



Friends of the Earth (England, Wales and Northern Ireland)

Residual Waste Research

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EXECUTIVE SUMMARY

The UK consumes more than its fair share of the world's resources, creating environmental and social problems across the world, particularly in developing countries. Many of these resources are literally wasted through the mainly linear process of material use in our economies.

Materials are extracted, used or further processed into products where they are used and then disposed of to landfill and incinerators. There is a clear need to improve UK and EU resource efficiency and reduce climate impacts, through promoting waste prevention, reuse, recycling and composting and by phasing out residual waste.

England and the three devolved administrations now have separate waste strategies, all of which have a stated objective of reducing the amount of residual waste going to disposal. The Waste Strategy for England 2007 also commits the government to setting targets for local government on residual waste, that which is not reused, recycled or composted.

Even with an excellent doorstep collection of recyclable materials and products for households, provision of civic amenity sites and bulky waste collections, there are still residual wastes arising from households. The development of policies to remove these materials and products from the waste stream needs to be underpinned by research which provides a robust evidence base for these policies, both in terms of accuracy of data and the effectiveness (or not) of the various policy options. This research is the first phase of a two part programme the first stage of which is the identification of what materials and products end up as residual waste and in what quantities, with the second stage focusing on what policy measures could be used to phase out residual wastes and what the environmental impacts would be.

The tonnage and composition of household residual waste was estimated based on two scenarios, hypothetical and practical. The decision to base the estimates on two scenarios was based on the researcher's knowledge of the sensitivity of residual waste estimates to starting assumptions on waste quantities and composition and collection system capture rates. Waste streams were categorised into collected household bin waste (i.e. including recycling, composting and residual waste uplifts), bulky household waste collections and civic amenity site waste.

Each scenario was based on a range of assumptions, boundaries and data sources and these are specified both in the main report and the accompanying spreadsheets. Data sources for each waste stream and category are specified. The spreadsheets provide a basic model which will allow the estimates to be easily updated should improved data on the composition of the household waste stream and capture rates become available.

The results of the research has produced estimates of the total quantity of residual waste arisings of between 5,364,000 and 10,188,000 tonnes for the hypothetical and practical scenarios respectively, from the most recent waste arisings data for each region of the UK.

The estimates are broken down by waste/material type and by source to identify the most significant wastes types in tonnage terms.

The hypothetical scenario identified a range of significant residual waste/material types, the principal components of which were other paper and card (1,264,077 tonnes), disposable nappies (922,817 tonnes), other miscellaneous combustibles (507,563 tonnes), other organic wastes (482,007 tonnes), construction and demolition waste (450,737 tonnes), other packaging (366,619 tonnes), packaging film (321,167) and mixed bagged waste (18,955). The source of these waste/material streams varied, with most of the other paper and card and disposable nappies arising from the household collected waste source, with construction and demolition waste and mixed bagged waste arising from civic amenity sites and furniture arising from bulky waste collections.

The practical scenario identified a range of significant residual waste/material types, the principal components of which were other paper and card (1,264,077 tonnes), disposable nappies (922,817 tonnes), kitchen waste (640,200 tonnes), construction and demolition waste (588,599 tonnes), other miscellaneous combustibles (568,168 tonnes), furniture (500,876 tonnes), other organic wastes (482,007), newspapers and magazines (446,917 tonnes), other packaging (442,926 tonnes), cardboard boxes/containers (434,889 tonnes), mixed bagged waste (387,099 tonnes), packaging film (386,098 tonnes) and packaging glass (351,050). The source of these waste/material streams varied, with most of the kitchen waste, other paper and card, disposable nappies, cardboard boxes/containers, garden waste and packaging glass arising from the household collected waste source, with construction and demolition waste and mixed bagged waste arising from civic amenity sites and furniture arising from bulky waste collections.

The difference between residual waste arisings in the hypothetical and practical scenarios demonstrates the potential reduction in residual wastes that could be achieved by improving capture rates. The practical scenario highlights those wastes that currently end up in the residual waste stream such as paper/card and plastic packaging which could be removed with improved capture rates and emphasis on segregation to prevent contamination.

Data issues/limitations were highlighted as a particular area of concern in terms of the robustness and accuracy of the estimates of waste quantities and composition. Recent research by the Open University into the composition of municipal solid waste has drawn attention to the limited nature of previous surveys of household waste composition, none of which have addressed the entire household waste stream in a systematic manner, resulting in there currently being no reliable estimates of the total composition of municipal solid waste for any part of the UK.

The report makes recommendations on a number of areas for additional research including a review of waste compositional analysis work carried out in the UK over the last 5 years, the commissioning of a representative national survey of the full range of household wastes arisings (household collected, civic amenity site and bulky wastes), integration of waste/product/material classification systems and a review of capture rates research to date, with a view to making recommendations on future research and data needs.

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1.INTRODUCTION

1.1UK Resource Use

The UK consumes more than its fair share of the world's resources, creating environmental and social problems across the world, particularly in developing countries. The current model of development based on the erosion of natural resources and capital is unsustainable. One means of measuring the impact of resource consumption is the Ecological Footprint and if everyone in the world consumed as much as the UK population it would take the resources of over three planets to support them.

Many of these resources are literally wasted through the mainly linear process of material use in our economies. Materials are extracted, used or further processed into products where they are then disposed of to landfill and incinerators after use. The aim of Friends of the Earth's Reduce Resource Use campaign is to improve UK and EU resource efficiency and reduce climate impacts, through promoting waste prevention, reuse, recycling and composting and by phasing out **residual waste**.

1.2What is Residual Waste?

Not all materials and products are able to be reused, recycled or composted and these are the materials that end up in residual waste and drive the need for disposal technologies such as landfill and incineration. Even with an excellent doorstep collection of recyclable materials and products for households, provision of civic amenity sites and bulky waste collections, there are still residual wastes arising from households. A strategy to remove these materials and products from the waste stream needs to be underpinned by research, the first stage of which is the identification of what materials and products end up as residual waste and in what quantities.

1.3Policy Context

A range of policies at European, national and regional levels provide the policy context for residual waste production and prevention and these are described below.

1.3.1EU Policy Context

The EU has adopted a range of thematic strategies under the 6th Environmental Action programme, the Thematic Strategies on 'Sustainable Use of Natural Resources' and 'Prevention and Recycling of Waste' set the policy context for residual wastes. While the Thematic Strategy on Sustainable Use of Natural Resources does not refer specifically to residual wastes, it does set out as its overall objective '*to reduce the negative environmental impacts generated by the use of natural resources in a growing economy – a concept referred to as decoupling*'.

The Thematic Strategy on Prevention and Recycling of Waste refers to the potential of EU waste policy to contribute to reducing the overall negative environmental impact of resource use and states that the basic objectives of current EU waste policy – to prevent waste and promote re-use, recycling and recovery so as to reduce the negative environmental impact –

are still valid and will be supported by this impact-based approach. The strategy recognises that this requires a combination of measures to promote waste prevention, recycling and re-use in such a way as to produce the optimum reduction in the accumulated impact over the life cycle of resources. Of the seven actions identified within the strategy, of particular relevance to this research is the introduction of life-cycle thinking into waste policy. The strategy states that *'by applying the life-cycle approach, priorities can be identified more easily and policies can be targeted more effectively so that the maximum benefit for the environment is achieved relative to the effort expended.'* Recommendations set out in Section 5 which relate to the impacts of such an approach for this research.

1.3.2UK Waste Policy

With the publication of Waste Strategy for England 2007, England and the three devolved administrations now have separate waste strategies. 'Wise about Waste: The National Waste Strategy for Wales' published in 2002 identified a range of potential mechanisms to increase participation in recycling schemes, including direct charging for the quantity of residual waste collected with segregated recyclables being collected for free or at a lower rate.

Scotland adopted a national strategy, the 'National Waste Plan' in 2003, which states that *'treatment technologies for residual mixed wastes that further boost recycling and composting outputs and thereafter reduce the final amount of material going to landfill, are the preferred way forward.'*

'Towards Resource Management. The Northern Ireland Waste Management Strategy 2006 – 2020', refers to household waste stating *'waste prevention will help us to meet our targets by reducing the amount of residual waste requiring recycling and recovery'*, and sets out the following activities as examples of those that can reduce the amount of waste entering the collected waste stream:

- avoiding waste generation;
- reducing the quantity and hazardous nature of waste at source; and
- reusing products before they enter the waste stream.

1.3.3Waste Strategy for England 2007

The strategy sets out the following objectives and targets:

- Decouple waste growth (in all sectors) from economic growth and put more emphasis on waste prevention and re-use.
- Meet and exceed the Landfill Directive diversion targets for biodegradable municipal waste in 2010, 2013 and 2020.
- Increase diversion from landfill of non-municipal waste and secure better integration of treatment for municipal and non-municipal waste.
- Secure the investment in infrastructure needed to divert waste from landfill and for the management of hazardous waste.
- Get the most environmental benefit from that investment, through increased recycling of resources and recovery of energy from residual waste using a mix of technologies.

The strategy goes on to say that, due to lower than predicted levels of waste growth, the Government expects lower levels of residual waste than were previously assumed to be produced.

The Strategy identifies incentives as one of its key proposals for action, and within this, proposes to consult on removing the ban on local authorities introducing household financial incentives for waste reduction and recycling, through early legislative change. Local government would be free to introduce schemes where householders who recycle their waste receive payments funded by householders who do not recycle. The strategy states that this incentive could reduce the amount of annual residual waste landfilled by up to 15%, equivalent to 1.5 million tonnes or 130kg per household. The strategy also commits the government to setting targets for local government on residual waste, that which is not reused, recycled and composted.

1.4 Objectives

This research is the first phase of a two-part research programme with the following objectives:

- **Phase 1 – Identifying residual waste**

The first stage of the process is to identify the materials and products from households that ultimately become residual waste and to estimate the quantities of these waste arisings.

- **Research Phase 2 – What policy measures could be used to phase out this residual waste, and what would be the environmental impacts?**

Phase 2 of the research will be developed in detail once Phase 1 is complete, and therefore is not addressed in this report in detail.

2. METHODOLOGY

2.1 Introduction

The methodology used to estimate the quantities of materials and products from households that will end up in the residual waste stream, comprised of the following stages:

1. Definition of assumptions and boundaries.
2. Review and collation of compositional waste analysis data.
3. Estimates of hypothetical and practical capture rates for collected household, civic amenity and bulky waste components.
4. Collection of waste arisings data.
5. Estimation of the quantities of residual waste by component for the collected household, civic amenity and bulky waste streams.

The tonnage and composition of household residual waste has been estimated based on two scenarios, hypothetical and practical. Estimating the composition of the residual household waste stream is at its most basic, a product of the starting composition of the waste streams,

and the estimated capture rates for the collection systems, which will vary depending on the material and collection system. Although data has been improving in recent years, through

research carried out by Defra and Wrap, there is a lack of peer reviewed research on the performance of collection systems for recycling and composting. The research team has therefore chosen to apply two capture scenarios (hypothetical and practical) to illustrate the sensitivity of these assumptions on the estimates of residual waste composition and arisings. The estimates of residual waste arisings both scenarios are contained in the two accompanying spreadsheets to the report:

- Residual waste estimates_hypothetical
- Residual waste estimates_practical

The spreadsheets also specify the assumptions and data sources for each waste category and waste stream. Recommendations on which estimates should be adopted for Phase 2 of the research are set out in Section 4.

2.2 Assumptions and Waste Streams

The following assumptions and boundaries were used in the analysis:

- Waste streams included in the research were collected household bin waste (i.e. including recycling, composting and residual waste uplifts), bulky household waste collections and civic amenity site waste.
- The research covered the whole of the UK (i.e. England, Wales, Scotland and Northern Ireland).
- Residual wastes were defined as the wastes arising which cannot be recovered by recycling and composting systems and end up in the 'black bag' or wheeled bin.
- Good quality recycling and composting schemes are in place and that these are operating according to two scenarios: Hypothetical and Practical.
- The recycling and composting schemes can recycle or compost the following materials*:
 - Newspaper, magazines, white paper, junk mail, cardboard
 - Steel cans, aluminium cans;
 - All colours of glass (but not window glass, pyrex glass, broken glass etc)
 - PET, HDPE, PVC
 - Food waste, garden waste
 - Electronic equipment (once the WEEE Directive comes in)
 - Batteries

*The methodology applied assumed that the recycling and composting schemes collected all materials which are potentially recoverable from the household waste stream.

2.3 Review and Collation of Compositional Waste Analysis Data

A literature review of published compositional data for household, bulky and CA site waste streams was carried out to identify the most appropriate data set(s) for use in this analysis. Data on the compositional breakdown of household wastes is notoriously poor and the majority of the waste compositional analysis studies which have been carried out have been limited to collected household bin waste.

Until recently there was no standard approach to conducting waste compositional analysis. Therefore comparing data from individual studies can be problematic due to differences in approaches such as the scope of the characterisation, sampling strategy, waste categories used and waste streams covered.

Recent research by the Open University into the composition of municipal solid waste has highlighted the patchy nature of the data produced from previous studies, stating: *'Whilst all these surveys have provided useful information, they were all intentionally limited in scope. Most of the studies covered only a limited geographical area or season of the year and none addressed the entire MSW stream in a systematic manner. **Consequently, there are no reliable estimates of the total composition of MSW for any part of the UK.*** (Burnley *et al.*, 2006).

Selecting the best data sources often entails compromising between the quality of a range of factors including age of the data, geographical spread (local, regional, national), waste streams covered, classification system employed (compatibility) and level of detail of classification (i.e. no. of waste/material categories used).

Choice of waste compositional data sources and classification system.

The literature review identified three key sources:

- Parfitt, J. (2002) Analysis of Household Waste Composition and Factors Driving Waste Increases.
- Burnley, S *et al.* (2006) Assessing the Composition of Municipal Solid Waste in Wales. Resources, Conservation and Recycling 49: 264–283.
- Burnley, S. (2007) A review of municipal solid waste composition in the United Kingdom. Waste Management 27:1274-1285.

Burnley *et al.* (2007) reviewed published research on municipal waste composition in the UK and concluded that the only systematic survey of the entire MSW stream covering all seasons of the year was the work undertaken for the Welsh Assembly Government. Therefore the data set from Burnley *et al.* (2006) formed the basis of both the waste compositional categories and the percentage estimates of waste composition used in the analysis. It was considered by the project team to be the most representative waste compositional data currently available. Additionally, the classification system employed was developed by the Environment Agency in consultation with the Scottish Environment Protection Agency and is closest to a 'standardised' classification system. However it should be noted that this classification system contains the category 'other miscellaneous combustibles' and this category will contain recyclable items but it was not possible to disaggregate this category within the scope of this research and so the total tonnage of 'other miscellaneous combustibles' will contain a proportion of recyclables.

2.4 Estimated Capture Rates for Hypothetical and Practical Scenarios for Collected Household, Civic Amenity and Bulky Waste Components

Capture rate estimates for each waste stream component have been assigned, drawing on a range of sources and based on two scenarios, hypothetical and practical. All assumptions made are specified in the accompanying spreadsheets.

2.4.1 Hypothetical Capture Rates

The hypothetical capture rate scenario assumes that the highest theoretical capture rates are achieved for all recyclable and compostable materials. The assumptions underpinning the capture rates are outlined below:

1. For all household collected, civic amenity site and bulky wastes, it has been assumed the best available recycling and composting schemes are in place and these collection systems operate at their theoretical optimum (see Section 2.2 for further details of these materials). In estimating the capture rate of household collected wastes, a presumption in favour of 100% capture rates has been applied except where, in the judgement of the project team, recovery of 100% of this material is not theoretically possible.
2. For all civic amenity sites and bulky uplift collected wastes, the estimated capture rates are based on the hypothetical rates in Defra (2004) National Assessment of Civic Amenity Sites - Future Challenges for CA Sites in the UK.
3. For waste categories where no capture rate data was available, capture rates were estimated by the project team. This mainly applied to the household waste stream, in particular the categories:
 - Other paper and card
 - Packaging film
 - Other plastic film
 - Other packaging
 - Carpet and underlay
 - Other miscellaneous combustibles

These have been highlighted here and in the accompanying spreadsheet to ensure transparency, and as capture rate data becomes available the uncertainty in the estimates of tonnage of residual waste from households can be reduced.

2.4.2 Practical Capture Rates

The practical capture rate scenario assumes that the highest practical capture rates are achieved for recyclable and compostable materials. The assumptions underpinning the capture rates are outlined below:

1. For all household collected, civic amenity site and bulky wastes uplifted, it has been assumed that a good recycling and composting scheme are in place and that these are well used (see Section 2.2 for further details of these materials).
2. In estimating the capture rate of household collected wastes, reports from Norfolk Waste Partnership, Paisley University and Merseyside Waste Disposal Authority were reviewed.

Capture rates were allocated based on the rationale 'maximum captures possible based on the most advantageous set of circumstances'. For wastes where no capture rate data were

available, capture rates were estimated by the project team based on capture rates for similar materials.

3. For all civic amenity sites and bulky uplift collected wastes, the estimated capture rates are based on the national capture rates in Defra (2004) National Assessment of Civic Amenity Sites - Future Challenges for CA Sites in the UK.

2.5 Collection of Household Waste Arisings Data

The next stage in estimating the household residual waste arisings in the UK was to establish the total household waste arisings within the UK. Total waste arisings data for England, Wales, Scotland and Northern Ireland were collected from the following publications, for the year 2004/05:

- Department of Environment and Rural Affairs. Municipal and Household Waste Statistics. Available at: <http://www.defra.gov.uk/environment/statistics/waste/wrmunicipal.htm>
- Northern Ireland Environment & Heritage Service. December 2005. Municipal Waste Management Northern Ireland 2004/05 Summary Report. Available at: <http://www.ehsni.gov.uk/summaryreport211205.pdf>
- Scottish Environment Protection Agency. Waste Data Digest 6. Available at: http://www.sepa.org.uk/pdf/publications/wds/wdd_6.pdf
- Welsh Assembly Government. Municipal Waste Management Survey. Available at: http://new.wales.gov.uk/topics/environmentcountryside/epq/waste_recycling/Municipal_waste_mngmnt_survey?lang=en

Household waste arisings for each region of the UK were summed to produce headline figures for UK household waste arisings of household bin waste, bulky household waste collections and households collected at civic amenity sites. Data for Scotland and Northern Ireland were not split into these categories, therefore the headline figures for these regions were split using the proportions shown in Table 1.

Table 1: Percentage Breakdown of Household by Collection Method

	Household Collected Waste	Civic Amenity Site Waste	Bulky/Other Waste
Breakdown by collection method	81%	15%	4%

Source: Parfitt, J. (2002) Analysis of household waste composition and factors driving waste increases. Defra Strategy Unit.

2.6 Estimation of UK Household Residual Wastes Arisings

The following calculations were undertaken to estimate the residual household wastes arising in the UK:

1. For each waste category, the percentage of residual waste arisings was calculated:
Percentage of Household Residual Waste Arising = Compositional Waste Analysis Percentage - (Percentage Material Capture Rate * Compositional Waste Analysis Percentage)
2. For each waste category, the estimated tonnage of residual waste arising from household sources then was calculated:
Estimated Tonnage of Residual Waste Arising = Estimated Tonnage of Household Waste Arisings - (Estimated Tonnage of Household Waste Arisings * Material Capture Rate)

The calculations are contained in the accompanying spreadsheets. Given the sensitivity of the analysis to estimates of waste composition and capture rates, and the project teams reservations regarding the quality of much of this data, the spreadsheets have been structured to enable them to be used as a basic dynamic model, which can be easily updated as more reliable data becomes available. The project team has made a number of recommendations on improvements to waste compositional data, and these are set out in Section 5.

3.RESULTS

3.1 Compositional Waste Analysis Data

The waste compositional estimates for household collected, civic amenity and bulky waste are set out in Table 2.

Table 2: Percentage Composition of Household Wastes Arising from Household Collected, Civic Amenity Site and Bulky Uplift Wastes (from Burnley *et al.* 2006)

Waste Category	Waste arising type (% composition by weight)		
	Household Collected Waste	Civic Amenity Site Waste	Bulky Waste
Newspapers and magazines	9.38%	2.40%	0%
Recyclable paper	2.02%	0.63%	0%
Cardboard boxes/containers	6.07%	2.34%	0.50%
Other paper and card	6.15%	1.73%	0%
Refuse sacks and carrier bags	1.92%	0.13%	0%
Packaging film	1.87%	0.07%	0%
Other plastic film	0.22%	0.16%	0%
Dense plastic bottles	2.48%	0.12%	0%
Other packaging	2.13%	0.31%	0.05%
Other dense plastic	1.53%	1.81%	1.20%
Textiles	2.42%	1.96%	0.25%
Shoes	0.58%	0.23%	0%
Disposable nappies	3.60%	0.01%	0%
Wood	1.11%	12.53%	5.40%
Carpet and underlay	0.75%	4.90%	6.50%
Furniture	0.06%	5.68%	37.15%
Other miscellaneous combustibles	2.10%	2.59%	8.55%
Packaging glass	6.70%	1.19%	0.30%
Non-packaging glass	0.45%	0.92%	0.30%
Garden waste	8.32%	17.18%	0.45%
Kitchen waste	24.96%	0.33%	0%
Other organic wastes	1.83%	0.33%	0%
Ferrous metal food/beverage cans	2.51%	0.13%	0%
Other ferrous metal	1.09%	5.59%	4.35%
Non-ferrous food and beverage cans	0.51%	0.03%	0%
Other non-ferrous metal	0.53%	0.81%	0.25%
White goods	0.08%	3.03%	22.65%
Large electronic goods	0.09%	0.69%	0.15%
TVs and monitors	0.01%	1.45%	2.70%
Other WEEE	0.55%	1.45%	4.20%
Lead/acid batteries	0.08%	0.63%	0%
Oil	0.04%	0.11%	0%
Identifiable clinical waste	0.23%	0.05%	0.00%
Other potentially hazardous	0.27%	0.61%	0.15%
Construction and demolition waste	1.64%	16.83%	0.30%
Other non-combustible material	1.13%	1.40%	1.80%
Fines	4.55%	0.40%	0%
Mixed bagged waste	-	9.28%	1.35%
TOTAL	100.0%	100.0%	98.6%*

*Bulky waste percentages do not add to 100% due to rounding

Appendix 1 provides a detailed description of materials included in each of the above waste categories.

3.2 Estimated Capture Rates for Hypothetical and Practical Scenarios for Collected Household, Civic Amenity and Bulky Waste Components

3.2.1 Hypothetical Residual Waste Capture Rates

The estimates of the hypothetical capture rates for each element of the household waste stream by waste category are set out in Table 3.

Table 3: Estimated Hypothetical Material Capture Rates for Household Waste

Waste Category	Hypothetical Material Capture Rates		
	Household Collected Waste	Civic Amenity Site Waste	Bulky Waste
Newspapers and magazines	100%	95%	95%
Recyclable paper	100%	95%	95%
Cardboard boxes/containers	100%	95%	95%
Other paper and card	20%	95%	95%
Refuse sacks and carrier bags	100%	95%	95%
Packaging film	33%	95%	95%
Other plastic film	33%	95%	95%
Dense plastic bottles	100%	95%	95%
Other packaging	33%	95%	95%
Other dense plastic	100%	95%	95%
Textiles	100%	80%	80%
Shoes	100%	80%	80%
Disposable nappies	0%	0%	0%
Wood	100%	98%	98%
Carpet and underlay	80%	80%	80%
Furniture	100%	80%	80%
Other miscellaneous combustibles	33%	33%	33%
Packaging glass	100%	95%	95%
Non-packaging glass	0%	95%	95%
Garden waste	100%	98%	98%
Kitchen waste	100%	98%	98%
Other organic wastes	0%	0%	0%
Ferrous metal food/beverage cans	100%	98%	98%
Other ferrous metal	100%	98%	98%
Non-ferrous food and beverage cans	100%	98%	98%
Other non-ferrous metal	100%	98%	98%
White goods	100%	95%	95%
Large electronic goods	100%	95%	95%
TVs and monitors	100%	95%	95%
Other WEEE	100%	95%	95%
Lead/acid batteries	100%	95%	95%
Oil	100%	95%	95%
Identifiable clinical waste	0%	95%	95%
Other potentially hazardous	0%	95%	95%

Construction and demolition waste	100%	33%	33%
Other non-combustible material	33%	98%	98%
Fines	100%	33%	33%
Mixed bagged waste	0%	45%	45%

The sources for the capture rates of each material are contained in the spreadsheet and where these have been estimated by the project team, the assumptions and rationale are described fully.

3.2.2 Practical Residual Waste Capture Rates

The estimates for practical capture rates for each element of the household waste stream by waste category are shown below (Table 4).

Table 4: Estimated Practical Material Capture Rates for Household Waste

Waste Category	Practical Material Capture Rates		
	Household Collected Waste	Civic Amenity Site Waste	Bulky Waste
Newspapers and magazines	82%	85%	85%
Recyclable paper	82%	85%	85%
Cardboard boxes/containers	73%	85%	85%
Other paper and card	20%	85%	85%
Refuse sacks and carrier bags	33%	0%	0%
Packaging film	20%	0%	0%
Other plastic film	20%	0%	0%
Dense plastic bottles	73%	67%	67%
Other packaging	20%	67%	0%
Other dense plastic	33%	67%	0%
Textiles	95%	40%	40%
Shoes	95%	40%	40%
Disposable nappies	0%	0%	0%
Wood	90%	80%	80%
Carpet and underlay	50%	50%	50%
Furniture	33%	33%	33%
Other miscellaneous combustibles	25%	25%	25%
Packaging glass	80%	85%	85%
Non-packaging glass	0%	85%	85%
Garden waste	90%	95%	95%
Kitchen waste	90%	95%	95%
Other organic wastes	0%	0%	0%
Ferrous metal food/beverage cans	78%	95%	95%
Other ferrous metal	78%	95%	95%
Non-ferrous food and beverage cans	78%	95%	95%
Other non-ferrous metal	78%	95%	95%
White goods	90%	90%	90%
Large electronic goods	90%	90%	90%
TVs and monitors	90%	90%	90%
Other WEEE	90%	90%	90%
Lead/acid batteries	80%	80%	8%
Oil	80%	80%	8%
Identifiable clinical waste	0%	80%	80%

Other potentially hazardous	0%	80%	80%
Construction and demolition waste	80%	25	25
Other non-combustible material	25%	95%	9%
Fines	80%	25%	25%
Mixed bagged waste	0%	0%	0%

3.3UK Household Waste Arisings Data

Data for household bin waste, bulky household waste collections and household waste collected at civic amenity sites were summed to produce headline figures for UK household waste arisings. The 2004/05 reporting year was chosen as this was the most recent reporting period common to each region of the UK and the estimated household waste arisings are shown below (Table 5).

Table 5: Estimated Tonnage of Household Waste Arisings in the UK in 2004/05

Region of the UK	Estimated Tonnage of Household Waste Arising by Source in the UK			
	Household Collected Waste	Civic Amenity Site Waste	Bulky Waste	TOTAL
England	21,255,000	3,198,000	1,205,000	25,658,000
Wales	1,357,326	217,482	9,830	1,584,638
Scotland	2,265,913	419,613	111,897	2,797,423
Northern Ireland	744,527	137,875	36,767	919,169
Total Household Waste Arisings in the UK	25,622,766	3,972,971	1,363,494	30,959,230

Appendix 2 provides further detail on the estimated tonnage of household waste arisings by waste category and waste stream for the UK.

3.4 Estimated Household Residual Waste Arisings Within the UK

The estimates for percentage waste composition and capture rates (hypothetical and practical) were combined to provide estimates of the percentage composition of the residual waste stream.

3.4.1 Hypothetical Residual Waste Arisings

Using the hypothetical material capture rates (Table 3) and the household compositional waste analysis percentages (Table 2), an estimate of the hypothetical percentage of residual waste arisings for each element of the household waste stream by waste category was calculated (Table 6).

Table 6: Estimated Hypothetical Percentage Residual Wastes Arising from Household Sources

Hypothetical Residual Waste Arising from Household Sources (%)
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Waste Category	Household Collected Waste	Civic Amenity Site Waste	Bulky Waste
Newspapers and magazines	0.00	0.12	0.00
Recyclable paper	0.00	0.03	0.00
Cardboard boxes/containers	0.00	0.12	0.03
Other paper and card	4.92	0.09	0.00
Refuse sacks and carrier bags	0.00	0.01	0.00
Packaging film	1.25	0.00	0.00
Other plastic film	0.15	0.01	0.00
Dense plastic bottles	0.00	0.01	0.00
Other packaging	1.43	0.02	0.00
Other dense plastic	0.00	0.09	0.06
Textiles	0.00	0.39	0.05
Shoes	0.00	0.05	0.00
Disposable nappies	3.60	0.01	0.00
Wood	0.00	0.25	0.11
Carpet and underlay	0.15	0.98	1.30
Furniture	0.00	1.14	7.43
Other miscellaneous combustibles	1.41	1.74	5.73
Packaging glass	0.00	0.06	0.02
Non-packaging glass	0.45	0.05	0.02
Garden waste	0.00	0.34	0.01
Kitchen waste	0.00	0.01	0.00
Other organic wastes	1.83	0.33	0.00
Ferrous metal food/beverage cans	0.00	0.00	0.00
Other ferrous metal	0.00	0.11	0.09
Non-ferrous food and beverage cans	0.00	0.00	0.00
Other non-ferrous metal	0.00	0.02	0.01
White goods	0.00	0.15	1.13
Large electronic goods	0.00	0.03	0.01
TVs and monitors	0.00	0.07	0.14
Other WEEE	0.00	0.07	0.21
Lead/acid batteries	0.00	0.03	0.00
Oil	0.00	0.01	0.00
Identifiable clinical waste	0.23	0.00	0.00
Other potentially hazardous	0.27	0.03	0.01
Construction and demolition waste	0.00	11.28	0.20
Other non-combustible material	0.76	0.03	0.04
Fines	0.00	0.27	0.00
Mixed bagged waste	0.00	5.10	0.74

The estimated tonnage of residual waste arisings was then calculated (Table 7).

Table 7: Estimated Hypothetical Tonnage of Residual Waste Arising by Waste Category and Waste Stream

	Estimated Hypothetical Tonnage of Residual Waste Arising from Household Sources			Estimated Total Tonnage of Residual Waste
	Household Collected Waste	Civic Amenity Site Waste	Bulky Waste	
Estimated waste arisings in the UK	4,212,767	914,932	236,287	5,363,985
Waste Category				

Other paper and card	1,260,640	3,437	0	1,264,077
Disposable nappies	922,420	397	0	922,817
Other miscellaneous combustibles	360,512	68,943	78,108	507,563
Other organic wastes	468,897	13,111	0	482,007
Construction and demolition waste	0	447,996	2,741	450,737
Other packaging	365,662	616	341	366,619
Packaging film	321,028	139	0	321,167
Mixed bagged waste	0	202,780	10,124	212,904
Other non-combustible material	193,990	1,112	491	195,593
Furniture	0	45,133	101,308	146,441
Non-packaging glass	115,302	1,828	205	117,335
Carpet and underlay	38,434	38,935	17,725	95,095
Other potentially hazardous	69,181	1,212	102	70,495
Identifiable clinical waste	58,932	99	0	59,032
Other plastic film	37,768	318	0	38,086
White goods	0	6,019	15,442	21,461
Textiles	0	15,574	682	16,256
Garden waste	0	13,651	123	13,774
Wood	0	9,956	1,473	11,429
Fines	0	10,648	0	10,648
Other WEEE	0	2,880	2,863	5,744
Other ferrous metal	0	4,442	1,186	5,628
Cardboard boxes/containers	0	4,648	341	4,989
Newspapers and magazines	0	4,768	0	4,768
TVs and monitors	0	2,880	1,841	4,721
Other dense plastic	0	3,596	818	4,414
Packaging glass	0	2,364	205	2,568
Shoes	0	1,828	0	1,828
Large electronic goods	0	1,371	102	1,473
Recyclable paper	0	1,251	0	1,251
Lead/acid batteries	0	1,251	0	1,251
Other non-ferrous metal	0	644	68	712
Kitchen waste	0	262	0	262
Refuse sacks and carrier bags	0	258	0	258
Dense plastic bottles	0	238	0	238
Oil	0	219	0	219
Ferrous metal food/beverage cans	0	103	0	103
Non-ferrous food and beverage cans	0	24	0	24

3.4.2 Practical Residual Waste Arisings

Using the 'practical material capture rates' (Table 4) and the household compositional waste analysis percentages (Table 2), an estimate of the percentage of residual waste arisings for each element of the household waste stream by waste category was calculated (Table 8). The estimated tonnage of residual waste arisings was then calculated (Table 9).

Table 8: Estimated Practical Percentage Residual Wastes Arisings from Household Sources

	Practical Residual Waste Arisings from Household Sources (%)
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Waste Category	Household Collected Waste	Civic Amenity Site Waste	Bulky Waste
Newspapers and magazines	1.69	0.36	0.00
Recyclable paper	0.36	0.09	0.00
Cardboard boxes/containers	1.64	0.35	0.08
Other paper and card	4.92	0.26	0.00
Refuse sacks and carrier bags	1.29	0.13	0.00
Packaging film	1.50	0.07	0.00
Other plastic film	0.18	0.16	0.00
Dense plastic bottles	0.67	0.04	0.00
Other packaging	1.70	0.10	0.02
Other dense plastic	1.03	0.60	0.40
Textiles	0.12	1.18	0.15
Shoes	0.03	0.14	0.00
Disposable nappies	3.60	0.01	0.00
Wood	0.11	2.51	1.08
Carpet and underlay	0.38	2.45	3.25
Furniture	0.04	3.81	24.89
Other miscellaneous combustibles	1.58	1.94	6.41
Packaging glass	1.34	0.18	0.05
Non-packaging glass	0.45	0.14	0.05
Garden waste	0.83	0.86	0.02
Kitchen waste	2.50	0.02	0.00
Other organic wastes	1.83	0.33	0.00
Ferrous metal food/beverage cans	0.55	0.01	0.00
Other ferrous metal	0.24	0.28	0.22
Non-ferrous food and beverage cans	0.11	0.00	0.00
Other non-ferrous metal	0.12	0.04	0.01
White goods	0.01	0.30	2.27
Large electronic goods	0.01	0.07	0.02
TVs and monitors	0.00	0.15	0.27
Other WEEE	0.06	0.15	0.42
Lead/acid batteries	0.02	0.13	0.00
Oil	0.01	0.02	0.00
Identifiable clinical waste	0.23	0.01	0.00
Other potentially hazardous	0.27	0.12	0.03
Construction and demolition waste	0.33	12.62	0.23
Other non-combustible material	0.85	0.07	0.09
Fines	0.91	0.30	0.00
Mixed bagged waste	0.00	9.28	1.35

Table 9: Estimated Practical Tonnage of Residual Waste Arising by Waste Category and Waste Stream

	Estimated Practical Tonnage of Residual Waste Arising from Household Sources			Estimated Total Tonnage of Residual Waste
	Household Collected Waste	Civic Amenity Site Waste	Bulky Waste	
Estimated waste arisings in the UK	8,063,613	1,559,661	564,848	10,188,121
Waste Category				
Other paper and card	1,260,640	10,310	0	1,270,950
Disposable nappies	922,420	397	0	922,817
Kitchen waste	639,544	656	0	640,200

Construction and demolition waste	84,043	501,488	3,068	588,599
Other miscellaneous combustibles	403,559	77,175	87,434	568,168
Furniture	10,300	151,195	339,380	500,876
Other organic wastes	468,897	13,111	0	482,007
Newspapers and magazines	432,615	14,303	0	446,917
Other packaging	436,612	4,064	2,250	442,926
Cardboard boxes/containers	419,932	13,945	1,023	434,899
Mixed bagged waste	0	368,692	18,407	387,099
Packaging film	383,317	2,781	0	386,098
Packaging glass	343,345	7,092	614	351,050
Refuse sacks and carrier bags	329,611	5,165	0	334,776
Other dense plastic	262,659	23,731	5,399	291,789
Garden waste	213,181	34,128	307	247,616
Fines	233,167	11,919	0	245,086
Carpet and underlay	96,085	97,338	44,314	237,737
Other non-combustible material	217,153	2,781	1,227	221,161
Dense plastic bottles	171,570	1,573	0	173,143
Wood	28,441	99,563	14,726	142,730
Ferrous metal food/beverage cans	141,489	258	0	141,747
Non-packaging glass	115,302	5,483	614	121,399
Recyclable paper	93,164	3,754	0	96,919
Textiles	31,004	46,722	2,045	79,771
Other ferrous metal	61,443	11,104	2,966	75,513
Other potentially hazardous	69,181	4,847	409	74,438
Identifiable clinical waste	58,932	397	0	59,330
Other plastic film	45,096	6,357	0	51,453
White goods	2,050	12,038	30,883	44,971
Other non-ferrous metal	29,876	1,609	170	31,656
Non-ferrous food and beverage cans	28,749	60	0	28,808
Other WEEE	14,093	5,761	5,727	25,580
Shoes	7,431	5,483	0	12,913
TVs and monitors	256	5,761	3,681	9,698
Lead/acid batteries	4,100	5,006	0	9,106
Large electronic goods	2,306	2,741	205	5,252
Oil	2,050	874	0	2,924

4. DISCUSSION

4.1 Hypothetical Household Residual Waste Arisings

The hypothetical household residual waste arisings were estimated to be approximately 5,364,000 tonnes, with the majority arising from household collected wastes. Table 7 ranks the waste categories in tonnage terms with 11 categories containing over 100,000 tonnes of residual waste.

Household Collected Wastes

The most significant waste arisings from the household collected source is other paper and card, followed by disposable nappies. Other paper and card consists of wallpaper removed from walls, photos, facial and toilet tissues and kitchen paper. Other significant wastes include other miscellaneous combustibles, other organic wastes, packaging film and other packaging.

In addition, it should be noted that hazardous waste arisings from both identifiable clinical waste and other potentially hazardous waste were significant in tonnage terms (>100,000 tonnes), and most of the material arose from the household collected wastes. If this material was un-segregated it would contaminate other wastes coming into contact, which could compromise the ability to further segregate residual waste arisings for recovery.

Civic Amenity Site Waste

The most significant waste arisings from the civic amenity site collected source are construction and demolition wastes and mixed bagged wastes and these form approximately 70% of all the wastes arising from this source. However, these waste types could potentially be reduced by introducing better segregation at the site to ensure that all recyclable/ compostable components are recovered from the mixed bagged waste and to further segregate construction and demolition wastes. Other waste streams that could be reduced arising from this source were wood, carpet and underlay, furniture, other miscellaneous combustibles, garden waste and textiles.

Bulky Waste

The most significant category of residual waste arisings from this source was furniture. Furniture could potentially be reduced by introducing better segregation to ensure that all reusable/ recyclable furniture is recovered (See Section 5 for specific recommendations). Other significant waste streams arising from this source were carpet and underlay, other miscellaneous combustibles and white goods.

4.2 Practical Residual Waste Arisings

Practical household residual waste arisings were estimated to be approximately 10,188,000 tonnes and Table 9 ranks the waste categories in terms of tonnage with 23 waste categories containing over 100,000 tonnes of residual waste.

Household Collected Wastes

Similar to the hypothetical scenario the largest residual waste streams were other paper and card and disposable nappies. Paper/card and plastic based waste categories make up approximately 53% of residual wastes from this source (approximately 4,270,000 tonnes) i.e.

newspapers and magazines, recyclable paper, cardboard boxes/containers, other paper and card, refuse sacks and carrier bags, packaging film, dense plastic bottles, other packaging, other dense plastic. Other significant types of residual waste arisings from the household collected source were garden, kitchen and other organic wastes. These waste types made up approximately 16% (1,320,000 tonnes) of the residual waste arisings from this source.

In addition, it should be noted that although hazardous waste arisings were not significant in tonnage terms, most of the material arose from the household collected wastes. If this material was un-segregated it could contaminate other wastes coming into contact, which could compromise the ability to further segregate residual waste arisings for recovery.

Civic Amenity Site Waste

Approximately 32% (501,488 tonnes) of residual wastes arising from civic amenity site sources are construction and demolition wastes. The capture rate of these materials for reuse/recycling could be improved upon by increasing segregation of these waste types. Mixed bagged wastes form approximately 24% the significant residual waste streams arising from the civic amenity site source. However, this waste type could potentially be reduced by introducing better segregation at the site to ensure that all recyclable/compostable components are recovered.

The other significant wastes also included: furniture, wood, carpet and underlay and garden waste. There may be potential for further increase the capture rate of these materials as there are existing markets for them.

Bulky Waste

The most significant residual waste arising was furniture which comprised 60% of residual wastes from this source (339,000 tonnes). However, these waste types could potentially be reduced by introducing better segregation at the site to ensure that all reusable/ recyclable furniture is recovered. Other significant waste streams arising from this source were: other miscellaneous combustibles and carpet and underlay and white goods.

4.3 Comparison of hypothetical and practical scenarios

The difference between residual waste arisings in the hypothetical and practical scenarios demonstrates the potential reduction in residual wastes that could be achieved by improving capture rates. The practical scenario highlights those wastes that currently end up in the residual waste stream such as paper/card and plastic packaging which could be removed with improved capture rates and emphasis on segregation to prevent contamination.

4.4 Data Issues/ Limitations

4.4.1 Compositional Waste Analysis Data

As set out in Section 3, no reliable estimates of the total composition of municipal solid waste for any part of the UK currently exist. As these compositional estimates form the starting point for the estimation of the quantity and composition of household residual wastes, the outputs of this research are reliant upon the accuracy of these estimates. The sources chosen for the analysis constitute, in the view of the project team, the best available data. However, as the

accuracy of the estimates of residual waste composition is sensitive to the accuracy of the data, the project team has made a series of recommendations on improvements to waste compositional data in Section 5.

4.4.2 Capture Rates

The decision to present the estimates by hypothetical and practical capture rates reflects the reality that no collection systems ever operates at 100% efficiency, while recognising that it is not the responsibility of this research project to 'second-guess' the design and operation of the collection systems. As set out in Section 2, the rationale for this approach was to illustrate the influence of the assumptions of capture rates on the final residual waste estimates. However, a decision must then be made on which set of estimates are to be used for Phase 2 of the research. While outputs of both scenarios are presented and discussed in this report, it is the

view of the project team that, as the practical residual waste estimates are based on published research on the performance of recycling and composting collection systems, that these should be used in any further analysis of residual waste arisings. The hypothetical residual waste estimates identifies those materials and products that would end up in the residual waste stream even with effective collection systems and may be more appropriate for use in identifying upstream policy interventions.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The research has provided estimates of the quantities and composition of residual waste arisings in the UK based on two capture rate scenarios. This produces estimates of the total quantity of residual waste arisings of between 5,346,400 and 10,188,000 tonnes. The methodological description and accompanying spreadsheets set out the assumptions and calculations that form the basis of these estimates, and additionally, provide a basic model which will allow the estimates to be easily updated should improved data on the composition of the household waste stream and capture rates become available. The research has highlighted a number of areas for additional research and recommendations on these are set out below.

5.2 Recommendations

As set out in Section 2, the research has demonstrated a clear need for accurate and comprehensive data on the composition of all of the household waste stream (household collected, CA site and bulky waste). Defra has published the Defra/WAG waste data strategy for waste streams across the UK, however this strategy does not address the issue of household waste compositional data. Waste compositional data collection is currently carried out in a piecemeal fashion, with no centralized coordination and analysis.

Recommendation 1: Review of current state of knowledge.

It is recommended that a review of waste compositional analysis work carried out in the UK over the last 5 years be carried out with a view to making recommendations on future compositional data needs.

Recommendation 2: National waste compositional analysis programme.

In order to obtain reliable estimates of the composition of all household wastes, there is a need to undertake a representative national survey of the full range of household wastes arisings

(household collected, CA site and bulky wastes). Such a study would need to address the following issues in the design of the sample methodology to ensure it was representative:

- Seasonal variation;
- Geographical spread (local, regional, national);
- Waste collection systems covered (e.g. household recycling, composting and residual waste collections; civic amenity sites; bring recycling points; bulky uplifts);
- Level of detail of classification (i.e. no. of waste/material categories used); and
- Classification system employed (compatibility of classification systems for different waste streams).

Recommendation 3: Waste/Product/Material classification systems.

The current classification systems used for household waste have developed on an ad-hoc basis over a number of years and were originally based on the classification system developed as part of the UK National Household Waste Analysis Project (NHWAP). The introduction of life-cycle thinking into waste policy, as set out in the thematic strategy on the prevention and recycling of waste, will require an integrated approach in terms of the classification systems applied along the supply chain to the products and materials that eventually become residual waste. Such an integrated approach would be facilitated by a classification system which was compatible with the materials and product classification system, as this would enable the residual waste categories to be more easily linked to policy levers for materials and products. In Phase 2 of this research, in order to gain a more detailed understanding of the materials and products that become residual waste, it is recommended that the waste categories used within Phase 1 could be mapped to the appropriate PRODCOM product categories.

Recommendation 4: Capture rates.

The decision to present the estimates based on two scenarios of hypothetical and practical was included to demonstrate the impacts on the assumptions made in recovery system capture rates. As in the case of compositional data for household waste, there is a need for further research which provides a robust evidence base for projections on hypothetical capture rates i.e. the capture rates that are achievable when a complete range of collection systems are in place and these systems operate at their theoretical optimum. It is recommended that a review of capture rates research to date be carried out, with a view to making recommendations on future research and data needs.

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Appendix 1: Description of Household Waste Categories

Table 10: Description of Materials Included within Household Waste Categories

Waste Category	Description of materials included
Newspapers and magazines	Newspapers, Exchange & Mart, glossy magazines, telephone directories, yellow pages, catalogues, travel, brochures.
Recyclable paper	Unused wall paper, paper bags, paper packaging, mail in an envelope, diaries, envelopes, letters, posters, writing, paper, computer paper, books, travel tickets, loose leaf, paper, photocopies, non-glossy pamphlets.
Cardboard boxes/containers	Boxes and packets for: cereal, washing powder, eggs, tissues, powdered milks, washing soda, biscuits, ice cream, fruit juice, milk, fabric conditioner. Corrugated card, greetings cards, postcards, beer mats, files.
Other paper and card	Wall paper removed from walls, photos, facial and toilet tissues, kitchen paper.
Refuse sacks and carrier bags	Plastic refuse bags and carrier sacks
Packaging film	Cling film, sandwich bags, frozen food packets and biscuit wrappers
Other plastic film	Bin liners and cellotape
Dense plastic bottles	PET Bottles for fizzy soft drink, mineral water, squash, fruit juices, spirit miniatures, beer, cider. HDPE Bottles for milk, bleach, fruit juice. LDPE Bottles for squeeze bottles including detergent bottles. PVC Bottles for mineral water in coolers. PP Bottles for shampoo bottles
Other packaging	Other including: expanded polystyrene, margarine tubs, freezer containers, yoghurt pots, clear egg boxes, cosmetic packaging, cassette boxes, and bottle crates.
Other dense plastic	Baths, drainage pipes, spectacles & lenses, curtain rail fittings, roller skate wheels, compact discs, decorative laminates, tableware, ashtrays, kitchenware, toys, food storage containers records, watch straps, washing up bowls, disposable cups, toys, toothbrushes and any items that cannot be identified to any of the above groups.
Textiles	Clothing and other or natural fibres.
Shoes	Old shoes
Disposable nappies	Disposable nappies
Wood	Wooden boxes, pallets, cork packaging, wood from DIY, wood fencing.
Furniture	All furniture excluding kitchen units and work-tops
Carpet and underlay	Carpet and underlay
Other miscellaneous combustibles	Combustible flooring, combustible tiles, other sanitary products, combustible items that do not fall easily into any of the above categories.
Packaging glass	Brown glass: bottles and packaging. Green glass: bottles and packaging. Clear glass: bottles and packaging.
Non-packaging glass	Mirrors, reinforced glass, non-fluorescent light bulbs etc.
Garden waste	Grass cuttings, weeds, flowers, prunings, tree branches, hedge trimmings.
Kitchen waste	Meat Excluded: Vegetable peelings & trimmings, fruit, including cooked vegetables etc. (excluded at source). Meat Included: kitchen waste that contains or is potentially contaminated with meat / meat products.
Other organic wastes	Pet excrement, bones (non-catering), dead animals.
Ferrous metal food/beverage cans	Cans for beer, cola, pet food, food.
Other ferrous metal	Keys, cutlery, bike locks, ring pulls, paper clips, safety pins, tools, car parts, oil filters, biscuit tins, radiators, metal shelving units, perfume, hairspray.
Non-ferrous food and beverage cans	Beer / cola, aerosols, ring pulls
Other non-ferrous metal	Foil: aluminium foil, milk bottle tops, yoghurt tops; DIY non-ferrous metal: copper pipe, stainless steel sink unit, saucepans, bike parts.

White goods	Refrigerators, freezers, washing machines, clothes dryers, dish washing machines, electric stoves.
Large electronic goods	Microwaves, electric heating, appliances, electric radiators, electric fans, air conditioner appliances
TVs and monitors	Television sets and computer screens
Other WEEE	Small Household Appliances: vacuum cleaners, carpet sweepers , appliances for sewing, knitting, weaving and processing for textiles, irons, toasters, fryers, grinders, coffee machines electric knives, hair dryers, toothbrushes, shavers, massage and other body care appliances, clocks, watches. IT and Telecommunications Equipment: mainframes, printers, personal computers, laptops and accessories (CPU, mouse, and keyboard included), copying equipment, electrical and electronic typewriters, calculators, fax machines, telex, telephones (including cordless & cellular), answering machines. Consumer Equipment: radio sets, video cameras, video recorders, Hi-fi systems, audio amplifiers, musical instruments (electric, e.g. keyboards); Lighting Equipment: straight & compact fluorescent lamps, other lighting or equipment for the purpose of shedding or controlling light with the exception of filament bulbs; Electrical & Electronic Tools: drills, saws, equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, folding, bending; tools for riveting, nailing, screwing or removing rivets, nails, screws or similar uses; tools for welding, soldering or similar uses, tools for mowing & other gardening activities. Toys, Leisure & Sports Equipment: electric trains, car racing sets, hand-held video games & consoles; video games, computers for biking, running, rowing etc. sports related electronic equipment. Monitoring & Control Instruments: smoke detectors, thermostats.
Lead/acid batteries	Lead-acid batteries (including car batteries, other lead-acid batteries)
Oil	Engine/lubricating oil contained within a bottle or a can.
Identifiable clinical waste	Syringes / sharps, medicinal products, potentially infected healthcare waste.
Other potentially hazardous	Paint cans: with or without paint contained; other batteries (including household batteries, household rechargeable batteries); Pesticides: items containing pesticides, liquid or solid; Other: Asbestos, fluorescent light bulbs, other household hazardous waste, identifiable hazardous items that do not fall readily into the above categories.
Construction and demolition waste	DIY rubble (bricks etc), sand, gravel, non-combustible tiles, ceramic toilets, ceramic wash basins, kitchen units and worktops, stones.
Other non-combustible material	Crockery, flowerpots, cinder and soil.
Fines	<10mm fines. i.e. material less than 10mm in particle size, not hand-sorted but classified as fines irrespective of composition. In general the material will be an 'organic rich' fraction.
Mixed bagged waste	Mixed household wastes presented for Bulky Uplift and at Civic Amenity Sites.

Appendix 2: Estimated Tonnage of Household Waste Arising by Waste Category and Waste Stream

Table 11: Estimated Tonnage of Household Waste Arising by Waste Category and Waste Stream in the UK

	Estimated Tonnage of Waste Arising from Household Sources			Estimated Total Tonnage of Household Waste
	Household Collected Waste	Civic Amenity Site Waste	Bulky Waste	
Estimated household waste arisings in the UK	25,622,766	3,972,971	1,363,494	30,959,230
Waste Category				
Newspapers and magazines	2,403,415	95,351	0	2,498,767
Recyclable paper	517,580	25,030	0	542,610
Cardboard boxes/containers	1,555,302	92,968	6,817	1,655,087
Other paper and card	1,575,800	68,732	0	1,644,532
Refuse sacks and carrier bags	491,957	5,165	0	497,122
Packaging film	479,146	2,781	0	481,927
Other plastic film	56,370	6,357	0	62,727
Dense plastic bottles	635,445	4,768	0	640,212
Other packaging	545,765	12,316	6,817	564,899
Other dense plastic	392,028	71,911	16,362	480,301
Textiles	620,071	77,870	3,409	701,350
Shoes	148,612	9,138	0	157,750
Disposable nappies	922,420	397	0	922,817
Wood	284,413	497,813	73,629	855,855
Carpet and underlay	192,171	194,676	88,627	475,473
Furniture	15,374	225,665	506,538	747,576
Other miscellaneous combustibles	538,078	102,900	116,579	757,557
Packaging glass	1,716,725	47,278	4,090	1,768,094
Non-packaging glass	115,302	36,551	4,090	155,944
Garden waste	2,131,814	682,556	6,136	2,820,506
Kitchen waste	6,395,442	13,111	0	6,408,553
Other organic wastes	468,897	13,111	0	482,007
Ferrous metal food/beverage cans	643,131	5,165	0	648,296
Other ferrous metal	279,288	222,089	59,312	560,689
Non-ferrous food and beverage cans	130,676	1,192	0	131,868
Other non-ferrous metal	135,801	32,181	3,409	171,390
White goods	20,498	120,381	308,831	449,711
Large electronic goods	23,060	27,413	2,045	52,519
TVs and monitors	2,562	57,608	36,814	96,985
Other WEEE	140,925	57,608	57,267	255,800
Lead/acid batteries	20,498	25,030	0	45,528
Oil	10,249	4,370	0	14,619
Identifiable clinical waste	58,932	1,986	0	60,919
Other potentially hazardous	69,181	24,235	2,045	95,462
Construction and demolition waste	420,213	668,651	4,090	1,092,955
Other non-combustible material	289,537	55,622	24,543	369,702
Fines	1,165,836	15,892	0	1,181,728
Mixed bagged waste	0	368,692	18,407	387,099

PLEASE NOTE: The figures within each column do not add up to the total, this is due to the percentage split data not adding up to 100%.