policy will need to be developed from an evidence-based platform; and it is hoped that this report and its accompanying suite of supporting material³ provides such a platform.

¹ <http://www.defra.gov.uk/science/how/evidence.htm>

² Waste and Resources Action Programme; Environment Agency. The work was commissioned by the Defra Waste & Resources Evidence Programme (WREP).

³ The overall findings from the review are presented as a series of modules for ease of access – see Annex 1

The evidence review adopted the definition of waste prevention set out by the OECD⁴ and the NRWF toolkit⁵. The definition encompasses:

- **strict avoidance** (not generating waste in the first place)
- **source reduction**; and
- **product reuse** (in its original form)
- as well as **reducing the hazardousness** of waste.

It excludes all forms of recycling – including food collection and commercial composting – and remanufacturing. The latter are sometimes included in a broader definition of “waste minimisation” and it is worth noting that stakeholders involved in the review sometimes did not make a clear distinction between recycling and prevention.

The scope of the review was agreed with Defra. It was informed by the resource lifecycle framework set out in Waste Strategy 2007; by the coverage of waste prevention topics in Defra’s Waste and Resources Evidence Programme (WREP); and by WRAP’s consumer research.

Over 800 source documents (against a nominal target of 200) were identified in a scoping phase, including 19 WREP projects which each had multiple reports. In all, 88 documents were reviewed in detail; 44 others were skimmed for relevant material, and 106 covered in the international review⁶. The desk element was supported by further evidence gathered from stakeholders (reported in section 7), interviews with 19 UK experts, and input from 40 international experts to the international review (document reference **L3 m5/2 (D)** – see below). The evidence is consolidated here under three main headings that relate to the key ‘entry points’ at which prevention behaviour can be influenced:

- voluntary action by consumers at home
- support through stakeholders (e.g. retail and reuse sectors)
- and directly through national and local policy

Other chapters report on issues related to monitoring and evaluation, on stakeholder views, and gaps in the evidence. **In reading the report it is important to bear in mind that the scope focused very much on secondary published literature, and on literature that had been peer reviewed or was undertaken by/for government, WRAP or the EA.** Though significant gaps were found in the evidence – especially reliable statistics - it was outside the scope of the review to piece together new information from primary sources.

The outputs from the review have been produced in a series of modules spread over three ‘levels’. This executive report comprises ‘Level 1’ (or L1). Further detail is provided in a series of Level 2 (L2) papers (that have also been compiled into a single volume). Further details, and briefing notes on particular subjects, are provided by a suite of Level 3 (L3) modules. The structure is an acknowledgement that not all readers will be interested in all of the material; and the intention is that users of the material can drill down from this top level executive report to the particular detail of interest. Navigation to other modules is indicated by **grey highlighted text** (e.g. Level 2 Module 3 is written as **L2 m3**) throughout this executive report; while the key for the modules is in Annex 1.

⁴ OECD (2002), Working Group on Waste Prevention and Recycling: OECD Workshop on waste prevention – toward performance indicators 8-10 October 2001.

⁵ National Resource & Waste Forum (NRWF) (2006) Household Waste Prevention Toolkit Part A – A Continuous Waste Prevention Improvement Approach. <http://www.wrap.org.uk/downloads/NRWFToolkit1.d24df631.2677.pdf> Accessed 30.03.2009.

⁶ Sources included in the review are detailed in Annex 1 and **references to them are given in the text in square brackets**. Other sources (e.g. web-sites, press releases) are listed as footnotes. The international review can be found in **L3 m5/2 (D)**.

2 Policy context

Total waste arisings in England are some 272 million tonnes per annum; 9% of this originates from households according to *Waste Strategy 2007*. Over the last five years, *total household waste* has declined at an average rate of 0.4% per annum⁷. *Residual waste* (that left after reuse and recycling) averaged 321 kg per head in the year to June 2008⁸, down from 450 kg per person in 2000⁹.

Waste Strategy 2007 sets the policy context for waste prevention in England. A key objective is to decouple waste growth (in all sectors) from economic growth. The strategy includes a specific target to reduce household residual waste from 22.2 million tonnes in 2000 to 15.8 million tonnes in 2010, with a further aspiration to reach 12.2 million tonnes in 2020. This is equivalent to reducing residual waste per person to 225 kg in 2020¹⁰. The means of achieving the target include recycling and composting, as well as prevention. Resource efficiency and waste prevention are also priorities in Defra's work on sustainable consumption and production, including product roadmaps for priority products and an extensive programme of consumer and product research¹¹.

To further the commitments made in Waste Strategy 2007, the government made provision in the Climate Change Act 2008 for the piloting of household financial incentives schemes in five local authorities. No applications have been made to date. Significant other measures that should encourage local authorities to pursue waste prevention include:

- the Landfill Allowance Trading Scheme (LATS) (monitored by the Environment Agency¹²)
- new waste performance indicators for local authorities announced in 2007 (NIs 191, 192 and 193¹³) – including an indicator for residual waste per head, and inclusion of reuse in the diversion indicator (with recycling and central composting) (see [L2 m2](#) for more detail).

WRAP is further supporting local authority activity on household waste prevention through revision of the former National Resource and Waste Forum (NRWF) waste prevention toolkit and is working with Defra on initiatives to promote sustainable clothing¹⁴ and third sector capacity in the reuse economy¹⁵. WRAP also plays an important role in promoting the reduction of packaging and food waste through the Courtauld Commitment with major retailers¹⁶; and from 2010 onwards WRAP will be leading on delivery of the government's resource efficiency policy to businesses and consumers.

Implementation of the EU Waste Framework Directive (WFD – Directive 2008/98/EC)¹⁷ in the UK will likely provide further impetus to waste prevention, with a new obligation for member states to design and introduce comprehensive waste prevention programmes by 2013.

⁷ Defra, Statistical Release November 2008

http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200708_statsrelease.pdf

⁸ Defra, Statistical Release February 12th 2009, 'Municipal waste management statistics: Provisional Quarter 1 – 2008/09.' <http://www.defra.gov.uk/news/2009/090212a.htm> NB These data are provisional as returns to WasteDataFlow can be revised by local authorities during the scheme year and there are also season effects on waste arisings and management. To minimise the effects of seasonal fluctuations, comparisons are made between the years.

⁹ Defra (May 2007), *Waste Strategy for England 2007*, p. 11.

¹⁰ Defra (May 2007), *Waste Strategy for England 2007*, p. 11.

¹¹ Defra, SCP Evidence Base Research <http://www.defra.gov.uk/environment/business/scp/evidence/index.htm>

¹² Environment Agency (Nov. 2008), Report on the Landfill Allowances and Trading Scheme.

¹³ For more information visit: <http://www.defra.gov.uk/environment/localgovindicators/ni191-193.htm> and <http://www.defra.gov.uk/environment/waste/localauth/perform-manage/index.htm>

¹⁴ Defra, Sustainable Clothing Action Plan

<http://www.defra.gov.uk/environment/business/products/roadmaps/pdf/sustainable-clothing-action-plan.pdf>

¹⁵ Defra (2008) Third Sector Strategy

<http://www.defra.gov.uk/corporate/how-do-we-work/third-sector/strategy/documents/Defra-Third-Sector-Strategy-1108.pdf>

¹⁶ WRAP, Courtauld Commitment. http://www.wrap.org.uk/retail/courtauld_commitment/

¹⁷ Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, Official Journal of the European Union 22.11.2008, L 312/3. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:en:PDF>

Also looking to the future, the House of Lords Science and Technology Committee published an inquiry into waste reduction in 2008¹⁸ to which the Government responded¹⁹. A key concern of the inquiry was the prevention of commercial and industrial waste, including the barriers that exist to local authorities engaging with businesses to reduce their waste. Business waste prevention was outside the scope of this evidence review.

Outside England, the devolved administrations in Scotland, Wales and Northern Ireland all have their own strategies on waste minimisation/prevention, which are detailed in [L2 m2](#).

3 Consumers – engaging

Engaging consumers and households to rethink their behaviour is one of the main ways in which waste prevention can be progressed. The evidence is summarised below for public participation in waste prevention, the motivations and barriers underlying behaviour and the contribution of public engagement initiatives to increasing action.

3.1 Coverage of the review

The review uncovered a large body of evidence on attitudes and behaviour on waste prevention, including five Defra WREP projects [1-5], Defra’s work on sustainable clothing, academic papers, WRAP consumer research and consultants’ reports (see Annex 2). Modules related to this section of the executive report are:

Level 1 Report	Level 2 Report	Level 3 reports
L1 m0 Executive summary	L2 m3 Consumers - Engaging	L3 m3/1 (D) Extent to which behaviours are practised L3 m3/2 (D) Consumer motivations and barriers L3 m3/3 (D) Impacts of public campaigns & interventions L3 m3/4 (T) Attitudes & behaviour – food waste L3 m3/5 (T) Attitudes & behaviour – home composting L3 m3/6 (T) Attitudes & behaviour – reuse L3 m3/7 (T) Attitude & behaviour – everyday actions at home L3 m3/8 (T) Consumer segmentation L3 m3/9 (T) Small group behaviour change models L3 m8/2 (D) Waste prevention bibliography

(D) denotes a briefing paper providing more background detail; (T) indicates a short focused topic briefing

3.2 Options available and consumer participation

The review found that there is no standard set of behaviours which is widely accepted as comprising ‘household waste prevention’. In practice, it covers anything from rejecting junk mail to reusing food leftovers; from home composting to donating electrical goods to charities; from buying second hand clothes to avoiding single-use bags, and so on²⁰. Unlike recycling - which is a more singular act - prevention comprises many small, individual behaviours. Also unlike recycling, prevention behaviour tends to be private and invisible, so there is much less likelihood of a social norm developing.

Data on the incidence of different behaviours are largely inconclusive, mainly because they come from surveys that relate to differing contexts (e.g. a specific area or group of people). A few nationally representative surveys are available, conducted mainly by WRAP (on food, nappies, home composting, junk mail and single use bags). The only reliable time-series tracking data is currently held by WRAP

¹⁸ House of Lords Science and Technology Committee (2008), Waste Reduction. http://www.parliament.uk/parliamentary_committees/lords_s_t_select/waste_reduction.cfm

¹⁹ Government (2008), Waste Reduction: Government responses to House of Lords Science and Technology Committee report. <http://www.publications.parliament.uk/pa/ld200708/ldselect/ldscstech/203/203.pdf>

²⁰ A complete listing of behaviours, together with evidence on motivations and barriers, is in report [L3 m3/2](#)

while some questions in Defra's Survey of Public Attitudes and Behaviours Toward the Environment also cover waste behaviours²¹.

From the literature, examples of the extent of practice for waste prevention behaviours include: home composting 35%; avoiding packaging 10%-40%; committed to preventing food waste 14%; always using a 'bag for life' 23%; avoiding junk mail 15%; and buying second hand 30-45% (sources and detailed participation data are given in L3 m3/1 (D)). On reuse, a higher percentage generally donates (clothes or bulky/WEEE²² goods) than purchases second hand; however, Freecycle membership is growing fast in the UK and is currently around one million members [6] (L3 m3/6 (T)).

Up to 60% of people do at least one waste prevention behaviour [1] but behaviours tend to be practised sometimes rather than always, and some people will do one or a few but not a whole range of behaviours [7]. Willingness is consistently greater than the actual level of engagement in waste prevention behaviours [7]. Donating items is commonly reported as the most practised behaviour; private reuse of items around the home and other 'low effort' reduction behaviours tend to occupy an intermediate position; and those that require major changes in consumer habits are often least practised (L2 m3 & L3 m3/1 (D)).

Practice varies across different socio-economic groups and the variations are often specific to the behaviour in question (L2m3, L2 m3/1 & L3 m3/4 to 7). In broad terms, however, waste prevention behaviours are more prevalent among individuals who are: older; middle to high income; female; living in detached properties; not living with children at home; and more concerned about the environment.

3.3 Behaviour change theories and waste prevention

A number of authors have used behaviour change theories either to explain or predict waste prevention behaviour [8, 9] or have reviewed others' work in this area [1]. One of the most widely tested is the theory of planned behaviour, which proposes that intention to act derives from three factors: a person's attitude, whether they feel able to act (known as 'perceived behavioural control') and wider social norms. Under the right external conditions (e.g. no limiting barriers), intention is expected to translate into action.

The theory of planned behaviour is just one of the many social psychological frameworks that are being examined and applied in pro-environmental behaviour change research (including Defra's programme on sustainable consumption^{23 24}). This body of applied theory points to the following as being important considerations at a practical level [1, 4]:

- **Personal values, norms and identity** – including whether I feel the issue is important, I feel responsible, I feel I am the kind of person who does this, and I feel I am able to do it, the perceived difficulty and costs;
- **Social norms and identity** – either whether I want to act because I see others do it (descriptive norm), or I feel obliged to do it because most people do it (injunctive norm), whether I get praise from others for doing it, or it gives me a sense of social 'belonging';
- **External conditions** – whether I have access to services or products or whether there are other barriers that are out my control;

²¹ <http://www.defra.gov.uk/environment/statistics/pubatt/>

²² Waste Electrical and Electronic Equipment

²³ Defra's programme of social research on pro-environmental behaviour can be found here <http://www.defra.gov.uk/environment/business/scp/evidence/theme3/sustain-consump.htm>

²⁴ Other key sources include various papers by Professor Tim Jackson

http://portal.surrey.ac.uk/portal/page?_pageid=822_512810&_dad=portal&_schema=PORTAL and Andrew Darnton's review of theories for government social researchers http://www.gsr.gov.uk/downloads/resources/behaviour_change_review/practical_guide.pdf

- **Habits** – behaviours that occur regularly and repeatedly without conscious reflection are referred to as habitual and are not directly subject to the influence of values, norms and so on. Theoretical mechanisms have been described for breaking into habits and 're-freezing' new ones (e.g. 'cueing' of desirable habits, learning by doing etc.)²⁵.

3.4 Motivations for waste prevention behaviour

The motivations driving waste prevention are as many and varied as the diverse activities under the waste prevention umbrella: they cover many of the aspects flagged by theory; and are often specific to particular behaviours (e.g. food, home composting, reuse, etc - see [L2 m3 & L3 m3/3 \(D\)](#)).

Importantly, research has suggested that waste prevention behaviours are poorly correlated with recycling, and are sometimes even negatively correlated [1 & 7] – such that recycling may become a reason for not doing more to reduce waste²⁶. The research also revealed a degree of confusion among the public between "recycling" and "reduction" and the two are often conflated in the public's mindset.

Studies that have tried to explain waste prevention behaviour through statistical models or testing of behavioural theory have generally found that their models have only weak explanatory power (see also [L3 m5/1 \(T\)](#)). Two of the main studies [1 & 7] found that some 70% to 85% of the variation in behaviour could not be explained. Difficulty in explaining waste prevention behaviour may be related to the fact that it is, in reality, not a single behaviour but many. Moreover, it is possible that there are missing inputs to the models which are drivers of behaviour but that do not relate either to waste, environmental values or world views (for example, the strength of purchase and food management drivers in WRAP's food waste research [10]).

The difficulties faced by such modelling exercises lie, in part, in the fact that there is no consensus about behaviour change at a theoretical level. Nevertheless, various motivations are identified in the literature. The following are the most frequently mentioned in the studies reviewed (simply presented in the same order as theoretical drivers shown above because the literature does not provide the basis for a clear ranking):

Values – universalism and moral motivations. Motivations for recycling are often described as more functional and influenced by external conditions (e.g. kerbside collection) than are those for waste prevention. Several authors link waste prevention behaviour to underlying personal values, including what are commonly termed 'universal' values (generally where an individual puts collective benefits ahead of their own personal gain) [1]. Moral and charitable motivations are drivers for reuse (especially donation); and an 'ethic of care' – a general sense of responsibility for the intrinsic value or on-going use of 'things' – has also been flagged ([L3 m3/6 \(T\)](#)).

Personal responsibility. Acceptance of personal responsibility is often cited as a primary requirement for prevention behaviour. It may be manifested, for example, as a sense of duty or obligation, satisfaction, embarrassment (or lack of it in relation to second hand goods), guilt, and active concern.

Self-efficacy. This describes the personal capabilities, confidence, know-how and skills needed to carry out a particular behaviour. Interventions or campaigns may address it by providing hands-on help or giving tips on how to perform an activity (e.g. the Love Food Hate Waste web site or several WREP projects [2, 3, 4]).

²⁵ See Defra research (forthcoming) *Unlocking habits to enable pro-environmental behaviours - EV0502*
<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16189>

²⁶ This 'negative spillover' is also identified in Defra's evidence review of catalyst behaviours (Brook Lyndhurst, in progress). See especially Thorgerson (2004).
<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16324>

Costs. Saving money through avoided or alternative purchase has been shown to be an important motivator - for example on home composting (through subsidy of bins), carrier bags (charging), buying from charity shops, interest in refills, and switching from bottled to tap water (L3 m3/2 (D)). Money saving is a complex driver, however, and has to be set against the risk that consumers will perceive cheaper or alternative products as lower quality or sub-optimal options (see section 4).

Social norms. Knowing or seeing that others are taking action can create a sense that individual contributions are worth the effort [1]. A national survey, for example, indicated that 5% - 10% of home composters started due to encouragement from friends [9]. Social norm effects and peer support are actively deployed in behaviour change interventions based around small groups working together (L3 m3/9 (T)) and some have recorded significant reduction impacts among the individuals taking part (e.g. Global Action Plan [2] and Love Food Champions [11] – see also L3 m3/3 (D)).

Habits can have either a negative or a positive effect on prevention behaviour: they can either block the take up of new behaviours where routines are so established that consumers never think to question them; or help to maintain established 'good' behaviours [1, 4, 12]. The challenge for behavioural change interventions is to break into (or 'disrupt') routinised thinking and help consumers maintain new habits once they try something new. This can be done through repeat communication and hands-on support, for example ([2, 4] and (L2 m3))²⁷.

3.5 Barriers to waste prevention behaviour

The barriers to waste prevention behaviour are equally diverse and almost mirror the motivations above (see L2 m3, L3 m3/2 (D) & L3 m3/4 (T) to L3 m3/7 (T) for further detail of the barriers listed below).

Apathy or a general lack of interest in the idea of prevention has been identified as a general barrier [4, 8] and specifically in studies of junk mail, food and refillables.

It's someone else's responsibility. Lack of interest is often compounded by a feeling that business and retailers are more responsible for the waste problem than consumers, commonly noted around packaging but also food waste [1, 4, 10, 11, 13].

Inconvenience is commonly cited as a barrier, with specific mentions for home composting, refillable packaging and retail self-dispensing systems, product service systems, reusable nappies and donating for reuse. Non-participants can be put off by the *perception* of inconvenience without any actual experience [e.g. 9, 14]. Behaviour change projects may address this by providing opportunities to see activities 'for real' (e.g. nappy or home composting demonstrations) or by making it very easy to participate (e.g. by providing sign-up forms for junk mail opt outs) [e.g. 3, 4].

Cost can be a motivator for buying low waste products where there is some price advantage (or subsidy); but where consumers perceive there will be little or no discount, or they think an alternative will be more expensive, this acts as a barrier (e.g. in relation to refills, product service systems and food purchase). Special offers on food have been shown to contribute to food waste by encouraging people to buy more than they need [10, 11, 15].

Weak self efficacy and a sense of powerlessness. Many people feel that their contribution, either to the waste problem or to the solution, is marginal. In particular, some specific prevention behaviours can be seen as too insignificant to be worthwhile [1]. In addition, consumers may lack the know-how which would enable them to act differently, including what products to buy/use (e.g. nappies or home composting), how to manage wastage (e.g. on food or junk mail), or where to access services (e.g. reuse).

²⁷ A large scale study of the influence of habits on behaviour is currently underway for Defra. *Unlocking habits to enable pro-environmental behaviours - EV0502*.
<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16189>

Social norms don't favour waste prevention. This problem faces two ways: the prevailing social norm values mass consumption, rapid turnover of products and a personal identity built on the ownership of 'stuff' [4]; waste prevention is not a mainstream behaviour and may sometimes be seen as weird or different (e.g. buying second hand [16]). Moreover, the actions that contribute to waste prevention are largely private and unseen, so there is no explicit social pressure to 'do the done thing' [1], nor a reminder to hang on to new prevention habits [5] – as there is now for recycling.

Dominance of the recycling norm. As we saw above, the recycling norm has become so strong that this is generally people's understanding when they are asked to "reduce waste". Intervention projects have found that people need to be educated about the specific actions they can take, and why these are worth doing, rather than relying on general exhortations to "reduce waste" – because many people believe they are already doing their bit through recycling (see [L2 m3 section 3.8](#)).

While the above list of motivations and barriers provides a generic indication of the 'basics' that need to be considered when trying to engage the public in waste prevention, it does not do justice to the richness of the evidence base for specific prevention behaviours. Further detail and insight can be found by following the signposts given in section 3.1 above.

3.6 Contribution of consumer behaviour change options to waste prevention

Approaches

Campaigns and interventions that tackle a full range of waste prevention behaviours are a relatively new area for local authorities²⁸. The existing evidence comes from WREP projects [2, 3, 4], and a small number of authorities and community-led initiatives [5, 17, 18, 19, 20]. The two main approaches trialled so far include:

- Doorstepping information and advice campaigns, targeted at **all households in a defined area** [3];
- Volunteer household campaigns/projects, where **individuals sign up to be part of a group** receiving a package of advice, challenge activities and (often) hands-on support [e.g. 2, 4, 5, 11]([L3 m3/9 \(T\)](#)).

In addition to these cross-cutting campaigns are local authority and other initiatives on **specific behaviours** such as nappy or compost bin promotions [e.g. 17, 21] and projects in schools. All three approaches may involve champions or mentors (paid or voluntary) who help to support households in taking up new behaviours (e.g. WRAP's home composting advisors; Global Action Plan's (GAP's) Eco Team facilitators).

National support for local activity in the UK has been principally through the activities of WRAP, including financial and communications support for compost bin promotion, and the Love Food Hate Waste campaign which provides a key communications 'asset' for local authorities. During 2009, WRAP has updated the NRWF waste minimisation (now prevention) toolkit and is producing revised monitoring and evaluation guidance.

²⁸ [L2 m3](#) provides a fuller discussion of approaches, organised around Defra's 4Es behaviour change framework. ('Intervention' is a generic term referring to any activity or project intended to effect change: 'campaigns' comprise communication processes intended to raise awareness, encourage participation, promote change and so forth.)

Tonnage

It is possible to piece together evidence of the impact of campaigns or interventions from the examples cited in the literature but the data come with important health warnings [see 5 & 17 for a discussion; also L2 m6 & L3 m6/1 (D)]:

- Monitoring and evaluation practice is not yet standardised so results are not necessarily comparable²⁹;
- Methodologies and execution are sometimes flawed (though there are robust examples too); and
- Not all evaluations differentiate between **increased recycling** and **waste prevention at source**, so that 'reduction' impacts may sometimes be overstated.

There is also a fundamental difference between generalised or doorstepping campaigns and those focused on groups of volunteer households (where there is currently more evidence). Results for the first are averaged over all households in an area regardless of whether people take up the advice or not; the second looks solely at the performance of those who volunteered to take part. There is some evidence [2, 4, 22] that these voluntary activities tend to attract individuals with greater than average environmental interest, so that their performance may not be generalisable to a more representative population.

These caveats have been borne in mind in calculating the following indicators of impact derived from the literature³⁰:

Waste prevention behaviour	kg/hh/wk	Source
Home composting* - WRAP	2.9	[WRAP] personal communication
Home composting* - other literature review	3.5 - 3.8	[1]
Food waste* - becoming a committed food waste reducer - Love Food Champion	1.46 2.50	[WRAP] personal communication [11]
Bulky waste** - donate for reuse (NB per person)	~ 0.07	[24 & 25]
Cross-cutting waste prevention campaign**	~0.5 to 1.0	Various (see L2 m3) 0.5 est. from [3] 1.0 est. from [18]

Table 1 Impacts achieved from waste prevention campaigns & promotions

* data refer to impact of each *individual* recruited to an activity ** data averaged across *all households* in specified geographical area

Some cross-cutting campaigns reported much higher impacts than the 0.5 to 1.0 kg/hh/wk shown above but we judged the results of those to be either unrepresentative (i.e. they involved volunteer households) or to have significant flaws. **More evidence is required to substantiate these results**, especially on the impacts of cross-cutting campaigns. In our view this would most usefully be gathered from new, robustly monitored campaigns in the future rather than piecing together more historic data of variable quality.

That said, the broad indicator for cross-cutting campaigns in table 1 is slightly lower than previous benchmark estimates of waste prevention potential [26, 27]: Enviro (for Defra) suggested a 10% reduction is achievable (including reuse); the original NRWF toolkit indicated 3.2% to 7.4%. If the apparent impact of cross cutting campaigns could be repeated across England it would imply prevention potential of **0.57 million to 1 million tonnes**, equivalent to 2% to 4% of total household waste.

²⁹ The WRAP toolkit and revised M&E guidance should encourage more standard practice in future.

³⁰ L2 m3 & L3 m3/3 (D) show the results from all studies identified, together with a discussion of M&E issues.

4 Third sector, retail and service stakeholders - *enabling households to take action*

This section turns to the contribution of particular stakeholders in supporting household action and their role in the service infrastructure for waste prevention.

4.1 Coverage of the review

The scope here was limited to three specific topics within a potentially vast subject field, mainly driven by the coverage of the work undertaken for WREP [28 - 33]. The review covered:

- Reuse and the third sector;
- Retail solutions, focusing on refillables and retail self-dispensing systems;
- Product service systems.

The WRAP Retail Innovation programme was a further key source of evidence [34 - 36]. Related issues not covered in the review but signposted elsewhere (L3 m8/1 (T)) include eco-design, packaging innovation, mandatory deposit schemes for refillables, remanufacturing, and product lifespan. Related report modules are:

Level 2 reports	Level 3 report
L2 m4/1 Reuse & the third sector	L3 m3/6 (T) Attitudes & behaviour – reuse
L2 m4/2 Retail solutions – refillables & self-dispensing systems	
L2 m4/3 Product service systems	

4.2 Reuse and the third sector

Three WREP studies examined the contribution of third sector organisations to the waste sector and their support needs [28, 29, 20]. A further study examined the contribution of community composting [31]. Evidence from these sources was supplemented by academic and practitioner literature.

Current situation

The precise scale and character of the reuse sector in England is currently unknown (though it has been researched in depth for London [24]). A best estimate based on the evidence is that approximately 500,000 tonnes is reused annually in England³¹, around half of which is textiles³². This estimate **does not** include commercial channels such as eBay and car boot sales, or Freecycle, which is expanding very fast in the UK [6]. Other key facts are:

- Half to two-thirds of households dispose of bulky waste and Waste Electrical and Electronic Equipment (WEEE) each year, mostly to Household Waste Recycling Centres (HWRCs).
- Capture of bulky waste (including WEEE) for reuse may be in the order of 10% to 15% [24, 37, 38].
- Council bulky collections achieve an estimated 2% reuse rate and HWRCs 2-3%, while channels such as charity shops can achieve 80%+ (though much of this is textiles) [24, 37, 38].
- Third sector collections in London achieved a 68% reuse rate of *bulky items* collected in 2006/7 [24].

³¹ WRAP are currently investigating this further to inform their future strategy related to reuse and the total estimate for reuse is expected to be broadly of this magnitude. See "Investment for Growth", Eunomia for WRAP/REalliance (forthcoming)

³² This is pieced together from various sources and excludes recycling – see L2 m4/1. It is likely to be a similar order of magnitude to the more precise figure being developed in the WRAP work.

- Large appliances and bulky waste are more easily captured for reuse; most small WEEE goes to landfill, either because of low consumer recognition that it can be reused, or it not being accepted by collections or charities [39].
- Between 800 and 1,200 third sector organisations provide recycling and/or reuse services [40; cited in 28, 29, 30]; in addition there are 7,500 charity shops in the UK ³³.
- Reuse charities and enterprises divert (not necessarily reuse) 90,000 tonnes of bulky waste and have helped 750,000 low income households to acquire appliances and furniture [41].
- 170 community composting sites (existing in 2007) composted 12,500 tonnes of organic waste [31].

Third sector involvement in waste activities is characterised by a large number of small charities and a handful of large social enterprises, plus nationally co-ordinated charity shops. Social objectives are often (but not always) the prime motivation for the organisation, with waste activities being the means of achieving those objectives, and such organisations can often have an important role in wider economic development and regeneration. An organisation's orientation – whether it sees itself as a 'waste business' or not – shapes its capabilities and role as a waste operator/contractor [29]. The dominance of third sector organisations is a special feature of reuse activity in the UK and different models may be observed in other countries [42]. Examples exist in Europe where there is a more developed second hand retail sector and/or greater integration of reuse organisations with the local authority bulky waste infrastructure: Flanders is a notable example of the latter (L2 m4/1 & L3 m5/1 (T)).

Barriers and success factors

Barriers cited in the literature are summarised in table 2 below. The success factors for these kinds of organisations are a mirror of the barriers. They include in particular:

- *Funding and business development support* – many of the barriers to capacity, effectiveness and growth are being addressed in the Defra/WRAP supported REAlliance programme, a community interest company led by a consortium of four third sector organisations that is providing support to third sector reuse organisations³⁴.
- *Co-ordination with local authority activities* – most often where activity is formalised in service level agreements. Some authors cite this as a key barrier where it is not seen [e.g. 37]; or show a correlation between levels of reuse activities and authorities which have service agreements with reuse organisations [24]. The Flanders example shows how a package of policy provisions (including reuse targets, special exemptions, allowances, employment subsidy and tax treatment of reuse) can support the development of an integrated reuse sector.

³³ <http://www.charityshops.org.uk/>

³⁴ See Defra's Third Sector Strategy which announced the set up of the REconomy capacity building initiative supported by Defra and WRAP. See <http://www.defra.gov.uk/corporate/how-do-we-work/third-sector/strategy/documents/Defra-Third-Sector-Strategy-1108.pdf>

<p>Operational</p> <ul style="list-style-type: none"> • Funding – tendency of some to rely on grants • Capacity, lack of enterprise culture, business skills, & governance • Decline in quality of material donated for reuse – result of ‘fast fashion’ and ‘flat-pack furniture’ • Logistics – high cost of property; large storage requirements • The ‘rules’ for bulky waste collection services may mean items are easily damaged – e.g. leaving items exposed to rain/vandals at kerbside; type of vehicle used to collect 	<p>Consumer</p> <ul style="list-style-type: none"> • Lack of visibility/knowledge of reuse options – donation or purchase • Most bulky waste taken to HWRCs – reuse organisations prefer collections to maintain quality • Stigma around second hand purchase, especially if linked to charity (L3 m3/6 (T)) • Perception of bulky waste collection service – sometimes seen as inconvenient or expensive
<p>Policy/regulatory</p> <ul style="list-style-type: none"> • Delays & changes in the implementation of the WEEE directive (though forthcoming revisions are expected to have a positive impact) • Perverse incentives created by relative prices of waste treatment options – reuse “chronically undervalued” [24] • Planning regulations & waste management site licensing (for community composting) • Conditions & thresholds for exemption from the Animal By Products Regulations (ABPR) (community composting) 	<p>Relationship with local authority bulky waste</p> <ul style="list-style-type: none"> • Lack of strategic planning for reuse in bulky waste services • Lack of co-ordination between LAs and third sector (except where service level agreements are in place) • Lack of co-ordination <i>within</i> LAs between social services (potential clients) and waste services (suppliers) • No consistent practice with respect to payment of re-use credits to third parties • Shift towards integrated waste management contracts – possibility that small organisations are ineligible/unable to tender

Table 2 Barriers to the growth and development of third sector organisations and reuse infrastructure

Potential contribution of reuse and the third sector to waste prevention

Authors are generally optimistic about opportunities and growth for reuse activities, both generally and involving third sector organisations. Revisions to the WEEE directive are expected to increase reuse activity: Furniture Recycle Network (FRN) have suggested it might increase appliance reuse from ½ million items a year to 1 million [41]. Stakeholders consulted during the review also suggested that the new national indicators for local authorities³⁵ (with the inclusion of reuse) may encourage authorities to pursue reuse as a means of achieving landfill diversion.

Community and social benefits

Strengths of third sector reuse/recycling organisations identified in the WREP studies included:

- Innovation and creativity, including trial of concepts before mainstream markets develop;
- Serving (social or market) niches that would otherwise not be covered by mainstream services;
- Leverage of additional resources (e.g. through volunteering);
- Strong ties with the local community, which may enhance education and communication activity;
- Job creation for low skill workers or the long term unemployed;
- Supply of appliances and furniture to low income households (the Furniture Reuse Network (FRN) and London Community Recycling Network (LCRN) both suggest that demand currently exceeds supply).

One study [28] set out to calculate the Social Return on Investment of community waste organisations but with limited success.

Carbon reduction benefits

Reuse of bulky waste [24] can lead to a carbon dioxide saving of 4.2 tonnes per tonne of furniture or appliances reused, and 19 tonnes per tonne of reused textiles³⁶. The 21,500 tonnes of organic material

³⁵ <http://www.communities.gov.uk/publications/localgovernment/finalnationalindicators>

³⁶ LCRN say the estimates have provisional approval from policy officers at Defra and WRAP. The saving is derived from avoidance of replacement manufacturing of new goods.

composted at community compost sites in 2007 approximated 1,850 tonnes CO₂ equivalent emissions saved [31, using Defra guidelines].

Tonnage

Reuse of bulky waste (including WEEE) and textiles currently amounts to around 500,000 tonnes per year. Authors agree that there is significant potential to capture many more items for reuse (and recycling), and so contribute to diversion from landfill:

- Only 15% of bulky waste is reused, and a further 25% recycled, leaving more than 1 million tonnes going to landfill or for incineration [37];
- The UK generates 1.5 to 2 million tonnes of clothing waste a year, of which only 16% is recovered for reuse or recycling [43].

At national level, authors suggest that reuse of between **a quarter and a third of bulky waste** would be feasible if best practice approaches are adopted, including better integration of third sector and local authority infrastructure [37, 38, 44]. This would be equivalent to around double the present tonnage³⁷. Where it has been estimated at local level (in London), authorities are currently achieving 0.1 to 3.7 kg/hh/yr reuse on average [24]. Similar projections are not available for **textiles**, though Defra's sustainable clothing action plan is investigating how greater recycling and reuse can be achieved [43].

No reliable evidence was identified on tonnes reused through commercial and private second hand channels, or through Freecycle, though indicative estimates calculated from data in various sources suggest anywhere between 8kg and 25kg per Freecycle member per year.

4.3 Retail solutions – refillables and self-dispensing systems

Coverage of the review

The review was concerned with packaging options that require active involvement of households/consumers in making alternative choices. Other retail packaging solutions are largely passive as far as the household is concerned (e.g. light-weighting³⁸ or mandatory deposit return schemes³⁹) and were excluded from the review. Working with Boots, a WREP study [32] explored 15 possible options for a lower weight refill to use with an original primary cosmetics pack when it is empty. Other evidence came from the WRAP retail innovation programme which included two studies on international experience of refills and their applicability to the UK [34, 36] and one study on store based self-dispensing systems [35].

Current situation

The share of refillables in packaging has been in long term decline, replaced by single-use (also known as single-trip or one-way) options. For example, the market share of refillable milk bottles has declined from 94% to 10% (during 1974-2006), for beer containers from 33% to 0.3% (1961-2006) and for soft drinks from 46% to 10% (1980-1989) [36]. Refillables are available in the UK but demand has not taken off among consumers or retailers [32, 36].

Both refillables and self dispensing systems (SDS) are more established in some other countries including the US and the Asia Pacific region, where different consumer cultures (less frequent shopping, more bulk

³⁷ Precise tonnage projections are not feasible because baseline estimates vary between authors, depending on their definition of reuse (e.g. reuse from all bulky waste including council collections; tonnage from reuse organisations only). There are no official waste statistics on reuse; WRAP recently commissioned work to size and characterise reuse to support its work in the sector.

³⁸ See "Packaging optimisation: the impact to date" on the WRAP website for information on retail packaging solutions.

³⁹ Mandatory deposit schemes are covered in detail in other Defra research: WR1203 ERM (2008) for Defra. *Review of Packaging Deposits System for the UK*.

buying) and awareness of environmental benefits play a part [34]. Self dispensing is found mainly in food stores specialising in fresh/organic/health food products⁴⁰.

Barriers and success factors

Authors generally agree on the main barriers to greater take-up of refills (summarised in table 3). A central conundrum is that consumers expect refills to be cheaper than original products; yet being cheaper can also convey a sense that the product is lower quality. Perception also plays an important role with retailers and producers, in particular a perception that retail volumes will be too low to generate acceptable profits. Notably, consumers like the fact that refills confer environmental benefits, but this is not found to be a primary motivation for purchase.

<p>Consumer</p> <ul style="list-style-type: none"> • Expectation that the refill will be (much) cheaper • Lack of significant discount (real or perceived) between original and refill pack • Perception that refills may be lower quality • Making the pack too small makes consumers think they are getting less value, even if quantity is the same as the original • Lack of awareness/worries about availability • Lack of understanding about how refills work • Needing to be organised • Fear about 'lock-in' to particular product • Concerns about hygiene in open access SDS • Lack of branding on self-dispensed goods 	<p>Retailer</p> <ul style="list-style-type: none"> • Shelf-space requirement of stocking original and refill versions of product – UK has greater product proliferation than, e.g., the US • Stock management • Perception of low market volume & impact on profits • Mess & wastage from spillage (SDS) • Possibility of needing staff to support customers in using SDS <p>Producer</p> <ul style="list-style-type: none"> • Worries about cost of either refitting production lines to make refills, or sourcing additional suppliers • Risks to brand image/perception of quality (esp. in relation to scuffing of reused glass; control where refill requires dilution) • Potential loss of product identity & consumer 'lock-in' if container design becomes generic • Perception of low market volume & impact on profits
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Table 3 Barriers to the take-up of refills & self dispensing in the UK

Factors that are found to encourage consumer interest in refills include:

- They are lighter and so more transportable for people without cars
- They take up less room at home (a reason why a bulk buying culture in the US favours refills)
- Consumers are already engaged with a brand; the refill is an extension of the offer
- If the overall consumer offer of original-plus-refill conveys a sense of a quality or a premium product to the consumer
- If they are cheaper (as long as the product still conveys a sense of quality)
- To reduce waste (but very much a secondary motivation after price and perception of quality)

The overall consensus in the literature is that refills need to be presented as a premium product at the same price, or at a lower price, so that consumers believe they are benefitting from switching.

Counter to some of the perceptions identified, the WRAP feasibility studies [34] found that both refills and self dispensing systems can generate cost savings for retailers and consumers. WRAP also suggest the voluntary agreements should be considered as a mechanism for overcoming barriers and for improving consumer messaging on the benefits of SDS. Across WRAP's international case studies, consumer cost savings were 26% on average [34]. SDS is also observed to encourage consumers to buy smaller portions, which could offer potential for reducing food waste.

⁴⁰ Though see also WRAP's current trial of a SDS for laundry products:
http://www.wrap.org.uk/wrap_corporate/news/wrap_retail_trials.html

Potential contribution of refills and self dispensing to waste prevention

There is a significant problem in estimating the potential contribution of refills and SDS to waste prevention at UK level, because impacts and benefits cannot be generalised across products [34, 36]. The case for refillables needs to be assessed on a product by product basis because the LCA benefits are so variable [36]. In particular, less packaging in refills needs to be set against factors such as relative recyclability of primary pack and refills, logistics impacts, and whether the consumer sustains a shift to refills.

Indicative estimates are given in the various studies for individual products or models. In the Defra WREP study [32], for each individual product sold (rather than total tonnage for that product) a weight reduction of 60% - 90% was estimated on the basis of usage over a six month period. When recycling benefits are added, weight reduction would be 77% - 81%. Taking into account assumed sales volumes as well as product weights, the WRAP refills study reported the following indicative impacts on total tonnages of different refill options:

- Glass instant coffee jars supported by soft pack refills: **77,000 tonnes pa**
- Soap pack pump dispensers supported by lidded packs: **4,000 - 7,000 tonnes pa**
(the higher figure being if the refill is a bulk container providing several refills)
- A trigger household cleaner dispenser supported by a capped bottle: **7,500 tonnes pa**
- A soap dispenser supported by pouch refills: **5,000 tonnes pa**
- Deodorant stick dispenser supported by shrink wrap refills: **10,000–11,000 tonnes pa**

The indicative savings for self dispensing systems were rather less. Illustrative examples included a 70 tonne reduction from cornflakes, 26 tonnes from coffee (assuming it replaces jars), and 86 tonnes for detergent cartons.

4.4 Product service systems (PSS)

Coverage of the review

This part of the review focused on one very specific study by Cranfield University (in conjunction with house builder Taylor Woodrow) of a particular application of the concept of product service systems [33]. The general idea of PSS is that consumers purchase some sort of service instead of owning a physical product, thereby reducing the number of goods they own and eventually throw away (e.g. appliances). The specific form of PSS tested was *result orientated PSS* – where the consumer has no contact with the product and simply buys an outcome, for example, clean clothes or a tidy garden. PSS concepts were developed in the study for:

- Home improvement
- Garden maintenance
- House cleaning
- Laundry (clothes & linen)

In the concepts tested, the PSS would be delivered through either a regular subscription or an ad hoc call out. The service would be administered by the housing developer through a call centre for consumers and service contracts with suppliers. The concepts were tested with consumers and staff from the developer in separate workshops, while potential waste and other environmental benefits were estimated quantitatively for different scenarios.

Motivations, barriers and opportunities

Key findings on reactions to the concepts are summarised in table 4.

Consumer	House builder & supplier of service
<p>Motivations</p> <ul style="list-style-type: none"> Buy service to free up time – more attractive to higher income, working households To avoid chores perceived as unpleasant Where residents lack confidence in own competence (e.g. DIY) PSS preferred for home improvement and gardening more than home cleaning or laundry More interest among those still furnishing their new homes than longer term residents 	<p>Opportunities</p> <ul style="list-style-type: none"> Potential revenue & moderate profit stream Added value after-sales service to new residents of housing developments
<p>Barriers</p> <ul style="list-style-type: none"> Enjoying the task being targeted (e.g. gardening) Cost (if time trade-off considered insufficient) Suspicion about competence of service provider Concern about loss of convenience/needing to be at home to receive service 	<p>Barriers</p> <ul style="list-style-type: none"> Concern about lack of competency in service supply which could dilute core profitability Uncertainty about volume of demand – and therefore profit risk Lack of regulatory stimulus (e.g. through planning or environmental regulations) Sacrificing a building plot to house the service centre, which would need to be costed into the business case

Table 4 Key findings on reaction of consumers and service providers to product service system concepts

Consumers were generally interested in the idea of PSS but were reluctant to consume it as a substitute for owning products; they tended instead to prefer PSS as a complement to 'self service' (SS) – that is, being able to do the task themselves when they wanted to, meaning that they would need to own the relevant appliance *as well as* using the PSS. The main condition influencing whether or not consumers liked the idea of PSS was a standard economic trade off between time and money. Those on higher incomes but time constrained were more likely to favour PSS than those on low incomes or retired.

Potential contribution of housing based PSS to waste prevention

The study suggests that product service systems may reduce the amount of WEEE from households on new developments by **13 tonnes over 10 years on a 200 household eco-development**, most of which (8.8 tonnes) comes from washing machines through avoided ownership or smaller appliances⁴¹. Critical to the impact calculations are assumptions about substitution of large appliances for smaller ones which households then keep for longer than usual (15 years as opposed to 7). The assumption here is that consumers hold onto appliances until the end of their operational life, rather than replace them because of aesthetics, fashion or upgrading to the latest technology.

Cooper [45] shows that the latter reasons are, in fact, key drivers of short product lifespan. There are also significant consumer barriers to keeping appliances in working order, including moderate to low interest in repairs [45 & L3 m3/1 (D)] and a systematic tendency to over-estimate the cost of repairs [46].⁴² The Cranfield study's authors also warn that actual consumer behaviour is a substantial unknown, since the models were tested as hypothetical 'what ifs'. They recommend that piloting and monitoring of PSS on new developments would help substantiate their findings, for example on new social housing schemes or in Eco Towns.

⁴¹ Key assumptions are: 100% adoption of PSS; 80% ownership of smaller washing machines & vacuum cleaners; 25% ownership of drills & lawnmowers.

⁴² Product lifespan is not covered in detail in this review, even though it is likely to be of fundamental importance to waste prevention. WR0107 [49] for example, ran a modelling scenario which showed that doubling product lifespan could have a significant impact on household goods arisings (L3 m5/1 (T)). Further sources on product lifespan are signposted in L2 m4/3 & L3 m8/1 (T).

5 Policy measures: *encouraging*

This section provides a summary of the literature on policy measures to encourage waste prevention. It includes measures that:

- already operate in England but where evidence suggests that impact could be greater if implementation mechanisms are modified;
- are in place in other countries but not in England;
- are not in place anywhere in Europe but which one or more studies reviewed suggest might offer benefits as part of a waste prevention portfolio.

The review covers policies which would need to be co-ordinated at national level, and policies where local authorities would need to take a lead in implementation. The selection of policy measures included in the review was shaped by what was found in the evidence base.

Inclusion of a policy measure in this evidence review should not be taken to imply that it has been or will be endorsed by Defra as an option for England. Further, in many cases Government's role is to provide a suite of measures or a 'toolkit' of options, from which local authorities can then select those most suitable for dealing with the challenges they face. Having provided the tools, Defra does not seek to force their take-up by authorities, preferring that they make decisions about what will work for them locally. For example, powers to pilot financial incentives schemes in England were introduced in the Climate Change Act 2008. So far no authorities have chosen to put forward a proposal for a scheme, though the powers remain on the statute book for use if an authority decides that such an approach is right for its own circumstances.

5.1 Coverage of the review

One of the WREP studies by Eunomia et al [46] undertook a large scale strategic review of policy options for waste prevention. The options included in the present review were shaped by that study, as well as the scoping exercise and suggestions from the project steering group. The evidence review focused particularly on policy measures that would impact directly on households or household waste prevention. Broader policy measures (such as the landfill tax escalator, business or schools waste) were excluded. Related modules are:

Level 2 reports	Level 3 reports
L2 m/2 Policy context	L3 m5/1 (T) Future waste growth, modelling & decoupling
L2 m/5 Policy measures – encouraging	L3 m5/2 (D) International review

5.2 Possible policy options and implementation issues

Table 5 below summarises the range of policy options identified in the literature, indicating their rationale, current status in England, and issues flagged in the evidence in relation to maximising the benefit of each measure. The potential quantitative (tonnage) impact of each measure (as reported in the literature) is also shown in the table and discussed in section 5.3.

Overall, the review identified policy measures that either have already been considered by Defra or are already in place in some form in England. Several studies covered by the review (references are provided at the end of table 5) considered the issue of direct charging for household waste and concluded that this policy option offers significant benefits for both recycling and source prevention. International experience (L3 m5/2 (D)) also suggests strong positive prospective benefits from this option. As has already been mentioned, this option is not being pro-actively pursued by Defra, but is included in this

review for the sake of completeness. Once again, its appearance in this document should not be taken as an implication of endorsement by Defra.

The international experience (L3 m5/2 (D)) also suggests that waste prevention is most effectively tackled where a complementary package of measures is in place – including prevention targets, producer responsibility, householder charging, public sector funding for pilot projects, and collaboration between public, private and third sector organisations, and intense public awareness/communications campaigns.

Government funding for campaigns is not traditionally treated as a 'policy measure' but it can be an effective lever for raising the visibility of prevention and encouraging new norms, as demonstrated by the WRAP-led Love Food Hate Waste campaign in the UK which prevented 137,000 tonnes in its first year.⁴³

⁴³ Consumers save £300 million worth of food going to waste (14.01.09), WRAP Press Release, http://www.wrap.org.uk/wrap_corporate/news/consumers_save_300.html . Accessed 19.03.2009

Policy option	Rationale	Current situation/status	Further issues	Potential impact
Household behaviour (through local waste services)				
Waste collection scheme design (e.g. alternate weekly collection (AWC), residual bin sizes, no side waste policy, etc.)	<ul style="list-style-type: none"> Restricting capacity for residual waste while <i>maximising</i> options for recycling encourages households to think about waste prevention as well as recycling 	<ul style="list-style-type: none"> National policy is to allow local authorities to choose system appropriate to their area WRAP guidance on AWC 	<ul style="list-style-type: none"> AWC known to be linked to reduced <i>total HH waste</i> but little evidence of relative contributions of source reduction and recycling More evidence forthcoming in Defra waste growth and composition reviews⁴⁴ 	<p>4-13% reduction in total household waste from recycling and source reduction combined (WRAP estimate)</p> <p>Equivalent to ~0.69 million tonnes</p>
Direct variable householder charging & financial incentives	<ul style="list-style-type: none"> Costs borne by residents are proportionate to how much waste each produces (e.g. like utilities) Charging by 'unit' of waste produced sends direct signal to household to recycle or prevent waste Can reward high recyclers/low waste producing households International evidence shows both recycling & source reduction impact 	<ul style="list-style-type: none"> Provision made in Climate Change Act for 5 local authorities to pilot incentives schemes No applications so far received by deadline 	<ul style="list-style-type: none"> 'Evidence suggests that a regular and convenient recycling service needs to be in place for charging to be effective as a residual waste reduction measure; and that complementary measures may be needed to avoid either simple diversion (e.g. to HWRCs) or fly tipping.' 	<p>1.0 million to 2.5 million tonnes (reduction in LA collected waste based on scenarios – percentage reductions from 2006 Defra study applied to updated 2008 Defra waste statistics for baseline)</p>
Producers & retailers				
Reducing quantities of junk mail*	<ul style="list-style-type: none"> Producer responsibility agreements provide incentive for recycling and promotion of junk mail opt outs Producers can be mandated to contribute to recycling collection costs (e.g. France) Other measures (not in place in England currently) include stronger incentive or enforcement for junk mail opt outs– see col. 3. 	<ul style="list-style-type: none"> Voluntary agreement between government and Direct Mail Association Targets for recycling of direct mail of 70% by 2013 Prevention mechanism through Mailing Preference Service MPS opt out available for many years (15% of HHs registered with MPS) Opt-in (or similar) provision under consideration 	<p>Other options mentioned in the literature:</p> <ul style="list-style-type: none"> Increase postage charge on bulk mail Tax or levy on junk mail Legislative backing of 'no junk mail' stickers, allowing LAs to enforce them Requiring all direct mail to have MPS details 	<p>119 k to 223 k tonnes direct mail could be avoided (scenarios based on package of 'other options')</p>
Extended product warranties*	<ul style="list-style-type: none"> Encourage longer product lifespan of products, reducing need to replace Would be communicated to consumers through product labelling Resulting change in consumer demand would influence production of more durable products 	<ul style="list-style-type: none"> Does not currently exist in Europe 	<ul style="list-style-type: none"> Would need to be implemented at EU level Not suitable for products with high "in-use" environmental impacts (need to be guided by life cycle assessment (LCA) of product) 	<p>Unknown</p>

⁴⁴ Resource Futures for Defra WREP (forthcoming), *Understanding Waste Growth at Local Level* WR0121. See also Resource Futures (forthcoming), *Municipal Waste Composition: A Review of Municipal Waste Component Analyses*.WR0119.

<p>Minimum standards for appliances*</p>	<ul style="list-style-type: none"> Waste/resource impacts included in eco-assessment for product labelling Product labelling informs consumers' choices Encourages producers to 'design out' waste 	<ul style="list-style-type: none"> Various labels in use – including EU Eco-label - but currently not widely recognised or effective at communicating waste/resource impacts & benefits 	<ul style="list-style-type: none"> Best implemented at EU level Could be built into the EU Eco-Label scheme Stricter options would include: <ul style="list-style-type: none"> compulsory labelling for weight & durability mandatory minimum criteria 	<p>Unknown</p>
<p>Mandatory use of rechargeable batteries in new products*</p>	<ul style="list-style-type: none"> Reduce quantities of hazardous waste by increasing length of 'time in use' of batteries Policy option would extend beyond households 	<ul style="list-style-type: none"> EU Batteries Directive comes into force in England in May 2009 Introduces producer responsibility requirements Focus on collection and recycling; no provision made for mandating rechargeable batteries 	<ul style="list-style-type: none"> Need a law requiring the use of rechargeables or law banning use of single-use batteries through EU Batteries Directive implementation Raising targets for battery recycling could encourage prevention as well 	<p>Unknown - market for small household batteries currently 20 k tonnes pa</p>
<p>Other producer responsibility agreements*</p>	<ul style="list-style-type: none"> Producers bear costs of waste disposal of their products which (in theory) encourages waste prevention and recycling Expected to influence product design 	<ul style="list-style-type: none"> Schemes in place at UK level for Packaging and WEEE Proposed upward revisions to WEEE directive targets include specific reference to reuse of whole appliances for first time 	<ul style="list-style-type: none"> Little evidence of strong impact on prevention – compliance mechanisms tend to favour recycling Collection costs currently greater than compliance costs, so LAs bear cost burden 	<p>Potentially significant but not known precisely</p> <p>Indicative potential of 250 k tonnes cited for packaging (based on assumption of 5% 'prevention effect')</p>
<p>Material or sector based voluntary agreements</p>	<ul style="list-style-type: none"> In addition to or complementary to producer responsibility 	<ul style="list-style-type: none"> Various in places in England Direct mail (see above) Courtauld Commitment – major retailers have voluntary target for absolute reduction in packaging waste and help cut HH food waste by 155 k tonnes, both by 2010 Carrier bags – voluntary agreement signed with retailers in 2008 		<p>Achievements:</p> <ul style="list-style-type: none"> 80 k tonnes pa packaging (2008) = zero waste growth 137 k tonnes pa food waste (2008) 23 k tonnes carrier bags since 2006
<p>Collaborative procurement (joint public sector procurement to eco-standards)*</p>	<ul style="list-style-type: none"> Encourages producers to offer most environmentally advantageous products Potentially drives product innovation towards low waste products Limited impact on household waste – spin-off to domestic products unknown 	<ul style="list-style-type: none"> Various initiatives in place in central and local government to 'green procurement' Waste not necessarily priority – benefits need to be set in LCA context 		<p>Unknown</p> <p>Immediate impact on HH waste probably small - but potentially significant impact on product design, including resource use in manufacture & products</p>
<p>Local authority waste management</p>				
<p>Home composting inclusion in LATS*</p>	<ul style="list-style-type: none"> Provides a financial incentive for LAs to promote home composting Decline in residual waste arisings observed where HHs home compost Modelling suggests significant cost savings possible for collection services Current system may divert garden waste into household stream where it is collected free of charge 	<ul style="list-style-type: none"> Not currently included in LATS calculations Authors & stakeholders argue that this non-inclusion gives perverse incentive to LAs to maximise collection of biodegradable waste – rather than promote home composting 	<ul style="list-style-type: none"> Would require change in LATS calculation methods Data issues – modelling work by WRAP under consideration by Defra Spending on promotions and communication required to maximise impact 	<p>1.4 million tonnes pa (projection for 2020 assuming 50% HH participation)</p>

<p>Stimulating re-use of durable goods*</p>	<ul style="list-style-type: none"> Reuse extends product lifespan, reduces waste to landfill & has carbon saving benefits Only ~15% of bulky waste currently reused Most disposed through LA collection channels/HWRCs Reuse rate for bulky goods in LA channels (collection & HWRC) only ~2-3% 	<ul style="list-style-type: none"> No national targets but reuse included in new national performance indicators for LAs Higher targets and inclusion of reuse in WEEE Directive revisions expected to boost reuse sector National guidance on optimising bulky waste collections REconomy programme supporting capacity development of third sector reuse organisations 	<ul style="list-style-type: none"> Data coverage & quality of reuse sector is weak Better integration & strategic planning of LA and third sector services needed Options might include: <ul style="list-style-type: none"> service level agreements with third sector single customer contact point for collection service in each authority 'first call' of reuse organisations on bulky waste financial incentives for reuse organisations No standard LA practice towards payment of reuse credits to third parties 	<p>~500 k tonnes of bulky & textile waste currently reused</p> <p>Optimised reuse rate ~30% of bulky waste arisings (double present level)</p> <p>Indicative scenarios of 215 k tonnes of furniture & 100 k tonnes WEEE (but limited to reuse organisations)</p> <p>30% reuse of <i>all</i> bulky waste would be equivalent to higher tonnage than scenario</p>
<p>Local authority targets for waste prevention* (potentially supported by levy for missed targets)</p>	<ul style="list-style-type: none"> Target for residual waste (reducing over time) encourages LAs to consider all means of reducing waste, including prevention 	<ul style="list-style-type: none"> Targets for residual waste in Waste Strategy 2007 (see section 1) New national indicator for residual waste No specific target for waste prevention (as distinct from residual waste) 	<ul style="list-style-type: none"> Levies for missing targets used in some countries to support progress to target Levy may be used in conjunction with direct householder charging Examples of specific targets in other countries (e.g. Flanders reuse target; Wallonia levy) 	<p>3+ million tonnes (scenario modelling based on Wallonia; depends on configuration of target and/or levy)</p>
<p>Implementation plans for WP *</p>	<ul style="list-style-type: none"> Dutch experience shows it can bring key stakeholders from whole product lifecycle together to draw up strategic plans ('covenants') for particular material streams & lead to reduction 	<ul style="list-style-type: none"> EU Waste Framework Directive requires waste prevention plan – may be opportunity to encourage LAs to draw up WP plans Some activity in UK sustainable product roadmaps – though end of life less prominent than energy/materials in current roadmaps 	<ul style="list-style-type: none"> Requires well facilitated stakeholder processes 	<p>Unknown but potentially significant Impact on HH waste less clear than on commercial waste</p>
<p>Restrictions on landfill</p>	<ul style="list-style-type: none"> Restrictions on particular materials increases treatment costs & encourages waste prevention 	<ul style="list-style-type: none"> Defra considering introduction of further landfill restrictions – research commissioned exploring key experience in other EU countries 		<p>Unknown but potentially significant</p>

Table 5 Summary of evidence reviewed on policy measures for waste prevention

*Indicates measure was included in the Economica et al study [46]

Key sources are [46] and various WRAP reports [23] & press releases. Other references for policy measures are [48-58] & [26]. Also draws on references in section 4. See **L3 m8/2 (D)** for full list of sources

5.3 Potential contribution of policy measures to waste prevention impacts

Confronted by the evidence presented in table 5, policy makers face a number of challenges:

- figures for tonnage impact are based on widely differing methodologies (some are derived from empirical research; some are based on case studies; some are based on modelling)
- some policy options have 'unknown' quantitative impact
- the range of tonnage impacts – from 20k tonnes per annum to 3+ million tonnes per annum – is very wide
- impacts relate to different waste prevention behaviours which, as we saw in chapter 3, are very diverse
- impacts would appear to be in part a function of wider social, institutional and political conditions
- most measurement of impacts has been in terms of tonnage diversion. For policy purposes, one also needs to consider both the carbon and the cost impacts, as well as the qualitative impacts which are not amenable to measurement.

The research team's reflections on these challenges are presented in the final section of this executive report.

6 Monitoring and evaluation

As we have just seen, data on the impact of various waste prevention measures cannot currently be easily assembled into a format that permits straightforward decision-making by policy-makers. If local authorities, Defra and other stakeholders are to make robust decisions, robust and high quality data are required (on tonnage, carbon and cost impacts, as well as information on less tangible qualitative impacts).

The means by which such data and information are secured – through monitoring and evaluation – can be difficult, and are characterised by a number of sensitivities. If policy makers are to further develop their capacity for evidence-based policy making, however, they will need to overcome these difficulties and manage the sensitivities. This section of the executive report presents what has been learned from the review about monitoring and evaluation so as to support such efforts.

6.1 Coverage of the review

The number of robust waste prevention evaluations is currently small [5, 17]. Often, evaluations report on projects targeted at groups of volunteers, rather than general populations. In addition to the general literature, WREP projects provide useful examples of M&E approaches in different contexts [2, 3, 4, 5]. Further detail on the range of approaches, their strengths and weaknesses, the evidence sources reviewed and references can be found in further modules:

Level 2 report	Level 3 reports
L2 m6 Monitoring and evaluation	L3 m3/3 (D) Impacts of public campaigns & interventions
	L3 m6/1 (D) Approaches to monitoring and evaluation

6.2 Approaches to monitoring and evaluation

Household waste prevention is notoriously difficult to measure, the key problems being:

- *We can't see it* – participation cannot be observed visually as it can be with recycling.
- *We can't know if it has happened even if the amount of waste collected falls* – disaggregating prevention from recycling effects is difficult and diversion to other channels is possible (e.g. HWRCs).
- *Even where we can classify changes as waste prevention we can't know whether this is either accidental or maintainable* – if a consumer buys a light-weighted bottle this week they may or may not have intended to – and they may or may not repeat the behaviour the next week.

A variety of different approaches to the measurement problem were identified in the review:

Approach	Context applied
Self-weighing , 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.
Use of collection round data 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.
Control and pilot groups to compare changes so that changes in waste arisings can be accurately measured	To compare performance in an area targeted with an intervention with a comparable area where no intervention happens.
Attitude and behaviour surveys including metrics, interviews and focus groups (<i>outcome focused</i>)	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.
Participation surveys (or participation monitoring) including enquiries to help lines, web statistics, publications disseminated, etc.	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.
Compositional analysis	To understand the impacts of initiative across different waste materials.
Conversion factors, estimates and modelling	Using conversion factors, proxies and ratio model with available detailed figures on consumption and waste generation.
Hybrid approach - a combination of any one or more of the above approaches	Uses a mix of monitoring and evaluation techniques.

Table 6 Monitoring and evaluation methods identified in the evidence review (for references see text in section 6.3)

6.3 Key issues relating to monitoring and evaluation approaches

In the evidence reviewed, there were no generally accepted monitoring and evaluation approaches which could be applied more widely for measuring the impact of consumer waste prevention interventions (see especially [5]); nor was there 'off the shelf' guidance. In the reuse sector, the FRN's 'Standard Weights' is the accepted basis for calculating reuse tonnages: even so, reuse is a good example of a sector where monitoring and evaluation is particularly difficult, and where there is considerable unease with respect to relying too heavily on quantitative (tonnage) measures, as these do not reflect the social and other benefits of reuse activities.

The review uncovered no formal evidence assessing either the scale or the impact of the sensitivities associated with monitoring and evaluation. That these sensitivities are real was confirmed by the engagement with stakeholders: issues associated with how householders feel about being monitored, about media reactions to monitoring and about different political approaches to waste all have the

potential to impact on decisions about monitoring and evaluation. The need for evidence in support of policy development nevertheless remains.

Key insights about the various approaches reviewed were:

- Self-weighing and diary data are widely used as an alternative to waste collection round data, and can be an effective alternative to collection round data [2, 11]. Its use on a larger scale carries risks because it is labour intensive if done properly and data quality can be poor [4].
- The use of weight-based data needs to be complemented by qualitative and survey evidence.
- 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, e.g. tendency to over-estimate waste reduction impacts.
- Short term evaluations provide no indication of sustained behavioural change. However, longer term approaches reveal sustained change can occur.
- Pilot trials and large-scale projects tend to have more rigorous monitoring regimes and as a result tend to have better data.
- Small group (volunteer) approaches where there is drop out from baseline to follow-up surveys can compromise sample sizes and statistical robustness.

6.4 Barriers to progressing monitoring and evaluation

The key monitoring and evaluation barriers discussed in the evidence are [see in particular 3, 4, 5]:

- Lack of funds, lack of staff capacity, lack of skills (including data analysis), non-availability or unsuitability of data, unexpected problems [4, 5];
- 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 [5]. Action research using experimental approaches may be particularly prone to this issue [4];
- 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 factors, e.g. influence of national campaigns [5, 19];
- Use of collection round data is inappropriate for non-geographically based interventions;
- The need for longitudinal data for monitoring and evaluation can pose a problem. One study [5] 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.

6.5 Opportunities for progressing monitoring and evaluation

Various suggestions are made in the evidence base for taking forward activity on monitoring and evaluation, including:

- Investigate the cost implications for each approach to present a 'pick and mix' selection of approaches to operators.
- To consider the development of further waste prevention metrics (beyond WRAP's committed food waste reducer and home composting).
- Further insight could be gained from evaluations on a selection of past projects to see if behavioural change / tonnage reductions have been sustained.
- A clear steer is needed on reporting priorities for carbon, tonnages, volume and cost when it comes to evaluating waste prevention initiatives.
- Explore linking waste prevention on a national level to personal consumption expenditure rather than GDP to allow for measurement of impact on product groups or market activity.

In addition, WRAP is currently revising its monitoring and evaluation guidance which should encourage further movement towards best practice approaches. Guidance is also being provided on how to develop strategic targets for waste prevention via the Waste Prevention Toolkit. 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.

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. A more promising way forward is to ensure that evidence is captured and collated into a common resource as it is generated.

7 Stakeholder engagement feedback

7.1 Scope of the stakeholder engagement

Given Defra's definition of evidence (see section 1), a programme of engagement with stakeholders was specified in the research brief. The purpose of the engagement was primarily to:

- Draw into the evidence base stakeholders' experience of working on waste prevention
- Help to identify gaps in the evidence
- Gauge views on the barriers and opportunities for progressing waste prevention

The engagement programme involved four workshops in London (2), Leeds and Bridgwater, together with two stakeholder surveys, one in the evidence scoping phase and one during the development of the analysis.

In all, 148 stakeholders (practitioner, policy and academic) attended workshops; 106 responded to the Wave 1 survey; and 148 responded to the Wave 2 survey. Further details of the stakeholder engagement are given in modules [L2 m7](#) and [L3 m7/1 \(D\)](#).

This level of engagement compares favourably with the consultation that contributed to England's Waste Strategy 2007, in which 500 organisations submitted responses⁴⁵. Nevertheless, it is inevitable that the findings from an engagement process can only report on the basis of those engaged. The rest of this section, which reports on the findings from the engagement, should be read on that basis. It should also be recalled that the inclusion of or reference to any given policy should not be taken to imply that it has, or will be, endorsed by Defra as an option for England.

7.2 Evidence gaps

Gaps were most frequently highlighted in the areas of waste prevention data, monitoring and evaluation. Stakeholder views of the gaps concurred with the scoping exercise for this review. Stakeholders reported that they need more evidence specifically with respect to:

- **'Hard' (i.e. statistical) data on the impact and/or potential of waste prevention activities** – including impacts of campaigns, relative benefits of different options, central guidance on actions to prioritise, and LCA/carbon benefits for different options.
- **Guidance on accepted methods for measuring waste prevention** – including techniques, standardised benchmarks for measuring performance, and how to deal with issues such as attribution and displacement effects.

⁴⁵ "Review of England's Waste Strategy: A Consultation Document – Summary of Responses to the Consultation", Dialogue by Design for Defra, 2006

- **Campaign messaging and evidence on successful behavioural change levers** – most notably understanding of consumer motivations but also how to target or segment audiences, what messages are effective and lessons from best practice case studies. Recycle Now and Love Food Hate Waste were frequently mentioned as exemplary models, supporting local authorities with thoroughly tested messaging based on expensive research that no single authority could afford.
- **How the configuration of waste services can favour waste prevention** – including robust evidence on the impact of system design on recycling and source prevention (e.g. alternate weekly collection or bin size) and cost benefit analysis of waste prevention versus recycling to help 'make the case' for prevention to local authority councillors (see footnote 16).

7.3 Experience of waste prevention – how to work with consumers

Workshop attendees were asked to list which waste prevention actions they think householders are currently taking, what they think consumers should be encouraged to do and how people could be motivated. These views were further tested in the wave 2 survey, where respondents were asked if they agreed with the prioritisation of actions. Key findings on **current household behaviour** were:

- The most mentioned actions that stakeholders thought households were already doing were using Freecycle, eBay and charity shops, home composting, reusable nappies, avoiding junk mail, food waste and plastic bags.
- Bulky waste reuse and shopping related prevention behaviours were ranked lower.

The top five **priority actions** that workshop attendees thought households **should be** doing were:

- Use re-use facilities
- Develop a better understanding of what needs to be done, particularly the distinction between recycling and waste prevention
- Smart shopping (e.g. avoid special offers) and plan shopping
- Buy less
- Home composting

Renting of e.g. consumables and appliances and reducing food waste followed these top five.

A majority (74%) of survey respondents endorsed the five actions above, re-emphasising the need for general attitudinal and behavioural change, as well as wanting to add food waste and junk mail to the list. Three actions that would need to be taken by other stakeholders rather than households were also flagged as priorities: producer responsibility; government action to enable and encourage prevention; and education campaigns.

7.4 Perceptions of barriers and motivating actions

Key barriers were thought to be:

- Consumer culture, understanding and knowledge
- Lack of retailer partnerships with other stakeholders (e.g. local authorities)
- Weak supply chain incentives (e.g. implementation of producer responsibility)
- The nature of incentives operating on local authorities as a result of waste policy (a feeling that the current system inadvertently favours recycling over prevention)
- Lack of evidence of what works to support decision making
- Lack of feedback to householders on waste performance

Stakeholders think these factors, together, lead to inconsistent messages to households, and make it difficult to define what the priority actions should be at local authority level.

When asked what actions retail, policy or local authority stakeholders could take to motivate action on waste prevention, the top three measures identified by workshop delegates were:

- Better – and more cross-sectoral - information provision to consumers about waste prevention activity and options (from government, retailers and local authorities working together)
- Better promotion and capacity building of the third sector to develop re-use services.
- Householder financial incentives, implemented by local authorities with national support ⁴⁶

Other suggestions made in the workshops related to retail options and design of collection systems (e.g. bin limits). A majority (86%) of survey respondents agreed with these priorities. The biggest area of debate was around incentives; 26 (of 148) respondents thought that incentives should not be a priority. Producer responsibility measures were the main aspect thought to be missing.

8 Evidence gaps and signposts

This section describes the current state of the evidence base on household waste prevention and outlines areas for further evidence gathering, based on the gaps identified in the research and by stakeholders. Supporting modules are:

Level 2 report	Level 3 reports	Level 4 reports
L2 m8 Evidence gaps and signposts	L2 m8/1 (T) Waste prevention evidence map	L4 m/1 Scoping sources
	L2 m8/2 (D) Waste prevention bibliography	L4 m/2 Evidence review summaries

8.1 The evidence base for household waste prevention

Because household waste prevention covers so many different subject areas the evidence is spread very wide and thin across diffuse organisations. This review has been a significant attempt to consolidate important sources (L3 m8/2 (D)) and begin to log international experience (L3 m5/2 9 (D)). WREP and WRAP studies are key sources of information, providing some of the greatest depth and robust insight on waste prevention activities.

WREP studies are important sources on:

- Third sector waste organisations and community sector waste projects
- Consumer motivations (particularly theoretical understanding)
- Consumer interventions – doorstepping and small group approaches
- Approaches to measuring waste prevention behaviour change – both practice reviews and trial of methodologies
- Scope and options for policy measures
- Future lifestyle trends and forecasting waste growth
- Concept testing of refillable packaging and a product service system model
- (and in addition to those included in this review) mandatory deposit systems for returnable packaging, interaction of waste collection arrangements and waste arisings

WRAP reports and guidance are sources of key information on:

- Retail packaging solutions, including refills (the retail innovation programme)
- Consumer attitudinal and behaviour research – from a practical angle (including food waste, home composting, reusable nappies, plastic bags, junk mail and reuse)

⁴⁶ The workshops were held shortly after the closing date for applications to Defra to be a pilot authority for financial incentives. A few comments were made in the workshops that incentives would only work if they were introduced universally across England.

- Technical data and modelling – e.g. on home composting, food waste, reuse⁴⁷
- Monitoring and evaluation
- Practical guidance to local authorities (the waste prevention toolkit)

Research under Defra’s sustainable consumption and production programmes also provides insight on consumer behaviour, in general and for specific topics such as clothing.

8.2 Evidence gaps

Issues around data cut across all aspects of household waste prevention covered in the review. The two key problems with the evidence base on household waste prevention – not only in England but across Europe too – are:

- **Lack of data** – national statistics, or nationally endorsed sources of information, which would help local authorities (and others) identify priorities or understand consumer behaviour, including:
 - Extent of consumer behaviour for different activities (lack of consistent estimates was confirmed in this review)
 - Tracking or longitudinal data
 - Size and character of waste prevention options – e.g. reuse and bulky waste; impacts of collections systems on arisings⁴⁸
 - Benchmarks – e.g. on carbon impacts of different waste prevention activities
- **Poor quality data** - on the impact of campaigns or interventions, including:
 - (Sometimes) unclear reporting of methods and data, assumptions or conversion factors used
 - Impact data derived from small sample sizes

Gaps identified through the literature research and by stakeholders are consolidated in table 7, organised around the principal points of influence framed in the study.

<p>Consumer</p> <ul style="list-style-type: none"> • Which messages work • Motivations for <i>each specific</i> prevention behaviour • Realistic participation rates in prevention, including potential saturation (e.g. home composting) • Impacts of campaigns/consumer intervention • Cost-benefits of dedicated waste prevention officers, and community outreach resource • Whether providing incentives adds value to interventions (e.g. subsidies, prizes etc.) • Spillover or rebound effects – is recycling a block? • Ethnographic observation of in-home behaviour to identify lifestyle levers 	<p>Retail and third sector</p> <ul style="list-style-type: none"> • Consumer engagement with bulky & WEEE reuse (potentially building on the approach in Defra’s sustainable clothing study & product roadmaps) • Comprehensive data on the size and character of bulky waste and the reuse sector (see footnote 16) • Evidence on the impact of producer responsibility on waste prevention, as opposed to recycling • Evidence from retailers working with other stakeholders to prevent household waste
<p>Policy measures</p> <ul style="list-style-type: none"> • Impact data for high level measures – England and international • Methodologies for measuring these impacts (e.g. of extended warranties on product lifespan) • Comprehensive data on the prevention effect of different collection system arrangements, including AWC • Cost benefit assessment of prevention versus recycling 	<p>Monitoring and evaluation</p> <ul style="list-style-type: none"> • Guidance on ‘fit for purpose’ techniques & how to operationalise them • Guidance on measurement issues – e.g. attribution/ displacement • Good practice on survey design • Quality of data analysis & reporting • Use of compositional data tied to attitude/ behaviour surveys • Standard conversion factors (except FRN standard weights for reuse, which are widely accepted) • Standard benchmarks for carbon impacts of different prevention activities

Table 7 Evidence gaps identified in the evidence review and stakeholder engagement

⁴⁷ Currently in progress to inform WRAP’s own work on waste prevention, no publication details available.

⁴⁸ But note that both of these issues are currently being researched by WRAP and WREP respectively.

8.3 Further development of the waste prevention evidence base

Taking these gaps into account, two types of further evidence were identified as being required – technical research (mainly for consideration by Defra and the academic community) and good practice guidance (for consideration by WRAP). These are shown in table 8 below.

Overall, the evidence review has highlighted a general lack of *consistent* or *high quality* data on either practice or impact. The challenge going forward will be to put in place processes that:

- can capture the practice data in 'real time' (rather than retrospectively which has been the case up until now);
- continue to use central resources to develop consumer insight on key activities that can then be disseminated to local authorities;
- will develop a suite of best practice guidance on aspects of waste prevention; and is capable of tracking both consumer and tonnage trends.

Entry point	Possible research options	Possible guidance options
Monitoring & Evaluation	<ol style="list-style-type: none"> 1. Feasibility of using compositional analysis in local campaign evaluation 2. Waste prevention behaviour tracking (Defra EBU survey) 	<ol style="list-style-type: none"> 1. M&E guidance⁴⁹ 2. Standard survey question bank 3. Standard metrics for impact (e.g. LFHW, home composting)
Voluntary action by consumers	<ol style="list-style-type: none"> 1. Consumer research on attitudes/behaviours to different reuse actions (e.g. appliances as part of Defra road map work programme) 2. Modelling – adoption curves for behaviours & saturation limits 3. Centrally co-ordinated consumer research specific to individual behaviours, repeated over time, and disseminated to local authorities 4. Negative spillover from recycling and ways to overcome (small scale qualitative research) 5. Observational/ethnographic in-home study of waste prevention action to identify lifestyle behavior change levers 6. Longitudinal follow-up of selected campaigns, with robust method, to quantify sustained behavior change resulting from interventions 7. Cost-benefit of dedicated waste prevention officers and/or outreach 	<ol style="list-style-type: none"> 1. Best practice guidance on campaign messages, including case studies that have worked 2. WRAP toolkit – plan for continuing dissemination & profile post launch, including training for local authority officers and others
Stakeholders⁵⁰	<ol style="list-style-type: none"> 1. Commitment to continual improvement of data on bulky waste and the reuse economy – WRAP/Defra liaison 2. Case study research of reuse partnerships with local authorities, how they work, model service contracts, impacts, benefits and ways of overcoming barriers (including overseas examples) 3. Case studies of retailer/stakeholder partnerships for reducing household waste, to support best practice guide 	<ol style="list-style-type: none"> 1. Dissemination ‘fact sheets’ on WRAP’s retail programme to help LAs engage the public on waste prevention and counter personal responsibility barrier regarding packaging (see section 2) 2. Best practice guide for LAs on reuse partnerships based on research insights 3. Best practice guide to local authorities on working with retailers to prevent household waste
Policy measures	<ol style="list-style-type: none"> 1. Modelling – relative benefits of recycling and waste prevention, and priorities for waste/costs/carbon, to support local authorities in making the business case for waste prevention 2. Examination of case studies of ‘early adopter’ local authorities of strategic waste plans & prevention targets, identifying factors for success and risks. 3. Modelling & scenario testing extended product warranties; consumer attitudinal research on warranties in context of product lifespan 	<ol style="list-style-type: none"> 1. Continuing update of Best Practice guidance to local authorities on how to develop strategic plans and targets for waste prevention (already part of training support to WRAP toolkit)
Cross cutting	<ol style="list-style-type: none"> 1. Role of financial incentives (<i>NB excluding direct charging</i>) in supporting waste prevention 	

Table 8 Options for addressing evidence gaps for household waste prevention

⁴⁹ WRAP’s WP toolkit and M&E guidance – which include a standard question bank - is in place but will need further development as more methods are used and feedback received.

⁵⁰ Progress by WRAP is underway on several of the research and guidance options listed here.

9 Implications and issues

This final section provides summary answers to the research questions (section 1) then brings together the impact evidence for consumer action, retail and third sector options, and policy measures.

9.1 Answers to the research questions

What is the extent to which waste prevention behaviours are practised?

The evidence revealed many limitations in the data available to answer this question, with some notable exceptions. A significant cause of weakness in the evidence is that no two researchers ask households about the same portfolio of waste prevention behaviours. Unlike recycling, **waste prevention is not one behaviour but many.**

Beyond acceptance of top level definitions (such as the OECD and the Waste Framework Directive) there is no consensus definition in the literature of which specific behaviours make up 'waste prevention'. This may help to explain why statistical models struggle to explain the origins of waste prevention behaviour – they typically leave around 70% of it unexplained. It may be the case that there is too much 'noise' caused by different motivations for different kinds of prevention behaviours in the models, so that they lose explanatory power.

Some authors manage to identify categories of prevention behaviours that seem to be broadly related, such as those that relate to minimising purchase, as opposed to private reuse of products at home. Others argue that each individual behaviour needs to be understood separately. WRAP's work on home composting and on food waste, which show very different origins, underline the case for behaviours to be targeted with bespoke messages.

While there is no consensus definition of a waste prevention behavioural portfolio, and estimates vary on the extent to which different behaviours are practised, studies generally agree that there is a broad hierarchy of action. Donation for reuse tends to be at the top (mainly clothes), running through private reuse behaviours, to avoidance or substitution of purchase at the bottom. Stakeholder views on the hierarchy of consumer practice differed and we speculated that their perception is skewed by their current interests and activities (e.g. in food waste). The danger of practitioners and policy makers relying on 'gut feel' and personal experience to understand consumers was highlighted by this mismatch of perception with the evidence.

What are the barriers and opportunities to encourage participation?

The most significant issue emerging from the evidence is lack of consumer understanding of both the idea of 'waste prevention' and of the actions that might be associated with it. There is, in particular, a general tendency to equate the idea of 'reduce waste' with 'recycling'. Some academic papers suggest that it is only the most environmentally motivated or committed recyclers that undertake prevention behaviour, and there are hints in the evidence that (kerbside) recycling may get in the way of developing prevention habits. So it cannot be assumed that prevention is the next 'natural step' from recycling.

Lack of understanding is compounded by lack of visibility. Waste prevention is usually a very personal behaviour, done imperceptibly (e.g. when shopping) or out of the sight of others (at home), so that there is no descriptive social norm to support it – as there is now with widespread recycling. Equally there is no injunctive norm – the sense that something should be done – because many of the behaviours involve rethinking consumption. Prevailing consumer identity that is achieved through the acquisition of 'stuff' or affiliation with brands was identified as a significant barrier to consumer engagement.

As we saw in section 3, opportunities exist to raise the profile and visibility of prevention, not through general exhortations to “reduce waste”, but by identifying specific activities, helping consumers to be good at them (e.g. through handy tips, doorstepping, community outreach) and educating about the need to do these things. Consumers may not immediately identify such activities as ‘environmental’ and other hooks may need to be found, at least in this early adoption phase. This kind of approach is exemplified in the WRAP-led Love Food Hate Waste campaign, as is the notion of an ‘ethic of care’ - for products, the environment or wider society – which was also flagged as a motivation in the literature.

What are the options available to householders?

A variety of methods and tools was identified in the literature to engage households in waste prevention behaviour. None of them is radically different from the approaches used to increase recycling participation, for example, doorstep campaigns, or community outreach. Common themes included the need to provide specific tips on how to do waste prevention, and activities that break into routine habits to increase the visibility of waste prevention.

It was possible to identify a small number of interventions where waste impacts had been measured, though significant data limitations were identified that make it difficult to produce a robust overall estimate of the impact of campaigns. Drawing on the data, our best judgement is that campaigns which target a mix of behaviours can achieve around **0.5kg to 1kg/hh/wk reduction**. These can only be indicative estimates at this stage and much more substantial evidence is required.

Of separate measures, the highest impacts are observed from home composting (where the data are the most reliable) and food waste.

What are the options for stakeholders?

Under this heading, the review looked mainly at reuse in general and the role of the third sector within it specifically, as well as retail solutions which require active involvement of consumers – notably refills and self-dispensing product systems. Passive solutions, such as light-weighting of packaging materials and or mandatory deposit return schemes were excluded.

In total, current reuse in the UK amounts to around 500,000 tonnes per annum, of which around half is textiles. Once again, the data is weak, needing to be pieced together from diverse sources. In addition to the above, is a commercial second hand market of unknown size, which is important because its channels compete for supply with local authority and third sector options. Freecycle is a new phenomenon which is growing fast but currently of unknown impact.

Higher reuse rates are achieved through third sector channels – around 65% to 80% depending on material, compared to 2-3% for bulky waste channelled through local authority collections and HWRCs. Third sector channels appear able to collect materials of a higher quality, thus enabling the high re-use rate, whereas LA collections and HWRCs are often collecting bulky waste of very low quality.

Authors agree that there is significant scope to increase the scale of reuse activity in the UK, though estimates of the tonnage potential vary – perhaps up to double the present level would be feasible. The evidence points to significant social benefits too from third sector operators, though researchers have found it very difficult to measure this benefit as a return to public investment.

Forthcoming revisions to the WEEE Directive are expected to boost the reuse economy. There is a consensus in the literature and from stakeholders that in order to optimise the role of reuse in waste strategy more needs to be done to create an integrated reuse system, which involves enhancing the following linkages and building good working relationships between reuse stakeholders:

- *Between waste and social services in local authorities, and between housing departments, housing associations and ALMOs⁵¹* - to join up supply and demand sides for reused furniture and appliances;
- *Between local authorities and the third sector* - through service agreements and consistent approaches to the payment of reuse credits; and
- *Between the service infrastructure and consumers/households* - by supporting campaigns and services that increase the visibility of reuse options, and working to undermine the stigma associated with second hand goods.

There are useful international examples of a more retail-focused second hand culture, and more integrated reuse networks between local authorities and the third sector. Flanders is an exemplar of a strategic level, integrated policy package for reuse, including per capita targets and favourable treatment on product taxes and employment subsidies (L2 m4/1 & L3 m5/1 (T)).

In relation to retail solutions, the principal barriers relate to consumer price sensitivity and no real price advantage. Consumers like the environmental benefits but these are not a primary motivation for purchase. Barriers for manufacturers and retailers relate to a perception of low profitability, stock management issues, and possible costs of refitting manufacturing lines. The main role that Defra can play here is in supporting WRAP and its retail innovation programme; and WRAP through the Courtauld Commitment. Influencing design standards was also hinted at in the literature, as was a possibility to influence consumer behaviour through carbon or eco-labelling. This evidence review did not include mandatory options – such as deposit-return schemes – which is covered in other Defra research⁵².

What are the infrastructure considerations and technical solutions?

There is much less opportunity to influence waste prevention through infrastructure than there was recycling in the early days of adoption. The main scope is to influence the service infrastructure that supports householder action for targeted prevention activities – such as home composting, bulky waste, purchasing, and food. The Courtauld Commitment is a key instrument here, especially if its remit can be widened beyond reduction of packaging in supply chains, as is being done with food waste. Other options include encouraging formal partnerships between local authorities and third sector reuse organisations; and supporting local authorities to partner with retailers to engage households, perhaps by demonstrating feasibility through best practice case studies.

What is the impact of different policy options and measures on waste prevention?

The objective set by Waste Strategy 2007 is to reduce residual waste from households to 12.2 million tonnes by 2020. To achieve this, the rate of decline of residual waste that has been seen since 2000 will need to be maintained.

It is beyond the scope of the present review to consider the mix of recycling, composting and prevention that could most effectively and cost effectively achieve this target. It does seem likely, however, that prevention will need to play a larger role over the next decade than it has in the past decade.

The various policy options that have been investigated in the literature covered by this review – ranging from measures such as collaborative procurement strategies, through programmes to stimulate re-use, to charging and incentive schemes – vary considerably both in terms of the scale of their potential impact, and in the degree of confidence that can be ascribed to calculations of impact. Different behaviours, different methodologies and different institutional arrangements combine to make comparison between options exceptionally difficult.

⁵¹ ALMO – Arms Length Management Organisation

⁵² WR1203 ERM (2008) for Defra. *Review of Packaging Deposits System for the UK*.

Nevertheless, the material presented in section 5 showed that five options emerge from the literature we have studied as having the potential to reduce household waste by more than half a million tonnes per year: waste collection scheme design; direct variable charging & incentives; the inclusion of home composting within LATS; increasing the re-use of durable goods; and local authority targets for waste prevention.

As we have stressed, this list of policies is no way signifies endorsement by Defra; it merely highlights the waste prevention options that, according to the literature reviewed, have the potential for the highest impact on tonnages.

9.2 Relative impacts of waste prevention options

Table 9, below, draws together all the quantitative tonnage information identified in the review on actual or potential impact of waste preventions options. It is important to bear in mind the many and various limitations with the data presented below, even though it is derived from the most robust sources found. Most of the illustrative totals involve some significant assumptions (e.g. grossing up to England level from a single local campaign). **These figures should be seen as best estimates which illustrate relative orders of magnitude, rather than definitive statements of potential.** (Note also that each measure is assessed in isolation: no attempt is made to measure any results that might arise from combinations of measures; note, too, that the impact of some initiatives is a function of the level of resources devoted to them.)

Actual achieved (latest year) – million tonnes/yr			
Love Food Hate Waste 2008 (a)	0.14	Courtauld – packaging 2008 (a)	0.08
Bulky & textiles reuse 2007 (e) (NB ests. suggest percentage of bulky reused could ~ double in future)	0.50	Carrier bags avoidance 2008 (a)	0.02
Projection or scenario – million tonnes/yr			
Home composting by 2020 (p) (included in LATS)	1.40	General household campaigns (p)	0.56 to 1.12
Love Food Hate Waste (p) (Courtauld by 2010)	0.16	Love Food Hate Waste (p) (total household food waste inc. above)	0.25
Junk mail – low (p)	0.12	Junk mail – high (p)	0.22
Reuse – furniture scenario (p)	0.22	Reuse – WEEE scenario (p)	0.10
Refill – e.g. glass coffee jars (p)	0.08	Refill – e.g. deo stick (p)	0.01
Deepen producer responsibility (p)	0.25	Mandatory rechargeable batteries (p) (if all single use substituted)	0.02
		Self dispensing – e.g. cornflakes (p)	70 tonnes
AWC - 4% to residual HH waste (p)	0.69	LA targets & residual levy (p)	3.00 (min)
Charging – 4% to total HH waste (p)	1.01	Charging – 10% to total HH waste (p)	2.52

Table 9 Illustrative potentials of waste prevention options for England

a = actual achieved p = future projection, or scenario scaling up best practice e = estimate. See [L2 m5](#) for sources and basis of assumptions

The figures seem to suggest that the largest voluntary gains could come from home composting and local cross-cutting waste prevention campaigns (though there is likely to be double-counting here, as local campaigns normally include home composting promotion: and, as WRAP point out that, although there

are benefits in a local authority implementing multiple (cross-cutting) activities over the course of a year or more, it may not be appropriate to promote these all under one campaign - advice should be sought on the best approach to the communications required to support such campaigns, e.g. to avoid too many messages and to make it clear what people are being asked to do). The other significant options are all top-down policy measures, though as explained earlier it is not possible even to make rough estimates of some of the more interesting options – such as extended product warranties – with current data.

In addition to pure tonnage gains, authors suggest there are potential 'quick wins' in options such as junk mail and carrier bag reduction (supported by voluntary agreements) that are popular with the public and relatively straightforward to implement. However, since their quantitative waste prevention impacts may not be that great (e.g. with bags) it will be important to leverage any 'foot in the door' effects of such initiatives in order to educate the public on the bigger impact activities. This will be especially so in local campaigns.

The international experience also suggests that the most effective and most frequently applied waste prevention policy measures come in a package including:

- waste prevention targets;
- producer responsibility;
- variable rate charging (pay as you throw) systems for householders' residual waste;
- intense public awareness/communications campaigns (long-term with deeper links to consumerism and short-term with emblematic targets);
- public sector funding pilot projects; and
- collaboration between public, private and third sector organisations.

The need for a 'package' approach, or a 'basket of measures', is linked to and reinforced by the fact that waste prevention is not one behaviour, but many. Tackling these complex and disaggregated behaviours will require similarly subtle and variegated policy.

10 Annex 1: Report module navigation

Reporting for WR1204 has been organised into modules that allow for the evidence to be accessed at different levels of detail, and different packages, depending on the interests of the reader. The modular structure is as follows:

Level 1 <i>executive</i>	<ul style="list-style-type: none"> • L1 m0 Executive summary • L1 m1 Executive report
Level 2 <i>synthesis</i>	<ul style="list-style-type: none"> • Technical report • Chapters of report available separately as synthesis papers under main headings covered in L1 m1 Executive report
Level 3 <i>briefs</i>	<ul style="list-style-type: none"> • Level 3(T): short (5-8pg) self contained briefs on key <i>topics</i> flagged at L1 & L2 • Level 3 (D): longer briefing papers providing <i>detailed material</i> that supports L2 & L1 modules
Level 4 <i>evidence base</i>	<ul style="list-style-type: none"> • Scoping database – signposts to ~800 sources • Evidence review spreadsheet – summary notes from all sources reviewed

The table overleaf lists the different modules and their titles. In addition to those shown in the table below are the two Level 4 modules which contain the evidence sources reviewed: the scoping database of all sources found; an evidence review database containing written summaries for sources reviewed in depth.

WR1204 Modular reporting map

Level 1 modules - Overarching reports			
L1 m0	Executive summary	L1 m1	Executive report
Level 2 modules		Level 3 modules	
L2 m1	Technical report (single document) <i>Individual chapters are basis of all L2 modules below & it links to all L3 modules</i>	L3 m1 (D)	Approach & method of the review
L2 m2	Policy context <i>links to L2 m5 'policy measures' below</i>	<i>links to L3 m5 modules below</i>	
L2 m3	Consumers - engaging	L3 m3/1 (D)	Extent to which WP behaviours are practised
		L3 m3/2 (D)	Motivations & barriers
		L3 m3/3 (D)	Impact & delivery of household waste prevention intervention campaigns (at the local level)
		L3 m3/4 (T)	Attitudes & behaviour – food waste
		L3 m3/5 (T)	Attitudes & behaviour – home composting
		L3 m3/6 (T)	Attitudes & behaviour – reuse
		L3 m3/7 (T)	Attitudes & behaviour – everyday actions around the home
		L3 m3/8 (T)	Consumer segmentation
		L3 m3/9 (T)	Small group approaches to behaviour change
L2 m4/1	Reuse & the third sector	<i>links to L3 m3/6 (T)</i>	
L2 m4/2	Retail solutions – refillables & self dispensing systems		
L2 m4/3	Product service systems		
L2 m5	Policy measures	L3 m5/1 (T)	Future waste growth, modelling & decoupling
		L3 m5/2 (D)	International review
L2 m6	Monitoring & evaluation	L3 m6/1 (D) <i>links also to L3 m3/3 (D)</i>	Approaches to monitoring & evaluation
L2 m7	Stakeholder engagement feedback	L3 m7/1 (D)	Stakeholder views on waste prevention
		L3 m7/2 (T)	Future scope for a waste prevention network
L2 m8	Evidence gaps & signposts	L3 m8/1 (T)	Waste prevention evidence map
		L3 m8/2 (D)	Waste prevention bibliography

11 Annex 2: Bibliography

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