

Barriers to recycling: A review of evidence since 2008



A summary of evidence since WRAP's Barriers to recycling at home research was published in 2008. The review identifies recent insights on the most prevalent barriers and highlights new themes now emerging.

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Front cover photography: [At home, putting used plastic milk bottle into plastics kerbside recycling bin.]

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Executive summary

In 2008 WRAP published a report on the barriers to recycling at home. The 2008 report set out a structured, four-part framework for analysing and interpreting the barriers to recycling at home, and developing communications to address them.

Since 2008 the recycling environment has developed rapidly in the UK. Recycling rates have improved, the kerbside recycling infrastructure and reprocessing technologies have evolved, the quality of recyclate is becoming more important, and the UK's socio-demographic environment is changing. In the light of these changes, WRAP has commissioned a further review of research evidence, in order to update and improve the evidence on barriers to recycling in the period 2008-13. The aim is to identify the extent to which the barriers to recycling have changed since WRAP's 2008 research, and to synthesise current knowledge of the principal barriers and the implications for overcoming them.

This report presents the findings from this evidence review. Academic, practitioner and grey literature sources have been searched and the evidence systematically brought together within this synthesis report. The report sets out:

- the background to the work, and how the review was conducted;
- the main changes and developments in knowledge about barriers since 2008; and
- the synthesised knowledge set out against the key lines of enquiry specified by WRAP for this study.

In summary, the review has re-validated the four principal classes of barrier first set out in 2008. These are still the main types of barrier in 2014:

- Situational barriers, including inadequate containers, lack of space, unreliable collections, no access to bring sites.
- Behavioural barriers, including household disorganisation, too busy with other things, no established household routine and forgetting to sort waste or put it out.
- Knowledge barriers, such as not knowing what to put in each container, and understanding the basic mechanics of how the scheme works.
- Attitude barriers, such as not believing there is an environmental benefit, viewing it as the council's job not theirs, and not getting personal reward or recognition for their efforts.

However, the review of evidence has also identified some important conceptual developments and refinements to the earlier model:

Key Change 1. The barriers framework is **conditional** – i.e. the four principal barrier categories are very often mutually interdependent and so should be approached in an integrated, context-specific way.

Key Change 2. The situational category used in the 2008 Model should be sub-divided into **property type** and **system** (the operational method for segregation, and the specification of accepted materials).

Key Change 3. The 2008 WRAP Barriers Model works well for kerbside collections but less well for **flats**, where a very different and situation-specific adaptation of the model is required.

Key Change 4. The ability of households to learn the effective behaviours is constrained by **continuing change** – to the systems and requirements; and through population mobility.

Key Change 5. The **private rented sector** is the single form of tenure that is expanding in the UK, but there are challenges to encouraging effective recycling behaviour within this tenure group.

Key Change 6. Recycling behaviour involves developing better concepts for understanding and influencing **collective household behaviour**, rather than individual behaviour.

Key Change 7. The notion is emerging of recycling '**effectively**'; the barriers that prevent effective recycling lead to people either 'putting out materials that are not intended to be collected locally for recycling' (which affects quality) or 'not recycling all the materials they can'.

Key Change 8. The collection of new materials / items since 2008, in particular food, generates barriers that are **specific to the material** (showing that reliance on a generic all-material barriers model is not always appropriate); plastics are a further specific case.

Key Change 9. The persuasive influence of local authority messages and communications is enhanced by the existence of a **strong and trusted relationship** between people and their neighbourhood, and with their local council.

Key Change 10. It has become more apparent since 2008 that recycling has largely now become a '**social norm**', and this together with the associated routine collection 'rhythm' is an important factor in leading people to recycle effectively.

Along with these 10 new developments, the review has synthesised current knowledge in terms of a range of themes that relate to effective recycling behaviour, summarised below.

Theme 1. Improving the effectiveness of recycling behaviours

In 2008 the emphasis was 'recycle more things more often'; the paradigm has now shifted towards helping people to make the most effective use of their recycling services.

- Effective recycling behaviour means increasing participation and capture, but also improving the quality of recycle streams by discouraging contamination. In other words, effective recycling means people consistently placing all the materials they are able to recycle in their appropriate recycling containers, and not putting out items that are not intended to be collected locally for recycling.
- This is the new paradigm, centred on 'effective recycling for quality recycle'. It has been used to underpin the revised approach to understanding the most prevalent current barriers to effective recycling, as highlighted in this report. Evidence shows most current recyclers could still improve their recycling behaviour.

Through less effective behaviour, recyclers can undermine the quality of the recycle stream in four main ways:

- Inclusion of items or 'contraries' in the recycling container that are not collected locally for recycling (households presenting non-targeted, but recyclable items, in their recycle; recyclables collected by the council, but put in the wrong container or the inclusion of non-recyclable material);
- Presence of contamination on the recyclables e.g. by not rinsing or emptying food containers before recycling;
- Presence of inappropriate (contaminating) materials within the recycled items, for instance inclusion of items consisting of unacceptable composite materials e.g. foil-lined cardboard, waxed paper; and
- Externally derived contamination (passers-by throwing non-targeted materials into recycling containers or, more significantly, contamination of open communal containers with general litter and bulky items).

Theme 2. Plastics

Plastic has become the material stream that has in recent years generated the greatest problems in people knowing exactly which items are recyclable, resulting in a degree of public confusion, and consequently less effective behaviour, and potential contamination of the feedstock supplied to reprocessors if this is not removed at the sorting stage. The evidence review has shown that there are four main types of barrier associated with plastics recycling:

- poor understanding / confusion about the types of plastic targeted and acceptable to a particular collection scheme;
- poor separation behaviour; for instance not removing film from otherwise recyclable pots, tubs and trays;
- low awareness of plastics that can be recycled from non-packaging sources; and
- attitudes to rinsing and hygiene, and the contaminating presence of food on plastic packaging.

Theme 3. Food

As with plastics, separate food waste collections are expanding in the UK, and the evidence review has shown food also to be a material associated with specific barriers to effective recycling behaviour.

- People do not always understand what is done with the food waste, why it is worth recycling it, and what types of food waste are wanted in the collection system. While plate scrapings and food preparation peelings/offcuts are commonly understood to be food waste, there is a much greater barrier in the public recognising unopened (out-of-date) packaged or half-eaten food products as food waste.
- People also do not recognise non-edible items such as tea bags, coffee grounds and eggshells as food waste.

Common misconceptions and attitudinal barriers can often deter participation in food waste collection schemes:

- concerns about smells and hygiene, especially if caddies are stored near the food preparation area;
- concerns about vermin, flies and cross-contamination of fresh food; and
- people finding the contents of the food waste caddy unpleasant.

Theme 4. Effect of property type, specifically kerbside frontage properties and flats

For kerbside collections the current evidence review shows the main barriers being much as they were in 2008:

- terraced properties fronting directly onto the pavement, where householders are unable to store boxes or bins, and have to take boxes and bins through sitting rooms where the front door leads directly onto the street; and
- properties, especially prevalent in northern towns, where there are rear collections from alleys and access routes that are hard to access by collection vehicles, so requiring the containers to be taken some distance to pick-up; this means mud and dirt get onto the collection boxes or bins, putting off tidy householders from using these services.

Approaching a quarter of all household properties in the UK can be described as 'flats' and these properties are often associated with poor recycling performance; capture is low and contamination can be high. The review has highlighted the complex and highly interlinked array of barriers that come to create these problems. It shows that the term 'flats' covers a massive variation in physical and social settings, and a comprehensive 12-category typology is proposed in the report, to allow these distinctions to be made and to help develop customised solutions to the different types of barriers involved.

Theme 5. Evaluation and impact of service changes and behaviour change communications

A body of evidence is accumulating on the impact of service changes on recycling behaviour, and the impact of behaviour change communications. There are limitations to the quality of the evidence identified and the conclusiveness of findings, and WRAP is now seeking to explore this area in further detail.

- However, authorities are sometimes reinventing the wheel due to a lack of awareness of the evidence from equivalent studies elsewhere; there is scope for an improved system to capture and use collective learning.

Theme 6. Social and geo-demographic segmentation of the population

Recycling behaviour and associated barriers to recycling effectively have been known to vary by socio-demography for a long time and this was built into the 2008 WRAP Barriers Model.

- The present review confirms the persistence of this connection. Recycling behaviour and the barriers to recycling effectively can vary across the social spectrum covering age, ethnicity, social grade, tenure and affluence. Communication messages make most impact when geared to the types and segments of people they are trying to reach.
- Evidence also suggests there may be benefits to targeting through socio-geodemographic segmentation tools, such as CACI's ACORN and Experian's MOSAIC classification systems.

Theme 7. The role of household dynamics and in-home division of labour in the 'work' of recycling

This final line of investigation reflects the growing recognition of the limits to the individualised social psychological models for behaviour change when applied to the collective household activity of recycling.

- The household, not the individual, is the basic behavioural unit, but more needs to be known about the recycling behaviour of all the different people within the home if we are to get better at helping households make the changes that will result in effective recycling behaviours.
- More (qualitative) research is needed in this area to get a better understanding of how behaviour change interventions could best influence the collective setting of people within a household, and taking account of the way household chores and the domestic routines are divided up amongst household members.

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1.0 Introduction

1.1 Overview of the project

In 2007 WRAP (Waste and Resources Action Programme) commissioned M·E·L Research to undertake a study: "*Barriers to Recycling at Home*"¹. The research outputs from this work were published in 2008 in the form of a conceptual framework together with a package of associated actions aimed at overcoming the barriers, described in this report as the 2008 WRAP Barriers Model. The model has been widely used by WRAP and its partners in developing services and communications to overcome these barriers. In 2013 M·E·L Research was commissioned to update this work by reviewing relevant research evidence generated since 2008, taking account of the impact during that five-year period of improved services, changes in social norms and the economic climate, and an increasing focus within the wastes and resources management sector on the quality as well as quantity of recyclate.

The aim of this work was to identify, collect, synthesise and interpret the available evidence published or otherwise available since 2008 on the main barriers to recycling in a manner that optimises yield and quality. This is to assist WRAP and its partners in maximising the effectiveness of household recycling initiatives, and to help shape the messages that can overcome the barriers to effective recycling. The literature review methodology followed the most systematic and scientifically rigorous approach achievable given the limited academic nature of much available evidence.

1.2 Scope and definition of the brief

The scope of the evidence review was to include literature across all academic disciplines, and to encompass both published academic papers and other reports, together with non-refereed or unpublished articles (known as grey literature, as explained in section 1.3).

There has been an important change, in effect a paradigm shift, in the framing question which WRAP has used to establish the boundaries and requirements of the latest review. The most recent framing question was to establish the "evidence on households' barriers to recycling *effectively*". By introducing the term 'effectively', WRAP has acknowledged that there are ways in which it is desirable for the public to go about recycling in order for maximum quality and value to be gained from the recyclate. The earlier concept of people reaching the state of the 'complete' recycler is replaced by that of the 'effective' recycler who uses the service correctly, i.e. in line with the design requirements.

The emergence of the requirement for 'effective' recycling reflects the growing importance of quality for recycling / reprocessing technologies and in the end use markets. To improve the quality of recyclate, the systems need to be used effectively, i.e. in line with the operational specifications of the recycling collection service. Quality is reflected in the price paid for recyclate and there is a premium to be gained economically from households recycling effectively. Behaviours that lead to unwanted materials being captured in the recycling collection scheme can in effect 'contaminate' the feedstock and result in extra sorting required by collectors and MRF or reprocessing operators or/and rejection and disposal of lower quality recyclate. In the literature it is common for these problems to be termed 'incorrect' recycling and 'contamination', so for this reason these terms were used to search for evidence on these issues. Contamination is a generic term used widely in the waste management industry but has a variety of meanings reflected in the literature and therefore picked up in this review.

The specific range of issues or variables that WRAP required to be covered included:

- recycling locations for household waste, including kerbside services, Household Waste Recycling Centres (HWRCs) and bring banks;
- recycling of specific materials, including food waste;
- property type, specifically houses and flats;

¹ WRAP/M-E-L Research, 2008.

- the impact of service changes in relation to recycling collections;
- the impact of communications campaigns in relation to participation, capture or recycle quality;
- socio or geo-demography, or segmentation and its role or influence in relation to participation, capture or contamination that reduces recycle quality;
- the role of household dynamics, division of labour and non-respondents in relation to household recycling; and
- contamination as a factor affecting the quality of recycle.

1.3 Summary of the approach to the review methodology

Over the past 20 years there has been an increasing emphasis on developing evidence-based public policy. In this context systematic methodologies for the review of evidence have been developed in areas of public policy such as health and social care, led by academically driven evidence compiled through agencies such as NICE, but these are not yet matched in the environmental field.

The most academically rigorous approach to synthesising evidence is through the established techniques and protocols for undertaking what is known as 'systematic review'. From an academic perspective, this review of evidence on the barriers to recycling is not strictly a 'systematic review' as too little evidence exists to pass the prescribed criteria; rather, it is a systematic literature search-undertaken to identify papers from academic journals, together with unpublished evidence from sources less academically rigorous in their approach, for example local authorities, the commercial and the third sector – sources known as grey literature. The term for the work used through the remainder of this report, is that of an 'evidence review'.

The substantive evidence review itself has been undertaken through a descriptive and critical approach, highlighting inconsistencies and gaps in the evidence. Emphasis is placed on relevant methodological issues within the studies because, in the evidence based paradigm, that often helps explain the results. While not strictly an academic systematic review, the evidence review does represent a systematic and scientific approach in that:

- there is a formal methodology, which ensures transparency and academic rigour;
- there is an audit trail which can be replicated by others;
- the selection of documents is not biased, any exclusion was based purely on relevance; and
- contrary or conflicting views have not been excluded.

In addition, it is not an academic systematic review in that no quality assessment has been applied, because to do so would exclude consideration of all the raw data and PowerPoint presentations which have formed a useful and extensive part of the overall source material.

Based on the evidence reviewed, a broad synthesis of the current evidence has been compiled, split into:

- developments and innovations new and emerging since 2008; and
- an overview of the main barriers and ways these have been addressed since 2008.

1.4 Structure of the report

Section 2 describes the systematic approach taken to the review of evidence, setting out the scope and exclusions for selection of the evidence, the method of review, and the approach towards the synthesis. Section 3 summarises the background to the original 2008 WRAP Barriers Model as reported in the study "Barriers to Recycling at Home", and the changes since then in recycling practices and recycling performance across the UK.

Sections 4 and 5 present the main synthesis of the evidence considered in this review. Ten key dimensions of change identified from the evidence since 2008 are reported in section 4. In section 5 the principal overall findings in relation to the main lines of enquiry set out by WRAP are reported. Finally in Section 6 there is a summary of the practical implications for local authorities and their partners, as well as for other organisations communicating to consumers about recycling, on ways of addressing the barriers.

2.0 Systematic methodology for the review

This section of the report describes the systematic methodology used in the review.

2.1 Definition of systematic review

The established academic methodology for a systematic literature review provides a systematic and transparent means for gathering, appraising and synthesising the findings of studies on a particular topic or question. It is promoted as best practice in many fields of research. It has a recognised prescribed formula, consisting of seven key steps²:

1. Aim – a tightly specified aim and objectives with a specific review question.
2. Scope – narrow focus.
3. Plan the review – a transparent process and documented audit trail.
4. Identify studies – rigorous and comprehensive search for all studies.
5. Selection of studies – predetermined criteria for including and excluding studies.
6. Quality assessment.
7. Analysis and synthesis.

The aim of this formal methodology is to be as objective as possible so that there is less likelihood of a biased selection of material, of 'cherry picking' documents which might fit into a pre-determined expectation or outcome. The process can be replicated by another researcher, but the interpretation, analysis and synthesis is of course unique to the authors. Section 2.2 below shows how this recycling barriers evidence review was undertaken using as close an approximation to the formal systematic review methodology as possible, but constrained by the nature of much of the relevant evidence.

2.2 Summary of method for the current evidence review

2.2.1 Time scale

The initial scoping phase of the review was carried out during March and April 2013. This allowed WRAP to make early decisions about its recycling research priorities for 2013/14. This was then followed by a second phase in which a broader synthesis of the material was carried out, together with a second trawl to ensure all contemporary studies were identified and included in the evidence review. This second phase also included a re-focus to concentrate on the explicit notion of 'effective' behaviours, and was carried out between October 2013 and January 2014.

2.2.2 Core review questions

The systematic process began with a search of all potential sources of relevant accessible knowledge published since 2008 covering three core review questions which summarised the brief:

- What do we know about current barriers to household recycling?
- What do we know about recycling behaviours in relation to specific materials, including food?
- What have we learned about behaviour change campaigns, and segmentation?

2.2.3 Search strategy

In a systematic search approach as undertaken here, the parameters are decided before starting the search, and amended appropriately if necessary. The search covered both academic and grey literature.

A Google Scholar search was carried out to identify academic literature, plus a scanning of the main academic journals which publish papers on recycling such as *Resources and Conservation and Recycling*. Internet websites such as *Wastenet*, *WRAP* and *Defra*, were

² Jesson et al, 2011

scanned. All citation lists were followed up, leading to the inclusion of additional relevant publications.

In March 2013 an email request was sent out to over 1,000 local authority waste contacts on the M-E-L Research municipal waste contacts email database, inviting them to send in any relevant reports on barriers to recycling that they had produced since 2008. Other commercial and voluntary sector sources and personal contacts were also followed up by email.

In October 2013 WRAP then emailed the 2,609 members on its self-registered newsletter database, again inviting people to send in their research findings. This list contained contacts in local authority municipal waste and recycling departments, and other partners.

Over 400 delegates attending the Local Authority Recycling Advisory Committee (LARAC) Annual Conference in October 2013 were invited by WRAP, if they had not already done so, to send in evidence, reports or findings from their own recycling behaviour research. The subsequent conference report also repeated this call.

In November 2013 telephone interviews were held between consultants from M-E-L Research and Recycling Advisors and other technical staff employed by WRAP in England and Northern Ireland, by Waste Awareness Wales and by Zero Waste Scotland. These were carried out to clarify other sources of knowledge known locally by these professionals, and extract further research evidence where not already identified.

The inclusion and exclusion criteria for all items of research evidence identified through this search were as follows.

Inclusion criteria

- dates: 2008-13;
- scope: as defined by WRAP; and
- range/language: English language, UK, [Europe, USA, Australia].

Exclusion criteria

- date: pre 2008;
- scope: not prevention or reduction or reuse;
- sectors: not industry, commercial, construction, trade; and
- sources: not weekly and monthly waste news media.

Key inclusion words:

The key words used in the search and screening process are listed below, these included terms known to be used in the sector:

- household waste recycling;
- barriers and /or constraints and recycling;
- marketing and /or social marketing and recycling; communication and recycling;
- attitudes and /or motivation and/or participation recycling;
- behaviour and /or behavioural change and recycling;
- recycling and kerbside /HWRCs (household waste recycling centres) bring banks;
- contamination /incorrect 3/ contrary recycling behaviour;
- specific materials: food, paper, plastic, electrical goods, batteries, metal, cans aluminium, garden waste;
- containers: bins, boxes, bags (food containers); and

³ The terms 'contamination' and 'incorrect' recycling were used in the search as these reflect key factors determining the effectiveness of a recycling scheme and the quality of the recyclate – and are therefore central to the new paradigm of identifying barriers to effective recycling, as set out in the definitions for this project in Section 1.2.

- any combination of the above.

2.2.4 Quality Assessment

In systematic methodology there is a hierarchy of evidence, based on concepts of validity, reliability and replicability of the methodology and findings. In this review all relevant documents have been considered as evidence for inclusion.

2.2.5 Review process

Following the systematic process, once a possible resource has been identified and accessed, the paper (not just the abstract or Executive Summary) is skim read to confirm whether the material meets the in scope criteria or not. Then following a second reading, selected data are entered manually onto a standard data extraction form. The data extraction form was piloted and amended. The data is then aggregated into topic areas in a scoping format, so that the analyst can see what the scope of any given area is, to answer the core question/s. This sets up an audit trail so that another researcher can replicate the procedure.

When writing up, the author can scan the forms to check which sources have something to add on a topic and if necessary return to the original document. The form used in this project is included at Appendix 3 and summarised below.

2.2.6 Data Extraction Form

1. **Source details:** Author, date, title, journal, vol. iss. pages.
2. **Paradigm:** academic/practitioner researchers- sociology, psychology, marketing, behaviour change, environmental sciences, geography.
3. **Overall Aim** and focus of paper.
4. **Design** approach: evaluation, survey, focus group, Randomised Control Trial, waste measure/sort, Mosaic, ACORN, Door stepping, desk research.
5. **Method** details: location of study, sampling selection, household type, population and sub groups, sample size, response rate.
6. **Models or theory** tested/applied.
7. **Data on barriers.**
8. **Contamination** (of recyclables).
9. **Recycling location:** kerbside, bring banks, HWRCs.
10. **Specific materials.**
11. **Segmentation.**
12. **Communication.**
13. Evaluation **impact of service changes.**
14. Evaluation **impact of community campaigns** on participation, capture, contamination.
15. **Comments.**

2.3 Search results

A wide range of material about recycling was obtained, across the spectrum of both academic and grey literature; most of the grey literature was provided by WRAP, Waste Awareness Wales, Zero Waste Scotland, local authorities and M-E-L Research. In total, 148 recycling documents were obtained through the search and were deemed to be in scope for this review, including academic articles, reports and datasets including Power Point presentations. These are all listed in the Bibliography contained within Appendix 1, consisting of:

- Sources identified through academic search, openly available;
- Research evidence and reports supplied directly by M-E-L Research and WRAP;
- Research evidence and reports offered to the authors through an email invitation to local authorities, consultancies and research centres.

Additional background sources cited to support arguments presented in this synthesis are also listed in the Bibliography.

One hundred and nine of these documents were found to be in scope for this review, 30 academic and 79 non-academic, and evidence from these studies has been used in the preparation of this synthesis report. The authors are confident that as a result of this multi-faceted search approach, all the relevant research up to the final cut-off date of January 2014, which organisations are willing or able to share, has been identified and assessed.

2.4 Synthesis

To construct the synthesis, the detailed evidence on the three core review questions was discussed by consultants within M·E·L Research in seven 'round table whiteboard analysis' sessions. At this point the authors drew on their extensive experience and knowledge of waste and resource management as well as understanding from the wider social and behavioural sciences on topics such as housing tenure, population churn and household behaviour. Two lines of thinking emerged:

- what has changed since 2008; and
- what are the main current barriers and themes within the current recycling context.

The outcomes from these sessions have helped shape the basis of the main body of this synthesis report, presented in sections 4 and 5.

2.5 Limitations to the evidence base

The terms of reference for this work stated that the evidence review should be recognised as the UK's primary source of accurate, up to date and comprehensive insight on barriers to recycling effectively, taking account of evidence generated by local authorities, funders, WRAP partners, academics and the waste management sector. The wide ranging scope should cover academic, commercial and third sector literature across the fields of sociology, psychology, marketing, behaviour change and the wider environmental sciences.

However the project was constrained by the limited technical content of many items of evidence, and this has imposed boundaries around the methodological rigour achievable. These constraints are listed below.

- Two-thirds of the reports used in this literature review are from the commercial or voluntary sectors, known as unpublished grey literature, which have a lower degree of validity, reliability and replicability because of the style and manner in which they are written up, than those exposed to critical peer review in the academic sphere; 14 reports are in PowerPoint and six documents take the form of baseline data.
- Hardly any of the grey literature contains an overview of previous knowledge, so the opportunity to build on barriers theory or models is missed; context is rarely described (because the commissioner knows the context and the contractor does not need to repeat it); the precise details of methodologies are rather skimpy.
- Conversely, academic articles do not cite grey material and with the exception of WRAP guidance documents there are few citations of WRAP/partners publications; out of 26 academic articles only two cite the 2008 Barriers report.
- Few of the reports directly ask the question 'what are the barriers to recycling effectively?' That is a relatively new question which has surfaced in the work carried out during this review, and so the work reported here is the first known attempt to synthesis current knowledge about it.

In summary, the review methodology adopted was systematic; and although not a full academic systematic review, and despite the above limitations, the content takes current knowledge further than the previous 2008 review, and narrative format of this overall synthesis report will be of conceptual and practical use to all the key interested stakeholders.

3.0 Household waste recycling in the UK – changes in context since 2008

3.1 Previous literature review 2000-08

The first stage of the research undertaken for the 2008 WRAP Barriers Model involved a review of the published literature of the time to identify known barriers and to develop a conceptual framework for the qualitative and quantitative phases to follow. Based on published literature between 2000 and 2008 it was concluded that barriers could be compiled into an overall framework consisting of four principal categories: services or local situational barriers; information and knowledge; attitudes and motivation barriers; and household/individual behaviour.

This review suggested that proportionally less attention should be placed on attitudes and environmental motivation and more on structural factors, such as the physical problems people experience sorting and storing the materials in the domestic setting and understanding waste segregation behaviour.

The 2008 literature review was followed by primary research, analysis of which led to some important fresh thinking about specific population segments that might be targeted for promotional and communications campaigns. It also clarified the detailed factors underlying the four different types of barriers, recognising that not everyone experiences all four at any given time and that some barriers, such as situational, imply operational service improvements by the local authority, not necessarily a behaviour change response from the individual.

In order to explain and understand the behavioural change that an individual has to move through to 'recycle more things more often', a concept of 'recycling competence' was developed. Based on established learning models, this suggested that as people learn the system they move from being 'unconsciously incompetent' (not aware, don't care) to eventually reaching 'unconscious competence' (embedded systematic routines that can be carried out habitually without conscious effort).

In addition to a quantitative measure of the barriers, the research showed the need for customisation and targeting of recycling promotional messages so that they would link better to the different barriers faced by different segments of the population.

3.2 Australia – Victoria State's unique application of WRAP barriers methodology

A unique and interesting international outcome following the publication by WRAP of the Barriers 2008 study was a decision by the Victorian Government of Australia to replicate the UK WRAP Barriers model but calibrate it by undertaking its own survey of barriers to household recycling, suitably adapted to meet their local conditions but based on the UK design. In 2011 this was published in *Kerbside Recycling in Metropolitan Melbourne* and asked 'what prevents Melbournians from recycling more?'⁴.

The key findings from this unique comparative study bore striking similarities with WRAP's 2008 barriers research. Primary barriers included situational factors such as bin sizes. On the practice of using recycling plastic bags within the recycling stream, many respondents thought plastic bags were recyclable, or placed items inside plastic bags thinking it would make sorting easier. There was uncertainty about whether items could be recycled, such as cardboard boxes with foil or plastic components, card pizza boxes that are dirty from food and juice boxes, so issues about 'dirty or clean' were raised. Lack of time and competing priorities were also important. Consistency of recycling services between areas, as well as information needs, access and preferences, and individual habits and beliefs were noted. The research identified room for improvement in services and revealed people's desire for increased knowledge, including more information on the wider outcomes of recycling actions. The younger age

⁴ *Sustainability Victoria, 2011*

group (16-29) and to a lesser extent the 30-39 age group were identified as target segments for future action.

The Victoria State project is a unique example illustrating the international transferability of the 2008 WRAP barriers model.

3.3 Investment in services since 2008

The period 2008-14 has seen a continued expansion of dry recycling collection services across the UK in terms of coverage and range of materials collected; a continuing trend towards reduced frequency residual waste collections; and the introduction of separate weekly food waste collections. Recent budget pressures on local government mean that some councils are considering how to save on waste collection costs, and are being more selective on collecting only the more valuable recyclates, and have begun to charge for the collection of garden waste.

Investment in the development of better materials recovery facility (MRF) technology and associated quality protocols have made co-mingled kerbside collections better able to supply value to the reprocessing industry than earlier technology, although debate continues as to whether kerbside sorting or co-mingled recyclate collections provide the better value service option.

Further up the chain the operational performance and economic viability of the sorting and reprocessing technologies depends a lot on the quality of the material received. As the industry seeks higher value, and more money is paid for higher value recyclate, (i.e. material that is to the grade and specification set for the reprocessing technology), this has led to a demand for higher quality material both in the UK and internationally, and consequently also a need to reduce contamination from non-target materials.

As a result of this, getting householders to supply only the materials targeted for the various collection streams has become more demanding over the period since 2008 and it could be argued that the skill and competence required to be a 'complete and effective recycler' is getting harder to achieve. Plastics comprise the material stream where this householder requirement is most complex due to the range of plastic types and variation in service provision. The 2008 barriers methodology did not examine in depth the detailed knowledge and understanding required of the more complex multi-stream schemes and the wider range of materials collected by co-mingled schemes, hence the need for this to be further explored in the current review, with specific reference to the barriers leading to lowering the quality recyclate stream.

As a consequence of these developments, recycling has appeared to some residents to have become more complex, and to vary notably from place to place^{5,6}. As recycling services vary across local authority areas, collection authorities often have highly customised and tailored requirements particular to their own contracts and collection technologies. As population mobility brings people into new authorities, the need to learn the competencies required for the local system has become more important. The 2008 barriers model is based on a static view of population behaviour and does not explicitly cater for the continuing 'induction needs' of new residents. These new residents might already be quite competent and committed recyclers but simply unaware or un-briefed on the requirements of the system in their new neighbourhood; or they may be set in a habitual pattern of previous recycling behaviour that is now unsuited to the local recycling infrastructure.

This is a further gap in the 2008 barriers methodology when applied to the current context of demographic change. The increased migration flow into the UK over this period from EU accession states provides a particularly sharp twist to this context, especially in receptor

⁵ *Shropshire Council, 2013*

⁶ *Enventure Research, 2013*

hotspots such as London, and agricultural areas unaccustomed to large cultural 'churn' in the population.

Recycling at home is being complemented by a steady growth in facilities for recycling 'on the go'; street furniture incorporating recycling facilities is being added in areas of high pedestrian footfall and in communal areas such as university campuses and business parks. These facilities are more likely however to have diverted recyclate from the litter and commercial waste streams, rather than substituting for recycling at home.

3.4 Improved rates of recycling

Since 2008, the household recycling rate in England has increased from 35% to 43% (Defra 2013⁷). In Wales 54% of municipal waste is now recycled; and recycling in Scotland and Northern Ireland has increased too with the latest statistics for each country reporting 41%⁸.

So far as trends in attitudes and self-reported behaviour are concerned, WRAP's on-line panel survey formerly entitled the *Recycle Now Tracker*⁹ showed in 2011¹⁰ that:

- amongst all social grades the importance of recycling (% saying recycling is very or fairly important to them personally) has converged over time, varying between 95% - 90% in 2011;
- those saying recycling is "very important" are a higher proportion in Wales than in the other UK nations at 60%, (nation range 60% - 51%);
- people in Wales are more likely than in other nations to say they recycle even if it requires additional effort, (78%; nation range 78%-72%);
- a higher proportion of people in Wales say they recycle everything that can be recycled, (range 64%- 50%);
- respondents in Scotland are marginally lower than other nations on: recycling importance personally (at 51% 'very important'); and recycling even if it requires more effort (71%);
- the proportion of people who say they do not recycle has remained at a consistent 3% or less since 2008;
- the proportion of people who claim to recycle even if it requires additional effort has increased from 68% in 2008 to 75% in 2011;
- attitudes to recycling even if it requires additional effort among social grades has converged over time;
- the proportion claiming to recycle 'everything' has increased from 53% in 2008, to 59% in 2011, with 2% saying they do not recycle;
- social grades AB are most likely to claim to recycle 'everything', social grades DE less so.

More detailed data from these surveys show that young people, the less affluent social grades, and people living in flats comprise social segments for further support on overcoming barriers to recycling. This is explored further in the evidence review.

⁷ Defra, 2013

⁸ Latest data available at the time of writing

⁹ WRAP/GFK NOP, 2011

¹⁰ The *Recycle Now Tracker* was re-developed in 2011, becoming the *3Rs Tracker*. Questions were changed at this point and so comparisons after 2011 cannot be made with previous years' data. Since 2011, WRAP has moved away from the *Committed Recycler* metric (using instead a measure of individuals' recycling behaviour compared against the materials collected by their kerbside scheme), so this measurement has not been included in the analysis.

4.0 Update on key evidence since 2008

4.1 Overview - ten key areas of change

When the 2008 WRAP Barriers Model was established, WRAP was working to a specific objective of having households 'recycling as many materials as possible, as often as they can'. Four main categories of barrier were seen as defining the factors preventing people from reaching this goal of the 'complete recycler'; they are not simply barriers to participation, but barriers to optimal achievement.

To expand on the brief introduction in section 3.1, the four specific categories of barrier established in 2008 were:

- **Situational barriers**, including inadequate containers, lack of space, unreliable collections, no access to bring sites.
- **Behavioural barriers**, including people being too busy with other things to recycle, no established household routine, and people forgetting to separate their waste/recyclables or put them out for collection.
- **Knowledge barriers**, such as people not knowing what to put in each container, and understanding the basic mechanics of how the scheme works.
- **Attitude barriers**, such as people not believing there is an environmental or social benefit to recycling, viewing it as the council's job not theirs, and not getting a personal reward or recognition for their efforts.

It was also mentioned briefly in section 3.1 that the conceptual framework for 2008 WRAP Barriers Model also introduced the idea of developing **recycling competence** amongst householders. Re-confirming that idea in more detail, the concept was based on the 'learning cycle' where people move from a state of *unconscious incompetence*, through *conscious incompetence* (recognition of the need to change), to *conscious competence* (learning to be better) and finally to *unconscious competence* – an idealised state of habitual optimum household recycling behaviour.

The 2008 WRAP Barriers Model then went on to set out **communication strategies, messages and media** through which interventions might then seek to improve people's levels of 'recycling competence' and thereby overcome the relevant barriers to recycling as much waste as possible, as often as possible.

This review of research since 2008 has shown that the four-category WRAP Barriers framework summarised above, remains a robust and conceptually reliable representation of the principal barriers to recycling at home. To that extent, the fundamentals of the approach remain essentially unaltered. However, recent academic literature and the evidence from practical research at local level, coupled with the changing recycling context and evolving social geography of the UK, has led to further developments and enhancements in the theoretical understanding of recycling behaviour.

In this synthesis of the recent research evidence, the framework for understanding recycling barriers has therefore been developed and enhanced accordingly, and this section 4 provides a detailed account of the main changes and developments in the conceptual framework that have been identified through this review. The evidence is structured along the lines of the 10 principal findings, which are that:

1. The barriers framework is **conditional** – i.e. the four principal barrier categories are very often mutually interdependent and so should be approached in an integrated, context-specific way. For example the specific barriers of behaviour, knowledge and attitude are frequently dependent on, and created by, the practical circumstances of householders such as the type of property they live in, the collection system serving it, and their life circumstances.

2. The situational category used in the 2008 Model should be sub-divided into **infrastructure** (e.g. property type) and **system** (the scheme characteristics and how the materials are presented for collection).
3. The 2008 WRAP Barriers Model works well for kerbside property collections but less well for **flats**.
4. The ability of households to learn effective recycling behaviours is constrained by **continuing change** – to the systems and requirements; and through local population mobility.
5. The **private rented sector** is the single form of tenure that is expanding in the UK, but there are challenges to encouraging effective recycling behaviour within this tenure group.
6. Recycling behaviour involves developing better concepts for understanding and influencing **collective household behaviour**, rather than individualised personal psycho-social constructs of behaviour.
7. The notion of recycling '**effectively**' can be unpacked into two parallel issues: people either recycling the wrong things (i.e. putting things into recycling that their council doesn't collect and so causing lower quality recycle), or not recycling all that is possible locally (by putting materials that could be recycled locally into residual waste resulting in poor capture).
8. The collection of new materials for recycling since 2008, in particular food, generates barriers that are **specific to the material** (showing that reliance on a generic all-material barriers framework is not always appropriate); plastics are a further specific case.
9. The persuasive influence of local authority messages and communications is enhanced by the existence of a **strong and trusted relationship** between people and their neighbourhood, and with their local council.
10. It has become more apparent since 2008 that recycling has largely now become a '**social norm**', and this compliance pressure together with the associated week-by-week collection 'rhythm' is an important factor in helping people recycle effectively.

Each of these emerging issues is now described and evidenced in detail below, with key sources of evidence cross-referenced in footnotes to the comprehensive bibliography in Appendix 1 where individual authors and evidence sources are cited and fully referenced.

4.2 The barriers framework elements are conditional and inter-dependent

In 2008 the WRAP Barriers Model was put forward as a list of specific individual barriers grouped under four categories. Situational barriers were the most frequently cited in the primary research undertaken for that project (lack of containers, limited storage space, and inappropriate container size for example). Taking an overview of all the literature^{11, 12, 13, 14, 15, 16} it is the authors view that all four barrier categories are actually intrinsically linked and interdependent. Interventions to counter the barriers therefore need to be developed in context, dealing with 'packages' of linked barriers, not barriers in isolation.

This is particularly true of the situational barriers, which frame the conditions for the consequent barriers in terms of household attitudes and behaviour. The most obvious example is with flats – the physical circumstances of flat dwellers and the recycling systems offered set the specific practical context within which it is necessary to identify the behavioural, knowledge and attitudinal barriers that apply to people living in this situation¹⁷.

- The implication of this, is that the analysis of behavioural and knowledge / attitude barriers when developing services and the use of communications campaigns to improve recycling

¹¹ Timlett and Williams, 2008a/b

¹² 2CV UK, 2010

¹³ Enventure Research, 2013

¹⁴ WRAP/Icaro Consulting, 2013b

¹⁵ ZWS/Exodus Research, 2013

¹⁶ M-E-L Research, April 2013

¹⁷ Hyder Consulting, 2010

behaviour, should be built on a situation-specific basis i.e. tailored according to property type and system.

4.3 The situational category should be sub-divided into physical infrastructure and system

An important development in understanding the barriers to effective recycling behaviour has been made by academic authors who have developed an alternative three-part classification of barriers based on infrastructure, system and behaviour (ISB)¹⁸. The category they call behaviour encompasses the three WRAP barriers of behaviour, knowledge and attitude and it is proposed these distinctions should remain in the updated framework reported here. However the distinction created in ISB between infrastructure and system, is a useful refinement to the understanding of situational barriers.

- This further reinforces the point in 4.2 above, that the initiatives aimed at ensuring households recycle effectively, are particular to the specific context of the infrastructure and system serving the households. Initiatives need to be 'infrastructure-and-system-specific'.

4.4 The emergence of flats

The original primary research which was used to develop the 2008 Barriers Model was carried out with households receiving kerbside collections. The model of 'recycling at home' largely reflected life in residential properties with kerbside recycling and residual waste collections. No specific account was taken of people living in flats, yet flat-dwellers experience physical infrastructure and waste management services that are very different from those experienced at kerbside properties.

Since 2008 an increasing body of evidence has shown that recycling performance is particularly low in areas with flats, apartments and houses in multiple-occupation (HMOs)^{19, 20, 21, 22}. The recycling services are often in the shape of communal bins, requiring a longer trip to take segregated waste to the collection point, sometimes outdoors; householders often are not issued with their own containers (or possibly just sacks or caddies) and frequently the residual waste bins are more convenient or refuse chutes with no capacity limit – a capacity restriction that otherwise prompts residential householders to use recycling facilities²³.

As a result flat-dwellers experience a waste management system which is less conducive to recycling and where the residual route often is easier to use. The physical design of flatted properties often provides more limited in-home space for storing recyclables prior to collection. Thus the situational barriers of both infrastructure and system conspire to make recycling in flats harder to achieve than in kerbside residential properties.

There is also an inter-correlation between the property type, the form of tenure (often social or private renting) and the associated lifestyle and circumstances of flat dwellers. These circumstances and their link to lower than average recycling rates, are discussed in more detail in sections 4.4 and 5.6. This compounding socio-economic factor, when coupled with the barriers of infrastructure and system, combine to create an especially challenging environment in which to get people to recycle in the most effective way.

- For all these reasons the original WRAP Barriers Model does not work well for flats and a specific sub-variant of the framework needs to be developed, to suit this context.

¹⁸ Timlett & Williams, 2011

¹⁹ WRAP/GFK/NOP, 2011

²⁰ Alexander et al, 2009

²¹ Taylor Intelligence, 2010

²² ZWS/Exodus Research, 2013

²³ Hyder Consulting, 2010

- Between 20% and 25% of the UK population live in properties described as flats²⁴. While tower blocks are steadily being removed from the housing stock, there is a corresponding growth in new apartments, 'loft living' and student / young people's accommodation, and new buy-to-let properties subdivided into flats. The proportion of the housing stock consisting of flats is likely to be sustained at least at current levels, so the demand for interventions to overcome barriers to recycling in flats is likely to continue.

In the subsequent section 5.5 of this report, the challenging environment of 'flats' is discussed further and a detailed typology is suggested as a way of focussing specific attention on the types of barrier particular to each category of flats.

4.5 The growing awareness of the need to accommodate 'continuing change'

The 2008 Barriers Model was based on the simple learning cycle – householders getting to understand the system they are offered, and learning how to become competent in using it. The thinking behind the model assumes a system 'frozen in time' with the householder learning over time how to use it, and ending up habitually using it properly without even thinking about it. Since 2008 a new reality of the recycling world has clearly emerged – one that is dynamic, frequently changing as new materials are added to recycling services, different types and sizes of container are introduced, collection frequencies changed, and the specification of wanted / unwanted materials changing according to prices, specific reprocessing technology changes and as end-use / market quality requirements are re-specified.

For householders this means having to adapt their understanding and behaviour. Regular system changes are emerging as a barrier to sustained householder commitment, and to remembering what the system requirements of the moment are. There is evidence of people not keeping up with the changes, forgetting the latest wanted / not wanted specification, and losing patience – attitudinal barriers associated with the situational barrier of service change²⁵. For example, fixed instructions such as those printed on bins or presented in giveaways such as fridge magnets can get out of date as the systems change, if they not replaced or updated.

Not only is the recycling system in a state of regular flux; the population served is mobile. The extent of population movement varies throughout the UK, but on average, 8% of households move home each year²⁶; it is higher in areas with students²⁷, whilst in some London Boroughs it can be upwards of 30% a year²⁸. This feature of population churn helps to explain why some residents do not have the appropriate containers or understand their local system and may also contribute to the stagnation in recycling rates²⁹. Outdated instructions (stickers and fridge magnets) can also be passed inadvertently to new occupants when they move in, meaning they may therefore be unaware that recycling instructions on how to most effectively use the scheme have changed. Compounding the challenging circumstances of flats described above, another feature of many flatted properties is the short and often temporary periods of tenure for many flat dwellers, particularly those in the younger age brackets. Of the three main tenure sectors Private Rented Sector (PRS) is the one in which turnover is highest³⁰.

Quantitative studies consistently show that young people from 16-30 are less effective recyclers^{31 32 33 34 35}. This could be considered as a paradox given that pro-environmental

²⁴ ONS, 2013

²⁵ Shropshire Council, 2013

²⁶ Dennett & Stillwell, 2008

²⁷ Timlett & Williams, 2009

²⁸ 2CV UK, 2010

²⁹ Waste Watch surveys, 2011;2012

³⁰ Perry, 2012

³¹ WRAP/GFK/NOP, 2011

³² WRAP/M-E-L Research, 2011

³³ Sustainability Victoria, 2011

³⁴ Enventure Research, 2013

³⁵ M-E-L Research, April 2013

attitudes and beliefs tend to peak in this age bracket³⁶. Little formal work has been undertaken to uncover the 'barrier of youth' but when placed in the setting above, the essential nature of the barriers associated with youth become clearer. Population mobility peaks in these age bands, and correspondingly is lowest in the later adult age bands where recycling performance is high. As mobility is a logically coherent barrier to recycling, as noted above, then this barrier is predominantly associated with the low performing younger age bands. Another covariant feature is the prevalence of young people living in flats and private sector renting; again these present specific situational barriers that disproportionately affect the low performing 16-30 age band. When taken together, these factors help to explain the paradox of young and generally more 'green' residents actually being one of the segments who do not recycle as well as they might.

Not only are the established UK communities intrinsically mobile; the impact of global population mobility and migration, are creating highly diverse, multi-cultural environments, both in our major cities and also in rural and seaside towns. People arriving and often resident only temporarily in the UK, are likely to be unfamiliar with UK waste management systems. They may have very different experience of recycling in their countries of origin. The barriers of knowledge, understanding and habitual household behaviour that are particular to international migrants, were not featured in the 2008 Barriers Model, yet are now emerging rapidly in certain areas of the UK (London especially)^{37, 38}.

In practice, this means that people move in with habitual patterns of waste segregation from their previous authority or country of origin, but often with no managed system of 'induction' into the recycling service in their new authority. 'They do it differently in other places'^{39, 40} is a knowledge and behavioural barrier that is starting to emerge, and features more now than when the original model was created in 2008. At that time, separating materials for recycling was a relatively recent experience and mobile households may only have experienced one or two different systems in their lifetime. Now as systems have evolved and adapted, and with many households having moved three or four times since recycling became a widespread service, the barriers created by 'change' are emerging as a significant obstacle to getting households to recycle effectively.

- To cater for the increasingly significant factor of 'change', the framework for understanding recycling barriers needs to accommodate the risk of confusion and poor understanding by new residents.
- A more systematic way needs to be found to engage with people, moving to a new area with an established recycling system.

4.6 Barriers particular to the private rented sector

As indicated above, the only tenure category that is increasing its market share in the UK, is the private rented sector (PRS). Latest housing tenure statistics show the PRS to have increased from 12% in 2001 to 13.9% in 2008 and 17.4% of households in 2011⁴¹. PRS properties now outnumber those in the social rented sector, and private renting now provides the tenure for 1 in 6 of all UK households⁴². In some neighbourhoods within metropolitan authorities this proportion can rise above 25%.

A major research review has found that PRS tenants⁴³ are a widely diverse group ranging from mobile workers and fixed term contractors working away from the family home, to young

³⁶ Nordlund et al, 2013

³⁷ M-E-L Research, April, 2013

³⁸ Alexander et al, 2009

³⁹ 2CV UK, 2010

⁴⁰ Shropshire Council, 2013

⁴¹ House of Commons Communities and Local Government Committee, 2013

⁴² Perry, 2012

⁴³ Hills, 2007

professionals saving to buy, and 'corporate high flyers' living in rented premises close to a city office during the working week. Many are students, and families in transition particularly migrants and their families. Some arrive in private renting through crises and family break-up. Many tenancies are short term (e.g. 6 month) lets and the tenants tend to have busy, active, out-of-home lives. All in all, these circumstances are the least conducive to the adoption of routine domestic behaviours such as participation in recycling.

The trend towards private renting is of growing importance in terms of the challenges posed to recycling. A report by the Joseph Rowntree Foundation notes that neighbourhood conflict often arises around waste management in areas with high private renting, involving poor use of appropriate containers and collections, because tenants often do not know how the system works⁴⁴. This suggests that some PRS tenants may be less effective recyclers and is further reinforced by the fact that many PRS tenants live in flats, especially in buy-to-let apartments, HMOs and recently sub-divided residential properties. As indicated in the above discussion of flats (Section 4.4), these properties often share communal recycling facilities and do not receive kerbside collections. Waste collection arrangements are often made with landlords and not the tenants themselves. Moreover, there is a growing trend towards 'rent to rent' tenancies where the tenant sub-lets informally to unidentified sub-tenants. While there is a body of research evidence on the barriers that are specific to flat dwellers (see later in Section 5.5), not enough has been done within it, to distinguish between the problems that arise from the physical nature of the premises (flatted developments and the type of recycling service offered), and those problems that arise from the nature of the tenure (in this case, private renting). There are two separate and growing issues here, and future research should pay sharper attention to the nature and lifestyle of the flat dweller, particularly in this case those in private renting, rather than simply subsuming this within the overall recycling problems associated with 'flats'.

- The 2008 WRAP Barriers Model is predicated on a stable lifestyle and the adoption of forms of domestic organisation that does not align well with the life circumstances of many PRS tenants. More work needs to be done to identify and overcome the complex range of barriers often found within the PRS, especially as this segment and the barriers associated with it, has grown significantly since 2008 and is projected to increase further in the coming years.

4.7 Household recycling behaviour is a collective not individualised concept

The theoretical models that have traditionally underpinned recycling behaviour change communications are those derived from psycho-social models of individual behaviour change. This is also true of the work of Defra on pro-environmental behaviours⁴⁵. The 2008 WRAP Barriers Model also reflected this common understanding, and models such as the theory of reasoned action (TRA) are built on the individualised assumption that by developing people's knowledge and attitudes, the desired individual behaviour will logically result.

Since 2008 the literature has started to shed a more insightful light on the understanding of household recycling behaviour⁴⁶. The most fundamental development is the recognition that most households are collective groupings consisting of more than one person. People within the household work as a behavioural unit, and share the work involved in separating recyclable materials for collection⁴⁷. Remarkably little research has been undertaken into developing robust qualitative insight into waste management behaviour within the household^{48, 49}. However, this body of work has made important conceptual progress in the

⁴⁴ Perry, 2012

⁴⁵ Defra, 2008

⁴⁶ Wheeler, 2013

⁴⁷ Wheeler & Glucksmann, 2013

⁴⁸ Evans, 2011a; 2011b; 2012

⁴⁹ Metcalfe et al, 2013

context of sociological research into the division of labour within the household and the understanding of recycling as 'work'.

The implication of accepting collective within-household behaviour as the basic behavioural unit is to open up broader questions about the techniques used in attempting to influence household behaviour. The individualised models based on the TRA lead to logic chains linking individual knowledge and attitude to resulting behaviour change. In viewing households as collective units the model needs to move towards educating and assisting collective household organisation and influencing the specific role of individuals undertaking 'domestic work' within the household division of labour. There is relatively little understanding of the way that communications messages delivered to the 'household' are then transmitted internally and reflected in changes in collective behaviour. For example, communication techniques such as door to door engagement (often referred to as 'doorstepping') are based fundamentally on the idea that a conversation with an individual can impact on household behaviour; communications messages are often designed around triggers to motivating individual behaviour change.

- The future shape of the WRAP framework for understanding barriers to recycling, and any associated communications strategies and messaging should evolve around a clearer qualitative understanding of how collective household behaviour change can be generated.
- This should be based on the emerging conceptual constructs of the household division of labour in relation to waste, and the notion of recycling as 'domestic work'.

4.8 The increasingly prominent barriers intrinsic to recycling 'effectively'

Less effective recycling behaviour results from householders either:

- putting materials in their recycling containers that are not intended to be collected locally for recycling or are not recyclable (causing contamination of the feedstock and effect on quality); and / or
- not recycling all the materials they could (causing poor materials capture); and / or
- not participating in their recycling scheme.

These three simple concepts are essential to understanding the specific nature of the barriers to recycling effectively. They represent different impacts, and the explicit recognition of these three distinct behavioural characteristics of recycling behaviour is an important conceptual step forward in clarifying the causal barriers and ways they might be overcome.

WRAP's most recent 3Rs tracker survey⁵⁰ has indicated for the first time the approximate proportions of 'recyclers' who engage with their scheme in the ways listed above. The two types of problem (contamination and poor capture) are broadly equal in prevalence, and detailed analysis of the survey data shows the UK recycling population falls into four broadly equal quarters in terms of their self-reported recycling behaviour⁵¹:

- about a quarter of current recyclers are recycling all the materials that are wanted, and none of the ones that aren't;
- a quarter capture well, yet also add materials that are not intended to be collected locally for recycling;
- a bit more than a quarter are not recycling all the materials they could; and
- a bit under a quarter are not recycling all the materials they could, and are also putting out materials which are not intended to be collected locally for recycling.

⁵⁰ WRAP/ICARO, Spring 2013

⁵¹ Survey respondents' self-reported behaviours were matched against actual council provision using respondents' postcodes and a WRAP database of the materials collected by each council. The database is updated annually, primarily via a survey with every council in the UK. There are margins of error within the population survey and the council survey. Postcodes also do not align precisely with council boundaries. Therefore these proportions should be viewed as indicative rather than absolute.

In considering the developments to the barriers framework thus far, much of the discussion has been about improving insight into the situational and demographic barriers. However, the above points show the additional importance of understanding and overcoming the three key household behaviours that impact on effective recycling (by causing contamination, poor capture and low participation). Addressing these behaviours means focusing on the awareness, understanding, beliefs and attitudes of householders to recycling. This is the prime setting for behaviour change communications. It is simple and self-evident, that:

- supporting people's awareness, understanding, beliefs and attitudes is the key to achieving maximum quality and capture of recycle;
- behaviour change communications are the essential mechanism for achieving this;
- the content and message channels are both highly contextually specific to situation (infrastructure and system), as outlined earlier; and
- behaviour change interventions aimed at improving the effectiveness of recycling should focus clearly and sharply on addressing these challenges.

4.9 Certain barriers are specific to the material

The 2008 WRAP Barriers Model was proposed as a universal model in that it related to recycling behaviour irrespective of the materials being recycled. Research since then has shown more clearly that some barriers can only be properly understood in relation to the specific material with which the barrier is associated.

The best example of this is food. Food waste recycling has emerged rapidly over the period since 2008. At that time, very little separate food waste collections were in operation; where food was collected it was most commonly in the form of non-meat food items e.g. vegetable matter being encouraged as a compostable addition to garden waste collections. Since 2008 the development of in-vessel composting (IVC) and in particular anaerobic digestion (AD) technologies allowing treatment of food wastes including meat, has prompted a rise in separate food collections. This has often been introduced in parallel with a reduction in the frequency of the residual waste collection to fortnightly, provided a weekly food waste collection service is in place.

An extensive evidence base is building up on the specific barriers preventing optimal capture of food waste^{52, 53, 54, 55, 56}. These barriers can be summarised as:

- Poor conceptual understanding of food waste 'recycling' – people do not see the value in doing it because they cannot visualise the concept of 'recycling' as applied to food waste and this leads to poor motivation. The recovery of value (including energy from AD) could be a more persuasive concept.
- Limited perceptual understanding of what is meant by 'food waste' beyond the narrow definition of plate scrapings and vegetable peelings. In particular, out-of-date and unopened packaged food is often not seen as 'food waste' and is therefore omitted from the separate collection stream, yet this is a significant proportion of the food waste that is placed in the residual stream.
- The form of containment, especially the absence of caddy liners, is a common barrier.
- Physical in-home barriers created from the absence of suitable containers in the food waste preparation area, usually kitchen, which can also be seen as an unhygienic location for food waste containers.

⁵² Brook Lyndhurst et al, 2009

⁵³ M-E-L Research, January 2011

⁵⁴ ZWS/Nicki Souter Associates, 2012

⁵⁵ WRAP/M-E-L Research, 2011

⁵⁶ WRAP/ICARO Consulting, 2013b

- Apart from these situational barriers the most commonly cited by non-participants are attitudinal barriers, especially related to hygiene and odour.

Looking ahead, separate food waste collection is fast becoming a mainstream activity particularly in Wales and Scotland.

- A food-specific version of the Barriers framework would be helpful in ensuring that barriers specifically associated with food waste are more effectively laid out and appropriate interventions designed to maximise capture.

Plastics comprise another material stream in which specific barriers of knowledge and understanding occur. Several studies^{57, 58, 59, 60, 61, 62} including the 3Rs survey, shows that plastics present the most substantial source of confusion for households leading to both poor capture and people putting items into the recycling that their council doesn't collect.

- Overcoming those barriers to recycling effectively that arise from household confusion means in large part, overcoming barriers associated with plastics.
- Higher targets for plastics recycling, and the extension of the types of packaging that can be recycled to include pots, tubs and trays (PTT), make a specific understanding of the barriers to recycling plastics, an important future priority.

The emerging barriers relating to food and plastics are also closely linked to the issue of improving quality, as discussed in more detail in the following Section 5.

4.10 Increasing importance of people's 'relationship with place' and with the local council

Since 2008 it has become increasingly clear^{63, 64} that an important link exists between people's receptiveness to meeting the requirements of their local recycling service, and the strength of their positive relationship with the local neighbourhood. Evidence shows that where people do not feel personally part of their neighbourhood, they are less likely to recycle effectively. Evidence can be found across these and a wide range of research reports, especially through qualitative evidence, showing that people who feel attached to their neighbourhood and concerned about the quality of their local environment are positively influenced in their recycling behaviour.

The research shows this also spills over into the degree to which people feel they have a positive reciprocal relationship with their local council. Where people feel positive towards their local council they are more receptive to the council's requirements for recycling. Trust is important – where people are suspicious that 'it all goes to landfill anyway' or 'we are just doing the council's job for them', the commitment to recycling is undermined^{65, 66, 67}. This is strongly reflected in the Mindspace model⁶⁸ for behaviour change, where the need for a trusted messenger and a relationship with local context are accepted as elemental components in a strategy for effective behaviour change communications.

It is evident that some of the 'situational infrastructure' contexts where major barriers to recycling exist – e.g. mobile flat dwellers; students and young people; and private renters in

⁵⁷ *Recoup, 2012a*

⁵⁸ *M-E-L Research, June 2012*

⁵⁹ *Dumas, 2012*

⁶⁰ *Silver Dialogue, 2012*

⁶¹ *WRAP/Corporate Culture, 2012*

⁶² *Shropshire Council, 2013*

⁶³ *2CV UK, 2010*

⁶⁴ *Robertson & Walkington, 2013*

⁶⁵ *Shropshire Council, 2013*

⁶⁶ *WRAP/ICARO, 2013b*

⁶⁷ *Wheeler, 2013*

⁶⁸ *MINDSPACE is an acronym for a behaviour change framework developed by the Cabinet Office (2010) comprising the themes of Messenger, Incentives, Norms, Defaults, Saliency, Priming, Affect, Commitments, and Ego.*
<http://www.instituteforgovernment.org.uk/publications/mindspace>

short term accommodation – are intrinsically those that tend to lack a strong relationship with place⁶⁹. People living in these circumstances often have few direct service relationships with the local authority and may not even be aware of who their council is. As a result the intrinsic barriers already identified that stem from these situational contexts, are often accompanied by the additional barriers of limited relationship with neighbourhood and council.

4.11 The power of 'social norm' and 'routine'

The final development since 2008 is the growing recognition that recycling has now become a 'social norm'⁷⁰. It is easy to forget that this change has taken place in a period of not much more than 10 years. From the millennium to the development of the 2008 WRAP Barriers Model, recycling services in the UK (kerbside especially) expanded fast, from a relatively minor and uncommon feature around the time of the millennium to 2008 when most people had experienced it for the first time. This understanding is reflected in the 'competence learning' aspect of that model – people starting to learn how to use the new feature of their council services.

Taking a broad overview of the more recent research evidence on changes in recycling attitudes and behaviour, the authors have concluded that the period from 2008-13 can be regarded as a qualitatively different, 'second generation' phase, in which recycling has matured in the public mind from innovation to social norm. It is the authors view that this is now embedded in most householders' experience (certainly in kerbside serviced properties) that there will be a requirement to separate out their recyclables as part of the normal everyday activity. The emerging problem is no longer about explaining this new service, but in explaining adjustments or functionally different changes in it, for example a new or changed separate food collection⁷¹, no longer collecting cardboard or an expansion in the range of plastics that an authority will collect^{72, 73}.

The influence of the 'social norm' is reinforced visually, by people putting things out that their neighbours put out, putting out their recycling container on the right day based on seeing when others do it, and sharing in the effort to keep up standards in the neighbourhood⁷⁴. Exceptions are identified as occurring for households for whom recycling is not part of their peer social norm. Areas with low participation can be seen as localised pockets where the norming barrier has yet to be overcome.

- To maximise the impact of the WRAP Barriers framework in these areas, an explicit 'norming strategy' should be built into approaches that are designed to cater for this context.

Other social research has revealed the powerful effect that a regular and reliable collection cycle has on waste and recycling behaviour⁷⁵. The pattern helps embed habitual recycling behaviour and research has shown that some households can face substantial behavioural barriers where this rhythm is not part of the way they live⁷⁶. Understanding and promoting the place of recycling in normal patterns of regular household behaviour is important in assisting households to take this up.

Households served by communal facilities face added problems in getting into this routine because of the absence of this cyclical 'trigger'. Where flat dwellers are asked to use communal facilities there is not the same pressure to follow a regular pattern linked to the service cycle, and this can make it harder for them to develop a domestic routine⁷⁷. Flat

⁶⁹ 2CV UK, 2010

⁷⁰ Halvorsen, 2012

⁷¹ WRAP, 2011; 2012

⁷² Shropshire Council, 2013

⁷³ Recycle Western Riverside, 2011

⁷⁴ Wheeler & Glucksmann, forthcoming

⁷⁵ Thomas & Sharp, 2013

⁷⁶ WRAP/ICARO Consulting, 2013b, 2013a

⁷⁷ WRAP/ICARO Consulting, 2013b

dwellers will deposit waste and recyclables in communal facilities at their convenience and in most cases it is fair to assume they will probably not be aware when these containers are emptied, so there is no observable regular 'trigger' to prompt recycling on a routine pattern as happens with the 'weekly rhythm' of kerbside schemes.

4.12 Conclusion

This section has focussed on the 10 principal ways in which the research evidence has developed since the 2008 WRAP Barriers Model was conceived. Published literature and other research evidence continues to validate the essential four-part structure of the original model; however, the more recent evidence has improved and refined the original structure, and has added enhancements that strengthen the insight it offers in understanding, and so overcoming, the principal barriers to recycling in the most effective way.

In the section to follow, the evidence review proceeds to sum up the current knowledge on barriers to recycling, organised in relation to the key lines of enquiry that were set out for this review. Some of this draws on work already highlighted in the evidence on the main changes, contained in this section. To an extent this may at times repeat similar points to those in this 'new issues' section, but the evidence is organised in a different way in order to convey a broader insight into the conceptual structure of the updated Barriers framework.

5.0 Synthesis of the evidence in relation to the key lines of enquiry

5.1 Introduction

This section of the synthesis moves on from the specific consideration of matters that have changed since 2008, and proceeds to summarise the overall research evidence on the most prevalent current barriers. It is **organised according to a number of specific themes set down in the project specification**. As above, authors and sources are cited in footnotes cross-referencing to the bibliography in Appendix 1. To avoid repeating material already covered in the previous section, cross-referencing between sections is used where relevant.

5.2 Recyclate quality and less effective recycling behaviours

Earlier in the introduction to this report (Section 1.1) it was established that the concept of 'effective' recycling behaviour has been used as a sharper definition of the desired behaviour than the previous concept of 'competence'. Behaviour that reduces the effectiveness of a recycling scheme comprises two forms – people recycling what isn't intended to be collected by the local scheme (thereby reducing quality) and people not recycling what they could (causing poor capture). This section of the synthesis deals specifically with the issues that lead to lower quality recyclate.

While competence was envisaged in the 2008 Barriers Model as a generic concept, the practical definition of 'effective' recycling behaviour is ultimately contextual – largely determined by the technology used at the sorting plant and/or the requirements to supply intended materials to reprocessors and end markets. This means that what people are asked to do, to be effective recyclers, can differ from authority to authority and from time to time. People get used to the 'ground rules' for using a particular system only to find it changes when a new contract comes into place or when they move house to a neighbouring authority. Inadvertently, they may end up lowering the quality of the recyclate as they do not fully understand the local ground rules.

The requirements for higher recyclate quality are increasing, and there can be a financial 'hit' to the authority if loads are rejected and contracts are breached. Typically, contracts to supply MRFs and reprocessors require there to be less than 5% of loads or input material rejected through the presence of non-compliant materials. Low effective recycling behaviour can raise this to 7-10% and figures as high as 40% reject rate have been quoted for recyclates from some flats in Cambridge⁷⁸ and from flats in London⁷⁹. Unwanted or non-targeted materials in the recyclate also cause operational problems in sorting plants such, where for example unwanted textiles that are put into co-mingled streams by residents, can trigger plant shut-downs by obstructing the operation of the separation equipment. Ensuring high quality is therefore a key practical and financial requirement in recycling effectively.

The evidence review has shown that the quality of recyclate can be adversely affected by various factors⁸⁰:

- i. Presence of items that are not intended to be collected locally for recycling:
 - non-targeted recyclate i.e. potentially recyclable material, but not collected by that particular council; or
 - material that is not recyclable (currently).

⁷⁸ M-E-L Research, May 2012

⁷⁹ Hyder Consulting, 2010

⁸⁰ Hyder Consulting, 2010; WRAP/Axion Consulting, 2010; M-E-L Research, May 2012; June 2012; Dumas, 2012; Silver Dialogue, 2012; WRAP/ICARO Consulting, 2013a.

- ii. Handling and presentation of recyclables:
 - by placing material in the wrong recycling container;
 - by not following rinsing or hygiene instructions (e.g. not emptying or rinsing food container);
 - by cross contamination in household handling (e.g. paper with a high fat or food presence);
 - by not separating packaging items (e.g. not removing film from otherwise recyclable pots, tubs and trays); or
 - inclusion of items which mainly are made of recyclable material but also contain unacceptable composite materials e.g. foil-lined cardboard, waxed paper.
- iii. Externally derived contamination:
 - passers-by throwing non-targeted materials and litter into recycling boxes/bins put out for collection; or
 - litter and bulky items being deposited in communal recycling containers.

Maintaining good quality in the diverted recycling streams requires householders to have:

- a broad understanding of the basic requirements of the overall scheme (what types of materials are collected in which containers, on which days);
- a clear understanding of the specific waste items / products that are collected for recycling in each separate stream, to enable people to make the right in-home sorting decisions (which individual items are wanted and which are not); and
- a motivational commitment to follow the instructions and an awareness of the issues that can be caused by not doing so.

The evidence review has shed light on the complex barriers in attitudes, knowledge, beliefs and behaviours that lead to poor recycle quality, which together can be summarised from two studies^{81, 82} as:

- a desire amongst committed recyclers to see recyclables collected – they put in extra things ‘just in case’ or sometimes ‘to make a point’ about the council not collecting items that active recyclers think should be collected for recycling⁸³;
- a belief that the down-stream separation process will sort things out anyway⁸⁴;
- a weariness with the effort required to separate materials, or to keep up with the latest requirements; and
- confusion due to changing requirements or from people moving but continuing with previous practices.

As already mentioned the research shows that issues with recycle quality are most commonly associated with plastics and food; which also have their own material specific barriers (see further discussion below in section 5.4).

There is also a longstanding problem with confusion that arises from the presence of the various recycling logos on products particularly packaging. Some research suggested the universal ‘Mobius loop’ logo was a signal to trigger recycling and the presence of words like ‘recyclable but check your authority’ in very small print adjoining a more visually striking recycling logo also prompted recycling^{85, 86}.

⁸¹ *Shropshire Council, 2013*

⁸² *Silver Dialogue, 2012*

⁸³ *Shropshire Council, 2013*

⁸⁴ *Silver Dialogue, 2012*

⁸⁵ *Wheeler, 2013*

⁸⁶ *Buelow et al, 2010*

5.3 Locations for provision of recycling services – kerbside, communal and bring / HWRCs
Use of kerbside collection services is the dominant recycling route for households living in properties with this service. Space to store recycling containers is the most commonly quoted barrier to the uptake of these services⁸⁷, followed by lack of containers through breakage, loss during a collection (container not returned to the property curtilage) or households moving and taking the containers⁸⁸.

Householders take waste to HWRCs and bring banks for a number of reasons⁸⁹:

- to dispose of materials that their local service does not collect;
- their recycling container is full and they do not have space to store their recycling and/or
- not wanting to store excess waste outside their home.

Bring sites and HWRCs and in London 'micro recycling centres' are sometimes the preferred option for householders who do not have internal space for large containers⁹⁰. Compared to kerbside collections, there are relatively fewer research studies on barriers to the uptake of bring schemes.

There is some evidence that householders use bring banks at supermarkets when they go shopping, so they are not making a special trip to recycle⁹¹.

Communal on-street recycling locations have expanded as a way of providing recycling services to flat dwellers (see section 5.5). Having to walk the waste to the collection point is the most commonly quoted behavioural barrier in this situation as it is perceived to require additional effort compared to the residential kerbside schemes⁹².

5.4 Recycling of specific materials including plastics and food

Plastics and food are the two materials with the greatest barriers to effective recycling behaviour, as already indicated. Here a synthesis of the evidence is presented in more detail.

5.4.1 Plastics

Plastics create the most common behavioural issues leading to confusion about what can be recycled and hence lowering the quality of dry recyclate. The number of schemes that are starting to accept a wider range of plastic packaging for recycling makes this issue one of growing importance.

Usually schemes will ask for specified plastic formats e.g. bottles only, some collect bottles and pots, tubs and trays (PTTs), or they specifically state the exclusion of plastics such as black plastics, film and expanded polystyrene⁹³. Plastics comprise a high volume and visible component of the household waste stream and a material that many householders want to recycle, and so can be inclined to err on the side of 'over-recycling', leading to quality challenges⁹⁴.

Although there is a consistent and pretty much universal demand for plastic bottles, there is comparatively less consistency across the country in respect of other grades and types of plastic. As a result, schemes differ from area to area and from time to time⁹⁵. The wide range in the types of plastic wanted, and the variation from scheme to scheme, together with the diversity in plastic waste arising in the home make plastics the most difficult material for people to recycle 'effectively'.

⁸⁷ 2CV UK, 2010; Taylor Intelligence, 2010; ZWS/Exodus Research, 2013; Sauce Consultancy, 2013; M-E-L Research, April 2013

⁸⁸ Hyder Consulting, 2010

⁸⁹ M-E-L Research, July 2012

⁹⁰ Enventure Research, 2011; 2013

⁹¹ M-E-L Research, July, 2012

⁹² ZWS/Exodus Research, 2013

⁹³ Recoup, 2012a

⁹⁴ Silver Dialogue, 2012; Shropshire Council, 2013

⁹⁵ Recoup, 2012

Aggregating the evidence has shown that the main barriers associated with plastics recycling can be classified into four main headings⁹⁶:

1. Poor understanding / confusion about the types of plastic targeted and acceptable to a collection scheme, specifically:
 - an inability to distinguish between polymer types, and confusion over logos and code numbers;
 - confusion over whether to include or exclude tops and lids;
 - difficulty in distinguishing PTT from polystyrene packaging for meat products and take-aways;
 - an inclination to add bags, carriers and film even if not specified; and
 - confusion about plastic paint pots and hazardous waste requirements.
2. Ineffective product separation behaviour:
 - not dismantling e.g. trigger packs;
 - not removing film from recyclable packaging items; and
 - not separating or rinsing food from plastics packaging.
3. Low awareness of wanted plastics from non-food packaging sources:
 - forgetting to include housewares e.g. plastic boxes and kitchen utensils when wanted e.g. at HWRCs;
 - forgetting to think about toys and plastic formed materials such as furnishing and DIY, again accepted at some HWRCs;
 - not considering items from the garden e.g. plant pots and garden products; and
 - not considering cosmetic, beauty, pharmaceutical, cleaning and hygiene product packaging, and packaging on gardening products and car cleaning / maintenance aids (often linked to confining plastics recycling behaviour to the kitchen, and not thinking about plastics from the bathroom and garden shed as a source).
4. Attitudes to cleaning and hygiene:
 - not recycling plastic packaging items because of the chore of rinsing them (as many plastic packaging products still contain food products/remains);
 - not being clear about the extent of washing / rinsing required; and
 - concerns about cleaning out toxic substances e.g. bleaches and garden products.

In summary, the barriers specific to plastics are extensive, complex and material-specific, often requiring a significant level of knowledge and understanding, and needing rigorous within-home waste management behaviour. Given that plastics recycling is growing in scope it is therefore particularly important that the Barriers framework can be used as an effective tool when developing interventions to overcome the material-specific barriers to recycling plastics effectively.

5.4.2 Food

Plastics comprise a high volume component of the household waste stream but the low density of the material means it contributes proportionally less by weight. Food on the other hand, contributes substantially to the total weight of household waste, and very considerably to the weight of biodegradable waste going to landfill. As with plastics, separate food waste collection is expanding in the UK, and the evidence review has shown food also to be a material associated with very specific barriers to effective recycling behaviour.

⁹⁶ WRAP/Corporate Culture, 2012; Silver Dialogue, 2012; Shropshire Council, 2013.

The evidence review has highlighted the key barriers specifically associated with food recycling. The first and most basic barrier can be summed up in the question, 'why bother?'^{97, 98}. Unlike materials that people can clearly see could be recycled into their original form or some derivative, there is no equivalent common understanding of how and why food waste should be 'recycled'. The term appears to be unhelpful as a description of the processes for recovering value from food through some kind of organic waste treatment. People often think food is composted but where meat-based food waste is collected this is often not so. As a consequence, low participation in food waste collection is often the result of a poor understanding of the purpose and value of doing it; the term 'recycling' can be seen as a barrier in itself to this understanding. It is the view of the authors that the recovery of value (including energy from AD) could be a more persuasive concept.

The authors suggest that the low levels of public understanding of the treatment activity may also contribute to the public's limited understanding and awareness of the materials wanted in a separate food waste collection service. There is limited perceptual understanding of what is meant by 'food waste' beyond the narrow definition of plate scrapings and vegetable peelings⁹⁹. In particular, unopened packaged food is often not seen as 'food waste' and is therefore omitted from the separate collection stream, yet this is a significant proportion of the food waste that is placed in the residual stream¹⁰⁰. Furthermore there is a lack of understanding that food waste includes non-edible items such as tea bags, coffee grounds and eggshells¹⁰¹.

Situational barriers strongly affect participation in food waste separation. In particular, lack of space in the kitchen for storing caddies and containers is a common reported barrier, along with the absence of a suitable liner¹⁰². As food preparation, and the clearing of items from plates, and disposing of out-dated items, generally all take place in the kitchen, this room and who-does-what within it, is the single most crucial situational setting for food waste recycling¹⁰³.

Most studies focus on the analysis of interview data obtained from one respondent – the person in the household who accepts at least some responsibility for recycling, but this person may not be the one who has a close understanding of what actually happens inside the kitchen. Qualitative in-depth studies suggest there continues to be a notable gendered division of labour within most households and the kitchen in particular (see sources reported in more detail in Section 5.8). These studies also suggest that in general women take responsibility for storage and sorting waste into recycling streams, whilst men do the heavy lifting, for example shifting containers to the kerbside or taking heavy waste to the HWRC. For this reason, research on food waste recycling behaviour needs to take better account of the gendered division of behaviour within the home and the attitudes and behaviours of women in particular.

Waste compositional analysis has also shown that food waste is highly correlated with family size and the presence of children – busy working families on medium incomes commonly are the highest food waste generators¹⁰⁴. Waste compositional analysis evidence¹⁰⁵ also shows that Asian and black households are proportionally higher food waste producing households than average, possibly associated with traditional food preparation customs, e.g. high reliance on preparing fresh produce. Of all the materials that can be recycled, food is the one with the most highly variable quantities generated per household, and the one where the highest

⁹⁷ M-E-L Research, January 2011

⁹⁸ M-E-L Research, May 2013

⁹⁹ Evans, 2011a;b; 2012

¹⁰⁰ M-E-L Research, May, 2012

¹⁰¹ M-E-L Research, January 2011

¹⁰² Metcalfe et al, 2013

¹⁰³ Wheeler, 2013

¹⁰⁴ A comprehensive analysis of household waste composition was carried out for Defra in 2009 by Resource Futures (Defra 2009); the association of waste composition with social groups is highlighted both in the research within that document, and in the practical experience of many waste collection services that cover diverse communities.

¹⁰⁵ WRAP/Exodus, 2008

quantities are associated with specific, definable household demographics. So it follows that the measures taken to overcome barriers to food waste recycling need to be very effective in relation to the specific lifestyles, attitudes and behaviours of this definable segment of the general population.

Common concerns and attitudinal barriers which can often deter participation in food waste collection schemes are widely reported^{106, 107, 108, 109}:

- concerns about smells and hygiene, especially if caddies are kept in food preparation areas in the kitchen;
- concerns about vermin, flies and cross-contamination of fresh food; and
- people finding the contents of the food waste caddy unpleasant.

Having food waste sitting around for any time in a kitchen environment is therefore an intrinsic constraint on the kitchen caddy storage route¹¹⁰. Coupled with this is the broader concern about the storage of food waste in outdoor containers in hot weather. While there is no more reason to assume that a separate weekly food waste collection is any more exposed to potential health risks than a weekly residual collection, the 'concentrated' container of food waste can be seen as a focus for hygiene concerns generally, not just in the kitchen.

Households tend to raise more attitudinal objections to food waste collection than they do for other materials, and the impact of this can be seen in the commonly cited research evidence for the drop-off in food waste participation that tends to occur in the weeks and months after the introduction of a scheme. Households that participate in separate food waste collections and then drop out, most commonly give their experience of smells and hygiene as the primary reason for lapsing¹¹¹.

Finally, with the vegetable element of food waste in particular, there are competing outlets, in particular feeding to domestic animals, pets and home composting¹¹², and also amongst some householders who compost at home feel that food waste is an excellent complement to otherwise excessive quantities of grass clippings in garden compost, and therefore use this route rather than separate food waste collections.

Since 2008 separately collected food waste has become the most rapidly expanding source of tonnage diverted from landfill. The service is still relatively new and bedding in, and people are only just getting used to 'the idea of it'. The barriers to food waste separation are highly specific to that material and there is a strong case for a specific Food Waste Barriers version behaviour change interventions to be formulated by food waste collection partners based on the knowledge summarised here, to help guide future efforts to overcome barriers to its more widespread adoption.

5.5 Effect of household type, specifically kerbside frontage properties and flats

The growing dominance of recycling collections from kerbside, as compared to bring schemes, has made the situational infrastructure of the household property a key focus for examining physical barriers. Most residential properties now have a kerbside collection service and the 2008 WRAP Barriers Model mainly centred on this property type. There are minor variations in the situational barriers for these properties, with the evidence review showing the main problems for kerbside properties being:

¹⁰⁶ Brook Lyndhurst et al, 2009

¹⁰⁷ WRAP/ICARO, 2013b

¹⁰⁸ M-E-L Research, July 2013

¹⁰⁹ Merythyr Tydfil County Borough Council, 2013

¹¹⁰ Metcalfe et al, 2013

¹¹¹ Merythyr Tydfil, 2012; SWLEN, 2013; Bernstad et al, 2013;

¹¹² Evans, 2011a;b; 2012

- terraced properties fronting directly onto the pavement, where householders are unable to store boxes or bins in the front garden or porch, they have to move boxes and bins through the house to where the front door leads directly onto the street¹¹³; and
- properties, more common in northern urban towns, where there are collections from rear alleys and unmade access routes which are hard to access by collection vehicles, meaning containers have to be taken some distance to a collection point by householders; and where mud and dirt get then onto the collection boxes or bins, putting off tidy householders from using these services¹¹⁴.

Size of property continues to be a physical infrastructure limitation, especially for the smaller properties built in recent years where in-home storage space is scarce. Not having space for the external bins and boxes, or having space for internal intermediate storage of recyclables, is the most commonly cited situational barrier based on the evidence review for residential properties, and the evidence since 2008 has not changed that.

Some local authorities have sought to use planning (development control) powers to prevent construction of residential premises without adequate consideration of the storage space for waste and recycling. Although not searched specifically in this review, the authors are not aware that any research has been undertaken to quantify the extent to which development control powers are being used in this way in the UK, nor the extent to which these provisions have led to additional in-home space in new properties in the authority area, or helped overcome householders' situational recycling barriers. This is an area worthy of future research, given that lack of in-home storage is the most prevalent infrastructure barrier.

The most significant household factor linked to less effective recycling behaviour found in the evidence review is the case of flats. Flats have emerged as a major priority for improving recycling, for the reasons given earlier in section 4.4. The 2008 Barriers Model did not adequately reflect the context of flats despite these now comprising around a quarter of UK properties.

The evidence review has highlighted a wide range of recent studies of the barriers associated with flats¹¹⁵. The four domains of situational (infrastructure and system), behaviour/lifestyle, knowledge and attitude are all conceptually robust in the context of flats, but the package of barriers is very specific to that environment. This is why it is recommended that a flats-specific version of the framework for understanding barriers to recycling should be developed to fully meet the requirements of authorities seeking guidance on how best to improve recycling from flats.

The vast physical and demographic diversity of 'flats' has been noted already, and from a synthesis of the individual studies identified in this review plus a wider consideration of urban form it is possible to discern a typology consisting of 12 distinct types of premises loosely termed 'flats'. In each case there are very different operating models for recycling infrastructure, service, and desired recycling behaviour, each with a very particular set of barriers to effective use of the recycling service. Further work is needed to develop this more fully, but the listing below shows the complexity involved and why this context is such difficult terrain for getting people to recycle effectively.

1. Tower blocks, high or medium rise:

- usually built by local authorities as social housing, some now stock-transfer to housing associations;
- some conversion to student accommodation; possible 'loft living' gentrification;

¹¹³ Timlett & Williams, 2008a; 2008b; 2009.

¹¹⁴ Jesson & Stone, 2009

¹¹⁵ Alexander et al, 2009; ZWS/Exodus Research, 2013;Hyder Consulting, 2010; Enventure Research, 2010.

- residual refuse chute on landing to basement paladin or continental bin;
 - recycling as landing sack collection or communal container¹¹⁶; and
 - often single person accommodation, high turnover, high void rate.
- 2. Low rise 'walk-up' flats and tenements:**
- usually local authority social housing, mixed family accommodation;
 - communal containers for residual waste and recycling on ground floor; and
 - can include older premises such as tenements with no purpose built waste storage areas (may now use converted coal sheds).
- 3. Flats over shops:**
- mainly private rented, some local authority if part of a municipal housing estate;
 - residual waste deposited in communal rear access containers; and
 - highly mobile tenure, short term, informal lets.
- 4. Residential maisonettes:**
- upper floor / ground floor properties often sharing single entrance door;
 - very limited space for recycling containers;
 - kerbside collection, sometimes communal; and
 - often occupied by newly forming families or young single working people.
- 5. Property conversions divided into self-contained flats:**
- can be very difficult to identify individual households (property sub-divided internally but share single front door);
 - limited space for storage, may share single kerbside bin and container collections;
 - informal arrangements for separate accommodation;
 - PRS tenants dominate, often highly mobile, in temporary residence; and
 - landlord may control local authority services, may be absentee or located at distance.
- 6. Houses in Multiple Occupation:**
- several functionally distinct occupier 'households' in the same premises, often the kitchen, living room and bathroom, and sharing waste containers;
 - high occupancy mobility, transient / temporary overstaying occupants;
 - most occupants are PRS tenants and may be students, and fragmented families in crisis with unpredictable domestic organisation; and
 - landlord may control local authority services, may be absentee or located at distance.
- 7. Serviced apartment blocks:**
- common entrance often with concierge or security, hard to access with information, concierge or managing agent may control access to residents;
 - can cover substantial new purpose-built city-centre high-earning professional worker tower blocks; or high rent purpose built medium storey suburban apartment blocks; and
 - usually have communal or shared waste and recycling containers in bin store.
- 8. Self-contained apartments:**
- smaller blocks of 4 or 6 flats in urban or suburban areas;
 - secure common entrance doors;
 - managing agents control waste services and recycling;
 - can have either individual or shared residual and recycling 'bin store' area; and
 - a mixture of long established older households and younger forming families.

¹¹⁶ These are increasingly being phased out due to Fire Service concerns

9. Gated village apartments:

- recently built city or town centre apartments, properties constructed in blocks but with the estate accessible only through security controlled gates with limited access;
- can be high earning professionals or retired households; and
- can have either individual or shared residual and recycling 'bin store' area.

10. Purpose-built student accommodation:

- often high rise blocks or flatted developments on campuses with waste collection services provided by the local authority;
- transient population, term time and for one year;
- high proportions of international students from a wide range of countries and cultures; and
- a mobile student lifestyle with little domestic organisation.

11. Sheltered accommodation:

- similar to serviced apartments or gated villages but with prevalence of elderly residents;
- usually have shared residual and recycling 'bin store' area, residents often have to take waste to the containers;
- care workers or family visitors may carry out domestic duties including food preparation and waste handling; and
- warden or concierge control of shared entrance, high personal levels of security for residents.

12. Miscellaneous – including hostels, B&B accommodation, also holiday lets:

- highly transient residents, often placed there in circumstances of personal or domestic crisis;
- waste management arrangements may be informal and not communicated at all to residents; and
- potentially chaotic lifestyle of residents.

A lot of the variables that are linked to lower effective recycling behaviour come together in the physical and social environment of flats, and this draft framework could be compiled into a taxonomy (structured tiers) organised by physical / situational barriers, lifestyle and life cycle factors, socio-economic status of residents etc. The limited but rapidly growing body of evidence on barriers to recycling in flats could then be structured accordingly, and learning points disseminated to aid best practice in overcoming the 'packages' of barriers typifying each category.

5.6 Evaluation and impact of service changes and behaviour change communications

The evidence review included a requirement to examine the available reports on the subject of communications campaigns, to assess whether there was any new learning on barriers to recycling.

The search identified 22 research reports on barriers to participation, capture and contamination, (some in the context of a service change), of which eight were detailed accounts of associated door to door engagement ("doorstepping") campaigns^{117, 118, 119, 120}. These reports give valuable insights into reasons why people are not recycling effectively, but they have no corresponding waste collection data from which to assess the outcome of the campaign; typically they are based on an opportunistic 30-40% doorstep contact sample, and they do not report demographic details of respondents.

¹¹⁷ Waste watch Recycle Western Riverside, 2008;2009; 2011;2012

¹¹⁸ Waste watch Recycle for London,2011

¹¹⁹ Waste watch Cambridgeshire& Peterborough Waste Partnership LPA, 2009

¹²⁰ Enventure Research 2011; 2013

Most studies report data on any improvements in recycling as indicated by local authority waste collection data¹²¹; although where longitudinal data is available some do indicate that the improvement is not sustained over time¹²². Few campaigns report tonnage or improvements in recycle quality attributable to the campaign intervention, and there are considerable methodological and cost implications to doing this robustly. Some reports rest on reported behaviour although the evidence review has shown there is frequently a gap of some 30% between those reporting participation and those actually participating, even in a limited way¹²³; ¹²⁴. This casts further doubt on the robustness of the evaluation methodology most commonly used in this type of work.

The evidence review concluded that overall the extent and quality of research into the outcome of behaviour change communications is patchy. The literature describes serious methodological limitations to achieving robust evaluation reports many of which problems stem from the complex multi-partner environment in which studies take place but also because studies have not been constructed at the outset with sufficient scientific rigour.

The limitations include:

- projects with data collected 'after' but not 'before';
- vague aim and objectives, for example: to increase recycling or recycle quality;
- lack of any identifiable counterfactual against which to assess impact;
- absence in the documentation of basic defining parameters – where and how the data was collected; service context; timing; specification of situation and study population;
- a focus on outputs (e.g. numbers of doors knocked, leaflets issued, requests for replacement containers) rather than impacts; and
- no accompanying local authority waste data.

In summary, there are limitations to the quality of the evidence identified and the conclusiveness of findings, and WRAP is now seeking to explore this area in further detail.

One further finding from our review is that none of these communication campaigns appear to be drawn together and stored anywhere. WRAP could play a useful role here in facilitating an on-going knowledge hub, simply storing and uploading appropriately classified studies, encouraging authorities, consultants and university projects to put their evidence on this data archive. The scanning work undertaken for this review provides in effect a one-off sweep to capture this material but the collective knowledge of the industry does not seem to be routinely accumulated, nor is there a well-known and easily accessed e-library that practitioners in local government and the waste management industry can readily draw upon. The Defra Wastenet facility may be too broad-based for this purpose and other resources could be investigated, possibly working in conjunction with the Local Authorities Recycling Advisory Committee (LARAC) or the Chartered Institution of Waste Management (CIWM).

5.7 Social and geo-demographic segmentation of the population

Recycling behaviour and associated barriers to recycling effectively are known to vary by socio-demography and this was built into the 2008 WRAP Barriers Model, both in characterising the levels of competence and in proposing targeted communications specifically aligned to the relevant social groups. The synthesis of the all the research evidence reviewed since 2008 continues to confirm this strong connection. When the data from recycling attitudes and behaviours surveys are cross-tabulated against socio-demographic data, the results, where they are reported, continue to reveal statistically significant correlations between survey responses and social groups on variables such as age, ethnicity, social grade, housing type and housing tenure¹²⁵. Moreover, prominent proprietary socio-demographic

¹²¹ Coterill & Liu, 2008; WRAP/Axion, 2010; M-E-L Research, January 2011; LGA/Southampton Council, 2012; Ricardo AEA, July, 2011; August 2013; Corporate Culture, 2013

¹²² Coterill & Liu, 2008; Bernstad et al, 2013

¹²³ M-E-L Research, May 2012;

¹²⁴ WAW/Ricardo AEA, July 2013

¹²⁵ WRAP/ M-E-L Research, 2011. M-E-L Research, May, 2012; July 2012; July, 2013; September, 2013

segmentation tools are increasingly being used to select consumer research survey samples in the first place, mainly ACORN¹²⁶, and Mosaic¹²⁷.

Two-way cross-tabulation of survey data produces statistical associations with key parameters as described above, but analysis of census and other social survey data shows that many of social variables are inter-correlated, making the attribution and direction of causal links with specific individual variables hard to discern. Moreover, when it comes to taking practical actions to improve recycling, it is hard to pick out and target people based on a single demographic factor (like age, gender or educational attainment). Instead it is more practical to pick out 'low performing areas' which are likely to contain a whole range of these social characteristics that tend to occur together and jointly contribute to low recycling performance. Services and targeted behaviour change communications are in reality most commonly implemented on an area basis, and this is one of the reasons why it makes sense to use a geo-demographic segmentation tool at local neighbourhood level to select the most productive areas for the intervention.

This factor has already been identified in Section 4 in the case of the proportionally low levels of recycling observed amongst flat-dwellers and amongst young people. Transience, high social mobility, social dis-engagement with 'place' and busy lifestyles are common features of both flat dwellers and young people and these factors combining with the un-promising physical infrastructure of flats conspire to bring together a raft of barriers in one setting. Because many barriers come together in ways that are very specific to the geo-demography of place, the multi-variate techniques for segmentation are both more conceptually valid and more useful in practice than the type of analysis based on simple two-way cross tabulation – despite the fact that the research evidence is dominated by this kind of analysis.

To accommodate the growing realisation of the value of conducting more sophisticated multi-variate analysis of data, it would be helpful if there were some initiatives aiming to extract this enhanced insight from the data sets in future. Tools such as Acorn and Mosaic have been shown in the literature to offer some potential for this, as they have been constructed as segmentors derived from complex factorial analysis of many covariate social and geo-demographic variables. However, even with these tools the authors conclude that recycling behaviour research has often not exploited their full value.

An example of this is in the case of Acorn, where much research evidence is produced through a simple analysis of the data according to the most aggregated, five-category level. Analysing data at this level misses out the added insight that can be gained from working at the more disaggregated level of detail that is available in both Acorn and Mosaic, providing a finer level of granularity. There is a high degree of social variation and associated differences in recycling barriers and behaviour within these categories, and the power of the tool to discriminate between these at fine detail is lost by the tendency of researchers to use a 'crude' 5-category level of analysis. Some studies¹²⁸ show the benefit of analysing at the full 64-level Acorn type – for example by analysing within the often-lower performing Acorn 5 segment in greater detail, this can pull out very different features amongst specific types that are lumped together in the overall category 5. The tool when applied on the ground at small scale, such as SOA¹²⁹ (c.125 households) or postcode (c.25 households), has the potential to be used to get both services and messages localised and finely attuned to the barriers particular to these detailed segments. Mosaic has 15 primary categories and therefore allows for greater granularity at category level, but large sample sizes are required for survey-based studies to enable this level of segmentation for the population as a whole.

In the later part of 2013, Waste Awareness Wales (WAW) released a segmentation toolkit which makes an interesting contribution to this type of application. It is based on an

¹²⁶ Timlett & Williams, 2009; all M-E-L Research, 2011; 2102; 2013; WAW Ricardo/AEA, 2012; 2103

¹²⁷ Rooke, 2012

¹²⁸ WRAP/M-E-L Research 2011

¹²⁹ Super Output Area – the smallest building block used by the government for census data.

integration of the 3Rs tracker data and the CACI Acorn segmentation model, to create a set of recycling segments. The aim is to develop communications strategies appropriate to specifically constructed geo-demographic population segments in Wales, following the lines of thought outlined above. However it still does not specifically identify and focus on the barriers to recycling effectively amongst the segments and, at the time of writing, has not yet been tested on a communications campaign. Exodus Market Research¹³⁰ has undertaken useful work for Zero Waste Scotland on segmenting barriers to recycling effectively, primarily (but not exclusively) around flats and tenements. Recently, Recycle for Greater Manchester¹³¹ has made interesting progress with a highly targeted and intensive pilot intervention using social segmentation to target localities and tackle recycle quality of the co-mingled recycle in a round in Rochdale. This shows all the merits of adopting the localised, community-based and issue-focussed behaviour change intervention using social marketing methodology. It is however a trial based in one locality, and at the time of writing is yet to be rolled out across Greater Manchester.

In summary, these most recent examples of segmentation show some useful ways forward in using this approach to improve the insight into recycling barriers, and for targeting interventions aimed at overcoming them, especially at local neighbourhood level. Studies are still experimenting with innovation in this field, and the evidence review shows enough potential to justify further exploring these segmentation and social marketing approaches in overcoming barriers to recycling effectively.

5.8 The role of household dynamics and in-home division of labour in the 'work' of recycling
Mention has already been made of the academic research that has strengthened recent understanding of recycling behaviour in the context of the sociology of household labour and the concept of recycling as domestic work (sections 4.7 and 4.11). Relatively little is known in detail on 'who does what' in relation to recycling within the household¹³². This insight is more likely to be gained by qualitative rather than quantitative research, but rigorous qualitative evidence is scarce, judging by the material gathered for the evidence review. The review has identified some notable studies on the gender division of labour within the household and the significant role of children in influencing household environmental behaviours including recycling¹³³. These are useful in guiding behaviour change communications but the fundamental problem, as highlighted in section 4.1 above, is the lack of a basic conceptual framework for understanding and influencing the collective behaviour of individuals operating within a household behavioural unit.

The evidence review shows that one common perceptual barrier leading to resistance to separating waste for recycling, is the belief that 'we are just doing the council's work for them'^{134, 135}. This is a more interesting and insightful perception than might at first meet the eye. It rests on a deeper implicit understanding of the expected division of labour between council and resident. The post-war development of the public services from the 1950s onwards did centre on an implicit 'service contract' between the taxpayer and the public services – the job of the public service 'corporation' was to deliver the service and the job of the taxpayer was to foot the bill and receive the service. Waste collection traditionally resembled other public or nationalised services like British Rail in this respect, with high levels of customer support and a lot of 'work' being done by employees etc.. Bins for example were often carried from the doorstep to the dustcart and then back again to the householder's doorstep.

Recent years have seen a substantial transfer of production work from provider to customer across a whole sweep of the public and private sector service economy. This ranges from self-

¹³⁰ ZWS/Exodus, 2013

¹³¹ Recycle for Greater Manchester/Corporate Culture, 2013

¹³² At the time of writing, Coca Cola Enterprises had not yet published their report "Unpacking the Household: Exploring the Dynamics of Household Recycling" which makes an interesting contribution to this area.

¹³³ Maddox et al, 2011; Evans, 2011a;b; 2012; Wheeler & Glucksmann, 2013; Metcalfe et al, 2013.

¹³⁴ Shropshire Council, 2013

¹³⁵ Wheeler & Glucksmann, forthcoming

assembly and self-installation of household goods, use of ATM cash machines rather than visiting bank clerks, to online holiday booking rather than buying packaged holidays from travel agents, and the introduction of self-check outs at supermarkets. The 'internalisation' of significant elements of the production process within 'work' to be done by the consumer rather than the provider, is a structural change on-going in the organisation of work in post-industrial societies.

The same pattern is apparent in the growing expectation placed on residents to segregate their household waste into separate containers ready for the council or contractors to collect and also to be sure to do this 'effectively'. For some people who adhere to the traditional public service 'compact' ('we pay taxes for the council to do all this for us') the enhanced expectations present a challenge to their beliefs about the rightful division of labour and responsibility. The new paradigm of 'co-production' is emerging however across the public services, and also other private sector service industries, and there is merit in communicating the requirement for effective recycling behaviour within this broader context. Cuts to local authority budgets more generally are prompting similar changes in other services – park wardens, library assistants, school crossing patrols, community litter-picks are all examples of environmental services once delivered by local authority employees, where councils are now looking for voluntary organisations or community champions to take on responsibility for doing the 'work'.

While the drivers for householders to separate their recyclables are different, the overall impact on household behaviour is similar, and can be seen as part of a wider social process. As noted above, some interesting academic research is under way in the UK and abroad in the understanding of household recycling behaviour as 'domestic work', and it would be valuable for recycling behaviour change to be approached based on this developing insight.

5.9 Conclusions

This section has sought to bring together a synthesis of the research evidence gathered from this review, organised along the lines of enquiry laid out by WRAP in the brief for this study.

Research evidence is richer in some of the field than others, and there is an overlap between some of the synthesis presented here, and the synthesis of evidence on the main dimensions of change since 2008 reported in section 4.

Overall however, it has been possible to assemble an extensive and insightful overview of the current state of knowledge in the UK on barriers to effective recycling set against the key questions laid out by WRAP.

The work undertaken in this review plugs a gap that exists in managing the current knowledge base, as there is no systematic infrastructure in place to store the insight being continually gained from academic, local authority and WRAP-supported research and evaluation projects. Good practice in understanding and overcoming the barriers to recycling in the most effective way, and in developing continuous improvement and the conceptual basis for this understanding, would benefit if a routine mechanism was developed for sourcing, extracting and synthesising this insight on a more regular basis in future.

6.0 Practical implications

6.1 Summary of practical implications and top tips

This concluding part of the synthesis review focuses on the practical implications for organisations with an interest in seeking to overcome barriers to recycling effectively. The aim is not to repeat points already made, but to draw attention to the possible ways in which each might be overcome in practice. In the section below, the main updated barriers are summarised under the overall themes specified by WRAP for this review, and some potential implications stemming from them are then suggested in italics.

a) Tackling less effective recycling behaviours

The barriers are **conditional** – in other words, they depend on one another.

- *This means that all four types of barrier need to be thought about and addressed together, rather than picking up on one or two barriers individually, out of the wider context.*

The simple situational (practical) category used in the 2008 Model should be subdivided into **property type** and **system** (the accepted materials and how they are presented for collection).

- *For collection scheme providers, this means making sure the householder gets a service tailored where possible to their property type and circumstances.*

Behaviours that reduce recycle quality and lead to poor capture are an important feature of people who are already recycling, but just not doing it as effectively as they could.

- *For councils and their partners wanting to improve recycling this means understanding where the biggest improvements can be made – by reducing contamination, by increasing capture, or both - and targeting messages appropriate to each. As well as focusing on driving up participation, organisations should therefore give equal, and possibly greater attention, to getting existing participants to do it more effectively.*

A recently-emerging barrier centres on the problems caused by **continuing change**.

- *To sustain effective and improved recycling behaviour councils and their partners need to develop ways of anticipating and handling the confusions that continuing change tends to cause; for example using innovative approaches to identify when new householders move in, and then explain the system to them as an 'induction'.*
- *When using fixed instructions such as those printed on bins or presented in giveaways such as fridge magnets it is important to note that these items can get out of date as the systems change, if they not replaced or updated. They can be passed inadvertently to new occupants when they move in, meaning they may therefore be unaware that recycling instructions on how to most effectively use the scheme have changed. Consideration needs to be given to ways of avoiding this outdated information misleading residents as systems change.*

b) Overcoming barriers to do with plastics

Plastics are often the focus of public confusion, resulting in ineffective recycling behaviour that can both lower the quality of recycle and lead to poor capture.

- *In overcoming these barriers, all organisations involved in designing plastics recycling communications need to develop communication strategies specifically around plastics, to address the commonly cited issues of:*
 - *poor understanding / confusion about the types of plastic targeted and acceptable to a collection scheme;*
 - *product separation behaviour, for instance removing film from pots, tubs and trays;*
 - *low awareness of wanted plastics from non-packaging sources such as kitchenware and toys, and where best to take them for recycling; and*

- *attitudes to cleaning and hygiene, and the contaminating presence of food on much plastics packaging.*

c) Overcoming barriers to do with separate food collections

As with plastics, food is also a material associated with very specific barriers to effective recycling behaviour.

- *All those communicating about recycling food waste, need to make it clear in the information they give to residents, the basic reason why it makes sense to recycle food waste – what's the real benefit? How does the technology bring about the benefit in practice? (e.g. in converting food waste to energy)*

Because not many people understand the reprocessing activity, this leads to a further problem, of poor public awareness of the specific food items wanted in a food waste collection; as a result people can easily think they don't have enough to bother taking part.

- *Councils and their partners need to make it clear to residents in their food waste communications, exactly what can be included in the food waste collection and not assume a common understanding of the term 'food waste'. Pre-packed and out-of-date packaged food should specifically be targeted to explain this can be included in a food waste collection.*
- *To encourage people to recycle food, all those communicating about food waste recycling need to advise and reassure people about safe and hygienic in-house waste food containment, so as to overcome the common attitudinal barriers often deterring kitchen food recycling behaviour.*

d) Dealing with the challenges associated with flats and the private rented sector

Approaching a quarter of UK properties can be described as 'flats' of one kind or another, and these are often locations with low participation and low recycle quality. The review has highlighted the complex and highly interlinked array of recycling barriers that lead to this. It also shows that the term 'flats' encompasses a massive variation in physical and social settings.

- *Councils and their partners should develop a local strategy for flats if these form a significant part of their properties, drawing on and adapting the basic barriers framework to guide their thinking as described in this report. Communications and service provision should be designed so as to take specific account of the very different environments and barriers associated with different types of flats, rather than thinking of flats as a 'one-size-fits-all' property type.*
- *To help councils think about this, the review has proposed using a 12-category typology to guide interventions to meet very different physical and social environments (see section 5.5).*
- *This also means providing a recycling service for flats that is designed specifically around the different types of flats in an area, and also taking close account of the social circumstances and lifestyles of the types of people living in them.*

People living in **private rented sector (PRS) properties** face a range of very specific barriers to recycling, listed in detail in this report.

- *This means that PRS tenants are likely to find recycling particularly difficult, and more effective ways are needed to overcome the specific problems they face. Tailored communications are needed as well as engagement with organisations that come into contact with this group of people. The communications should be written with an understanding of the lifestyles many PRS tenants experience, such as short term tenancy, high personal mobility, landlord involvement in the waste services and facilities, and confusion over specific responsibilities that individual tenants may*

have. Amongst PRS tenants there are many factors that tend to group together making recycling especially hard to do effectively, and to be effective communications should be written showing a practical insight into these barriers and ways of overcoming them.

e) Impact and evaluation of service changes and behaviour change communications

There is a considerable body of evidence accumulating on the impact of service changes and of associated behaviour change communications. Findings from our review however show that while process descriptions and experience is useful, evidence on outcomes and attributable impacts is of relatively poor quality. Also none of this evidence appears to be drawn together and stored anywhere. There is scope for an improved system to capture and use collective learning.

- *WRAP and other relevant agencies should consider how best to store and disseminate this learning so local authorities and their partners can benefit from it.*
- *A key challenge for future recycling interventions is to base the design on a standard evaluation framework, with a logic framework that details expected a clear aim and outcome and output objectives. Such an approach in simple terms should state:*
 - *Here is the problem.*
 - *Here is what we intend to do about it (the intervention).*
 - *Here's what we want to happen as a result (outcome).*
 - *Here's how we are going to test whether it worked.*

f) Linking communication with the social and geo-demographic segmentation methods

Recycling behaviours, and the associated barriers to recycling effectively, have both been known to vary by socio-demography for a long time, and this was built into the 2008 WRAP Barriers Model. The present review confirms the persistence of this connection. Recycling behaviour and the barriers to recycling effectively can vary across the social spectrum, age, ethnicity, social grade, tenure and affluence.

- *Organisations should design communication messages that are explicitly geared to the types and segments of people they are trying to reach, in order to maximise impact.*

Evidence also suggests there may be benefits to targeting through socio-geodemographic segmentation tools, examples being CACI's ACORN and Experian's MOSAIC classification systems.

- *For this reason councils and their partners should give consideration to ways that these tools (which are often held centrally within council policy and research teams) might be used for identifying local priority areas for behaviour change interventions, and then designing the right communications channels, media and messages that are most likely to hit home with these target segments.*
- *Where the proprietary software is not held by the authority, approximations to neighbourhood segmenting can still be considered by the creative use of census, council tax banding, property tenure data etc. This kind of socio-demographic analysis is used by most councils for land use planning, educational service planning for pupil place provision etc, and this socio-geodemographic knowledge could be readily adapted for use in designing and targeting recycling communications.*
- *WRAP could support local authorities and partners in doing this, by showing what messages work with specific audiences and which communications channels and media are most effective with each segment.*

Messages and communications appear to make a more persuasive impact where there

is a strong and trusted relationship between people and their local neighbourhood, and with their local council.

- *The evidence suggests it can strengthen the impact of communications if local trusted community groups and champions are engaged to issue the message. This can tap into and help to build neighbourhood pride and improve local area quality more generally.*

g) The role of household dynamics and in-home division of labour in the 'work' of recycling

The review has shown that recycling is often a collective household activity – working best where it is a team effort. It follows that recycling is best understood as one of the many types of domestic work that take place in a typical household, and recognising that this 'work' is split up amongst people in the household to get it done. Recycling is therefore a **collective household behaviour**, often with several household members involved; there may also be several 'mini-households' or concealed households living within one property.

- *This means that communications and messages need to reflect the need for all members of the household to work collectively (recognising shared work), rather than based on the idea of contacting and motivating one householder to recycle effectively. This does not necessarily imply communicating with every household member, as households generally have someone who mostly deals with the rubbish; but it does mean getting across a message that recycling is 'teamwork', where everyone in the household who creates or handles waste has a role to play.*
- *The 'person responsible for the household's waste' needs to take it on themselves to get the others organised too, and to cascade the recycling messages and behaviours that are most effective for the local scheme, to everyone in the household.*
- *This approach to communication can then be used to craft more focussed messages centred on behaviour change by individual roles played by household members (such as clearing up after meals, tidying bedrooms, doing the DIY) where it is important to trigger effective recycling behaviours, to maximise capture but minimise contamination.*

However, research on within-home behaviour has generally been not very well developed. Furthermore, the within-home dynamics of disengaged, hard-to-reach households are even less well understood than the average household, and such households are reluctant to take part in the social research upon which social and behavioural models are based, leading to further gaps in the knowledge that councils and their partners need to help design recycling messages and communications effectively.

- *A number of organisations could explore this and find messages for conveying the recycling message at local or national level – e.g. through self-help groups, deliberative citizens' panels or informal resident groupings like tenant and resident associations or neighbourhood forums.*
- *A simple idea is to talk to these groups about how things work within their households, and so get a better understanding of how behaviour change interventions should best influence the collective setting of the domestic division of labour for people in these circumstances, which are often very different to that assumed to apply in organised households.*

Finally, a key development since the earlier 2008 review is that recycling has now largely become a **social norm** and also that getting into a regular in-home **collection 'rhythm'** is an important factor in helping people to adopt effective recycling behaviours.

- *This means that where social norm and routine are missing or disrupted - either*

through a communal system without the visible weekly or fortnightly prompt, or a collection system that has been changed and experienced bedding-in problems, specific efforts need to be given to substituting for, or restoring, the rhythmic behavioural patterns of recycling behaviour.

- *In the case of the communal systems that lack the visual trigger of a routine collection day set-out, councils and their partners could work with other agencies (for example, housing associations and home care support services) to help people in these situations to adapt to this household norm and so establish these routine behavioural patterns that help make recycling 'second nature'.*

6.2 Conclusion

This concluding section of the synthesis review has highlighted some of the potential practical implications stemming from the evidence reported earlier.

The intention has not been to put forward a blueprint for future actions, as this would stretch beyond the brief for this study. It has, rather, been prepared as an illustration of the ways in which the most recent compilation of research evidence on the barriers to recycling effectively can be used by waste management practitioners as a resource, helping them to learn from the evidence and deliver more effective recycling services as a result.

Appendix 1: Bibliography

Key: [Unpublished] denotes not publically available. [P] denotes Powerpoint Presentation. [Data] denotes raw data.

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Appendix 3: Data Extraction Form

WRAP Evidence Review 2013

Data Extraction Form [needs to cover who, when, where, how, why, what]

1. **Ref details: Author, date, title, journal title, vol. iss. pages.**

2. **Paradigm (academic/practitioner researchers)**

Sociology psychology marketing behaviour change,
environmental sciences consultancy geography

3. **Overall Aim and focus of paper**

4. **Study Design:**

Evaluation; survey; interview; doorstepping; FG; RCT

Waste sorting /measuring: PR/OR/CR. Sec data /desk

5. **Method details:** Study location (city):

Sampling selection: household type – houses; flats

Demographics / population and sub groups

Sample size; response rate

Analysis: qualitative; statistical; factor analysis

Mosaic IMD ACORN

6. **Models or theory tested/applied**

7. **Data on barriers**

8. Contamination /incorrect behaviours

9. SERVICES

Recycling location: kerbside; bring bank; HWRCS

10. Specific materials: food; plastic; residual; paper; etc

11. Market Segmentation

12. Communication

13. Evaluation : Impact of service charges

14. Evaluation: impact of communications campaigns on participation, capture, contamination

15. Comments

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[www.wrap.org.uk/content/barriers-
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