Resource Futures

Analysis of biodegradability of residual waste based on subtraction of diverted materials

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Executive summary

Resource Futures was contracted by Defra to conduct a modelling exercise to assess the biodegradability of waste currently being sent to landfill sites in England.

Historically, Defra has used an assumed figure of 68% for biodegradability, based on the work of Julian Parfitt for the Performance Innovation Unit in 2002. However this figure was originally intended to refer to all council-collected waste, rather than specifically to residual waste or to the fraction of the residual waste being sent to landfill.

Subsequent modelling exercises (Defra WR0119, based on 2007 data and EV0801, based on data for 2010/11) have produced slightly lower biodegradability figures for total council-collected waste, and modelling of the residual fraction suggests that the biodegradability of landfill waste is lower still.

In 2010/11, Defra commissioned a study (WR1003) to conduct a large-scale compositional analysis of Municipal Solid Waste (MSW) arriving at landfill. While this study is not completely comparable (MSW includes some commercial and industrial waste in addition to waste collected by councils), the results overall and the results from the household fraction (which is council-collected) suggest that the biodegradable content is considerably lower than the 68% figure currently in common use.

This aim of this study is to model the biodegradability of council-collected residual waste, and waste to landfill. This has been done by taking an initial figure for the composition of council collected waste as a whole and subtracting the material that is diverted for recycling or composting, in order to assess the biodegradability of the remaining (residual) material. Data for this exercise drawn from EV0801, and adjusted to bring the data into accord with Defra Municipal Waste Management Statistics for 2010/11.

Following this, an attempt is made to estimate the impact of mechanical treatment on the biodegradability of material sent to landfill sites. This is based on the relative proportions of EWC (European Waste Catalogue) codes 20.03.01 (mixed municipal waste) and 19.12.12 (waste from mechanical treatment) reported in 2010/11 and the biodegradability for 19.12.12 material from the WR1003 study. There are a number of significant caveats around this exercise, which are discussed in the report, but mechanical treatent does seem to have a significant effect in further reducing the biodegradability of waste being sent to landfill.

The study does not attempt to account for the impact of thermal treatment. This is due to a lack of data on the composition of the inputs to and outputs from thermal treatment. While the landfill study WR1003 is not affected by this data gap (since it was based on random sampling of mixed codes at landfills), approaches based on modelling could be influenced. Effects from the composition of thermal treatment residue sent to landfill will be minimal due to the low mass of this material. The larger potential sources of error concern the quantity of material sent for thermal treatment and its composition (e.g. it may be that this material has a higher biological composition than regular residual waste, which would have the effect of reducing the biodegradability of the residual material sent to landfill). Overall, however, we would estimate the impact of this effect to be relatively small.

The estimated biodegradability of council-collected waste, council collected dry recycling, residual waste and material sent to landfill are set out in the table below.

Waste stream	Biodegradability (%)
Council collected waste	66%
Council collected recycling and composting	74%
Council collected residual	61%
Council collected waste to landfill	54%

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1. Introduction

Work commissioned by Defra to establish the biodegradability and composition of municipal waste being sent to landfill (WR10031) seems to suggest the currently assumed figure of 68% biodegradability of MSW being sent to landfill should be updated. The 68% figure first arose from a calculation attempting to quantify household waste by combining kerbside, civic amenity site and some other waste data sources (Parfitt 2002)2. Since then, Defra's working assumption has been that this figure, derived for combined household waste, can also be applied to landfilled MSW. At the time (ie around 2002), given the lower state of development of recycling and food/garden waste collection, this may have been a reasonable assumption.

This assumption was called into question by WR1003 Biodegradability of municipal solid waste, which suggests that mixed municipal waste sent to landfill (defined by that study as EWC (European Waste Catalogue) codes 20.03.01 and 19.12.12, of local authority or commercial origin) has a significantly lower biodegradability (51% for all landfill MSW and 59.5% for untreated household waste to landfill under EWC 20.03.01). Other Defra projects to model national waste composition based on existing compositional studies (WR01193 and EV08014) support the case for the biodegradability figure for residual waste being considerably lower, and suggest that the biodegradability of combined municipal waste may also be lower than 68%. In fact WR0119, which attempted to produce confidence intervals for the biodegradable content of municipal waste (for England 2006/07), found that the 68% figure lay well within the lower and upper bounds of 95% confidence intervals; although the application of confidence intervals for this study was somewhat problematic5.

The aim of this work is to provide additional evidence on the biodegradability of municipal solid waste, and the biodegradability of residual waste once the diverted materials (organic and dry recycling) have been removed. The data used 2010/11, since this is the period that the Defra landfill study (WR1003) was carried out, and is also the year covered by the EV0801 national compositional estimates. Both EV0801 and the analysis in this report cover local authority collected waste in England.

Modelling was carried out for both household waste (defined as the sum of kerbside and HWRC waste and recycling, bulky waste collections, bring site arisings and litter and street cleansing waste) and council-collected waste (defined for the purposes of this work as household waste plus local authority collected commercial waste and recycling).

The study also calculates the biodegradability of residual waste, using the modelled composition of diverted materials, on the assumption that the figure of 68% is correct,

This study assumes that material sent by local authorities to incineration has a similar composition and biodegradability as material sent to landfill, and so does not distinguish between residual waste and waste sent to landfill. This assumption has been applied due to lack of robust information on the composition of EfW inputs and outputs.

1.1 A note on terminology

The term "Municipal Solid Waste" (MSW) is here reserved for the revised definition from the Waste Framework Directive, which includes all waste of household origin or waste including material similar to that from waste of household origin. This encompasses all council-collected waste, but also some commercially collected commercial and industrial waste. In 2010/11 Defra figures showed 15.6 million tonnes of council-collected residual waste (regardless of disposal method) while Environment Agency data showed that 18 million tonnes of MSW in mixed waste categories was sent to landfill (WR1003: 7).

[1] Harris B. (2012) *Biodegradability of municipal solid waste*, DEFRA WR1003.

[2] Parfitt J. (2002) *Analysis of household waste composition and factors driving household waste increases*, WRAP

[3] Parfitt J., Bridgwater E. (2009) *Review of Municipal Waste Component Analyses*, DEFRA WR0119.

[4] Bridgwater E. (2013) *National compositional estimates for local authority collected waste and recycling in England 2010/11*, DEFRA EV0801

[5] WR0119, Annex 4, pp 65-67.

This suggests that council-collected material accounts for around 78% of residual MSW (assuming based on CIWM figures that approximately 10% of council collected residual waste is incinerated[6];). The actual proportion of MSW accounted for by council-collected material is likely to be less, once the effects of other treatment processes have been taken into account.

[6] http://www.ciwm.co.uk/CIWM/InformationCentre/AtoZ/IPages/Incineration.aspx

2. Method

Arisings for materials in council-collected waste and recycling were based on Defra's Municipal Solid Waste Management Statistics for 2010/11.

Compositional data for the material diverted from landfill through recycling or composting, and for estimation of a revised combined council-collected waste biodegradability was derived from a previous Defra publication (EV0801). This study modelled the composition and arisings of municipal solid waste for England based on two sources of data:

- WasteDataFlow results for the year 2010/11
- Results from a range of compositional analyses of local authority waste conducted between 2008 and 2011. The number of data sets examined per waste stream was:
    - Kerbside residual 106
    - Kerbside dry recycling 38
    - Kerbside organics 20
    - HWRC residual 13
    - Bulky waste collections 11
    - Street cleansing and litter 15
    - Commercial residual waste 7.

The arisings figures in Defra statistics are slightly different to those in EV0801, and are aggregated differently. The first task was therefore to reconcile the two figures. The headline Defra and EV0801 figures are compared below, along with the mapping between the two sets of categories.

Table 1: Comparison of arisings from EV0801 and Defra MSWMS 2010/11

EV0801		**Defra MWMS 2010/11**	
Category	**Weight (t)**	**Category**	**Weight (t)**
Kerbside household residual waste	10,935,891	Regular household collection	11,048,000
HWRC household residual	1,647,562	Civic amenity sites	1,635,000
Bulky household residual waste	*450,539*	Other household sources	1,047,000
Street cleansing and litter	*550,253*		
Subtotal other household sources	1,000,792		
HWRC household recycling	*2,579,750*	Household recycling	9,725,000
Bring site recycling	*507,900*		
Street bin recycling	*19,299*		
Other household recycling	*459,359*		
Kerbside household recycling	*6,461,211*		
Subtotal household recycling	10,027,519		
Kerbside commercial residual	*1,239,687*	Non-household (excl. recycling)	1,882,000
HWRC commercial residual	*278,990*		
Subtotal commercial recycling	1,518,677		
Commercial recycling	139,636	Non-household recycling	864,000

Reconciliation was achieved by combining the figures for the relevant EV0801 categories (e.g. combining all household recycling into a single category) before weighting to reconcile with the Defra arisings figure – there was insufficient information on the derivation of the Defra figures to weight the EV0801 categories differentially. An exception was made for commercial recycling, where the large discrepancy

between figures is due to recycling of rubble and aggregate at HRWCs. Since this is not counted in the original Parfitt (2002) study, and is not similar in composition to the other materials, it was decided to omit this figure and use the unaltered commercial recycling figure from EV0801. The other discrepancies between Defra's statistics and EV0801 relate to differences in the interpretation of household waste and in accounting for recycling rejects.

Arisings and composition were then calculated for each of the following waste streams.

Table 2: Waste streams modelled

Waste stream	Comprises
Household waste and recycling	**Residual:** kerbside, HWRC, street sweepings cleansing & litter, other household residual **Recycling:** kerbside, HWRC, bring banks, other household recycling
Household residual	**Residual:** kerbside, HWRC, street sweepings cleansing & litter, other household residual
Household recycling	**Recycling:** kerbside, HWRC, bring banks, other household recycling
Council-collected waste and recycling	**Residual:** kerbside, HWRC, street sweepings cleansing & litter, other household residual + non-household residual **Recycling:** kerbside, HWRC, bring banks, other household recycling + non-household recycling
Council-collected residual	**Residual:** kerbside, HWRC, street sweepings cleansing & litter, other household residual + non-household residual
Council-collected recycling	**Recycling:** kerbside, HWRC, bring banks, other household recycling + non-household recycling

The figures for "household waste and recycling" are directly comparable with Parfitt's (2002) figure of 68%, since this included all of the above streams except for commercial waste (Parfitt 2002: 2).

Biodegradability was then calculated for each stream using the biodegradability figures from EV0801. These conversion figures are comparable to those in Parfitt 2002, but contain a higher degree of granularity. The conversion figures – based on Environment Agency LATS guidance – are conventional, designed to assess whether items are likely to be fully, partly or not biodegradable. They are not accurate measurements of the carbon content of the materials. This is a serious limitation, but one that is outside the scope of this study. As part of WR1003, WRc conducted laboratory analysis of DOC and DDOC for material fractions from the waste analysis. However, this work did not establish a series of evidence-based multipliers for establishing biodegradability. For a brief discussion of this work see WR1003, Appendix 4.

Table 3: Biodegradability conversion rates

Material	Biodegradability
Food waste	1
Garden waste	1
Organic pet bedding/litter	1
Other organics	1
Newspapers	1
Magazines	1
Recyclable paper (excl News and Mags)	1
Other paper	1
Card packaging	1
Other card	1
Packaging glass	0
Non-packaging glass	0
Ferrous food and drink cans	0
Other ferrous metal	0
Non-ferrous drinks cans (excl non-ferrous food tins)	0
Foil	0
Other non-ferrous metal	0
Plastic film	0
Dense plastic	0
Artificial textiles, excluding shoes	0.5
Natural textiles, excluding shoes	0.5
Shoes	0.5
Treated and composite wood	1
Untreated wood	1
White goods	0
Large electronic goods (excluding CRT TVs and monitors)	0
CRT TVs and monitors	0
Other WEEE	0
Batteries	0
Clinical waste	0
Paint/varnish	0
Oil	0
Garden herbicides & pesticides	0
Disposable nappies	0.5
Other (sanpro and dressings)	0.5
Furniture	0.5
Mattresses	0.5
Carpet/underlay	0.5
Other combustibles	0.5
Bricks, blocks, plaster	0
Other non-combustibles	0
Soil	0
Other wastes	0.5
Unspecified Fine material <10mm	0.5

In addition to the above, the exercise was repeated using only the modelled arisings and biodegradability of the diverted material. This was subtracted from a quantity of waste (based on the combined Defra Municipal Waste Management Statistics) with an assumed biodegradability of 68%. This was to allow calculation of the impact of current diversion on residual waste composition, assuming Parfitt's (2002) figure of 68% biodegradability remains constant.

3. Results

The modelled arisings, BMW arisings and BMW percentage of each waste stream are shown in Table 4 below. Details of the composition of each stream are shown in Appendix 1 and in the Excel spreadsheet supplied with this report.

Table 4: Arisings and biodegradability by waste stream

Waste stream	Total weight (tonnes)	Total BMW (tonnes)	BMW %
Kerbside residual waste	11,048,000	7,058,734	63.9%
HWRC residual waste	1,635,000	679,881	41.6%
Other household residual waste	1,047,000	547,270	52.3%
Household recycling	9,724,000	7,205,369	74.1%
Non-household residual waste	1,882,000	1,179,592	62.7%
Non-household recycling	139,636	59,990	43.0%
Household waste and recycling	23,454,000	15,491,255	66.0%
Household residual	13,730,000	8,285,886	60.3%
Household recycling	9,724,000	7,204,968	74.1%
Council-collected waste and recycling	25,475,636	16,730,837	65.7%
Council-collected residual	15,612,000	9,465,478	60.6%
Council-collected recycling	9,863,636	7,265,359	73.7%

The results suggest that when both residual and recycling are included, household and municipal waste have very similar biodegradability of around 66%; while residual waste has a biodegradability of around 60% (household waste) or 61% (municipal waste). The total amount of BMW being sent to landfill in 2010-11 is estimated at slightly less than 9.5 million tonnes. This shows that recycling diversion (with recycling having a relatively higher biodegradable content) is resulting in a lowering of the biodegradable content of the remaining residual waste.

Due to the nature of the data (WasteDataFlow tonnages plus information from a range of different compositional studies) it is not possible to compute a reliable confidence interval for the data. Our best gauge of reliability might be to compare the data with other (independent) studies from a similar timeframe, such as WR1003 and the (2007) WR0119 (see next section). This comparison suggests that an error margin of ±2% would seem reasonable, but it must be stressed that this is a subjective assessment and does not constitute any statistical measure such as a confidence interval.

3.1 Comparison of results with previous studies

Table 5 below compares the result of the current work (WA0214) with that of previous studies. As we would expect, the results are very similar to EV0801 (as the current work makes use of the data from this study).

Overall, there may be a pattern of reduced biodegradable content in combined residual waste plus recycling (from 68% in 2002 to 66% in 2010/11), but the change is hardly a radical one – indeed, the change is within the 95% confidence level of the 2006/07 study (WR0119), and as such does not present firm evidence that a change has taken place. Notwithstanding this caveat, however, the central estimate for biodegradability in municipal waste has fallen slightly between the 2002 and 2010 studies.

As long as it is understood that the same limitations to interpretation of the data apply to estimating the biodegradability of the residual stream, it can be stated that the central estimate for biodegradability seems to have fallen slightly faster than in all residual plus recycling, with a 3% difference between the current estimates for residual (61%) and those constructed in 2007 (64%). There is no equivalent data

from Parfitt 2002 to enable assessment of this trend. An overall reduction in the biodegradable content of both "council-collected waste and recycling" and "council-collected residual" waste would be in line with findings on recent waste trends, particularly in relation to the reduction of food waste tonnages[7].

Table 5: Comparison of biodegradability content estimates with previous modelling exercises

	Year of data	All household waste and recycling	All council collected waste and recycling	Household residual waste	Council collected residual waste
Parfitt 2002	2002	68%			
WR0119	2006-07	67%	67%	63%	64%
EV0801 / WA0214	2010-11	66%	66%	60%	61%

Table 6 shows the headline results from the landfill analysis WR1003, to allow comparison with the results of the current study. It should be noted that sampling for WR1003 as based entirely on EWC code, regardless of origin (i.e. it was sampled from all Municipal Solid waste, including commercially collected commercial and industrial waste). This limits the comparability of the results with the results of modelling based on council-collected waste.

While the estimate for the biodegradability of waste sent to landfill is considerably lower in the landfill study, this is due largely to the impact of waste coded 19.12.12, which has been subjected to mechanical treatment. The difference suggests that mechanical treatment is an important mediator of the composition of waste being sent to landfill. The most appropriate comparisons are between domestic residual waste from the modelling studies and waste coded 20.03.01 domestic in the landfill study (60% vs. 59.5% biodegradability) and residual council-collected waste vs. combined 20.03.01 (61% vs. 56.1%). While the first comparison is very close (and within the 95% confidence interval of the landfill study) the second is significantly different – this may be due to the landfill study including samples of non-council collected residual waste in the 20.03.01 commercial category (as the aim of this study was to look at the full range of mixed Municipal Solid Waste being sent to landfill rather than council-collected waste).

Table 6: Comparison of results with landfill analysis from WR1003

Landfill report output	Value
20.03.01 domestic	59.5%
20.03.01 commercial	56.7%
20.03.01 combined†	56.1%
19.12.12	46.3%
Combined landfill	51.4%

† *This figure is lower than the domestic or commercial figure due to the inclusion of a small number of samples (HWRC, fly tipping, street cleansing) that were not included in the commercial or household categories in the landfill analysis).*

3.2 Subtractive modelling from a predefined baseline

Table 7 shows the results obtained for the biodegradability of residual waste when we start by assuming the biodegradability of combined household waste (using the quantities from Defra's statistics) and subtract the accounted for diversion (based on Defra arisings statistics and the compositional estimates from EV0801 as discussed above).

[7] Bridgwater E, Quested Q (2013) *WRAP Synthesis of Food Waste Compositional Data 2012*

Table 7: Subtraction of diverted MSW from an assumed baseline

Household Bio %	Diversion Bio % †	Household arising (t)	Div (t)	BMW in household (t)	BMW in diversion (t)	BMW % in residual
64%	74%	23,454,000	9,724,000	15,010,560	7,195,760	57%
65%	74%	23,454,000	9,724,000	15,245,100	7,195,760	59%
66%	74%	23,454,000	9,724,000	15,479,640	7,195,760	60%
67%	74%	23,454,000	9,724,000	15,714,180	7,195,760	62%
68%	74%	23,454,000	9,724,000	15,948,720	7,195,760	64%

† See methodology for an account of how this figure is derived and Appendix for the data on which it is based.

The results show that, even assuming the 68% figure for arisings still held, the biodegradability of residual waste would be lower, at 64%. It is highly likely that the biodegradability of waste being sent to landfill would be significantly lower than this, due to the impact of mechanical treatment (see discussion above).

3.3 Estimating the impact of waste treatment and EWC 19.12.12

The above results show an estimated residual waste biodegradability of around 61% for council-collected waste. However this does not tell us the biodegradability of material being sent to landfill, since some of this waste is being processed through treatment facilities that could potentially change the biodegradability of the residue.

Detailed modelling of the impacts of treatment is outside the scope of this work. Such an exercise would also prove very challenging, due to an absence of empirical data on the residue from different treatment facilities. This is a significant data gap that Defra may wish to consider addressing.

It is possible to attempt some provisional modelling of the impacts of treatment based on using data from WR1003 for waste coded as EWC 19.12.12 (waste from mechanical treatment). There are, however, a number of caveats that must be made in advance:

- WR1003 did not make any attempt to distinguish treatment types – sampling was purely by EWC code. For discussion of the range of materials included in EWC 19.12.12, see WR1003, Appendix 2.
- WR1003 was based on sampling Municipal Solid Waste, including commercial and industrial waste. Given the total arising of landfill MSW as compared with residual council-collected waste, we know that council-collected waste only accounts for around 78% of MSW. As such, the biodegradability figure for 19.12.12 derived in WR1003 may not be representative.
- The analysis is based on weighting the residual waste end-fate by the relative proportions that end up as EWC 19.12.12 and 20.03.01. Given that this data refers to all MSW, the proportional split may not be entirely accurate. For example, it may be that a higher proportion of commercial and industrial waste ends up as 19.12.12, which would result in an overestimation of the effect on council-collected waste.
- The data from the current study does not contain an exact analogue of council-collected 20.03.01, since it looks only at council-collected residual waste regardless of treatment. For the purposes of this exercise, the biodegradability for all council collected residual waste (61%) will be used as the most comparable figure.

These are significant caveats, and the workings that follow should be treated with considerable caution. Nevertheless, they provide a reasonable indicative example of the likely impact of waste treatment on the biodegradability of council collected waste sent to landfill.

Table 8 below shows the breakdown of all mixed MSW by EWC code. Given the high preponderance of the two major codes, and the lack of compositional data for the other codes, we allocate council collected waste according to the relative proportions of 19.12.12 and 20.03.01 (48:52).

Table 8: EWC codes covering mixed municipal waste

EWC	Type	Definition	Tonnes (2011)
190501	Waste from aerobic treatment	non-composted fraction of municipal & similar wastes	5,004
190503	Waste from aerobic treatment	off-specification compost	84,532
191212	Waste from mechanical treatment	other wastes from mechanical treatment of wastes	8,431,131
200301	Other municipal wastes	mixed municipal waste	9,088,763
200302	Other municipal wastes	waste from markets	1,898
200303	Other municipal wastes	street-cleaning residues	196,651
200307	Other municipal wastes	bulky waste	210,012
200399	Other municipal wastes	municipal wastes not otherwise specified	90

Source: Environment Agency, RATS database.

Applying this split to the estimated arising of council collected residual waste (15,612,000 tonnes) along with the (EV0801) estimated biodegradability for untreated residual council collected waste of 61% and the (WR1009) calculated biodegradability for 19.12.12 municipal waste of 46.3% (confidence interval ±2.3%) gives the following.

Table 9: Estimated biodegradability of council collected waste, accounting for treatment

	Arising (tonnes)	Biodegradability (%)	BMW (tonnes)
Non-treated waste	8,099,008	61%	4,940,395
Treated waste	7,512,992	46%	3,478,515
Total	15,612,000	54%	8,418,910

The results suggest that the overall biodegradability of council-collected waste to landfill is likely to be in the region of 54%. However, for the reasons noted above, this figure should be treated as indicative. Given the reasonably high estimate of reliability of the modelled figures for council-collected residual waste, and the 2.3% confidence interval for 19.12.12 material, it is nevertheless highly likely that the biodegradability of council-collected residual waste to landfill is below 60%.

4. Conclusions

The modelling exercise leads to the following conclusions:

- There is some evidence to support a small drop (c. 2%) in the biodegradability of council-collected waste and recycling, although this is within the range of confidence intervals produced for the 2006/07 national compositional estimates (no corresponding confidence intervals were produced for the 2010/11 estimates).
- There is stronger evidence that, due to the composition of material diverted for composting and recycling, residual waste has a lower biodegradability than combined council-collected waste and recycling.
- From the above points, there is compelling evidence to conclude that the biodegradability figure of 68% is not a realistic assumption **when applied to residual waste**. This figure is more likely to be around 60-61%. This is primarily due to diversion of recycling from residual waste, with recycling having a relatively higher biodegradable content (estimated at 74%) than the mean biodegradability of the waste.
- In addition, the discrepancy between the modelled residual waste biodegradability and the results of the analysis of the composition of material being sent to landfill (due to the much lower biodegradability of material coded 19.12.12) suggest that the impacts of mechanical treatment in diverting biodegradable material away from landfill may not be being quantified in the modelling studies, since these typically use compositional data from the point of collection rather than post treatment. Given the large proportion of the landfill stream accounted for by waste that has been through some form of mechanical treatment, it seems likely that this is a significant anomaly, and one that is set to grow over time. We have conducted some modelling in this study that suggests an overall biodegradability figure of around 54% may be appropriate for material arriving at landfill sites, but this figure is accompanied by a range of significant caveats and the subject deserves further investigation.

Appendix 1: Detailed arisings of component waste streams

	Kerbside residual	HWRC residual	Other residual	Household recycling	Non-hh resid	Non-hh recyc
Food waste	3,415,642	51,138	67,719	389,201	414,169	2,128
Garden waste	360,767	59,293	124,873	3,493,990	34,429	12,604
Organic pet bedding/litter	452,338	25,688	-	802	21,377	-
Other organics	113,982	6,473	17,790	-	5,387	-
Newspapers	176,629	10,481	22,622	933,864	26,870	11,202
Magazines	140,997	8,367	17,731	508,170	24,534	6,094
Recyclable paper (excl. News & Mags)	350,136	23,895	19,274	452,161	78,841	5,470
Other paper	496,592	35,754	10,234	55,707	117,608	673
Card packaging	347,105	21,936	28,589	592,595	151,975	20,738
Other card	86,078	11,390	1,300	24,412	60,127	745
Packaging glass	344,978	12,555	35,965	1,077,371	103,133	14,169
Non-packaging glass	62,035	31,514	181	30,550	9,529	414
Ferrous food and drink cans	125,183	4,424	3,115	137,072	21,507	1,717
Other ferrous metal	98,245	20,607	13,689	143,767	15,970	67
Non-ferrous drinks cans	25,320	2,135	8,941	28,316	2,442	354
Foil	56,796	1,359	1	18,913	4,589	247
Other non-ferrous metal	46,570	6,839	6,053	127,566	10,307	342
Plastic film	758,488	63,425	29,367	44,193	104,683	-
Dense plastic	887,597	240,136	40,392	346,258	183,544	4,040
Artificial textiles, excluding shoes	133,277	83,653	1,671	33,129	25,108	190
Natural textiles, excluding shoes	242,799	31,925	3,043	67,332	20,267	387
Shoes	74,937	10,179	939	16,744	6,324	96
Treated and composite wood	89,974	84,321	4,152	482,966	66,027	-

	Kerbside residual	HWRC residual	Other residual	Household recycling	Non-hh resid	Non-hh recyc
Untreated wood	51,964	12,647	1,062	141,184	30,510	-
White goods	843	549	62,560	114,593	179	997
Large electronic goods	5,945	1,491	4,982	39,076	761	-
CRT TVs and monitors	30,973	-	9,015	92,331	2,323	-
Other WEEE	92,607	23,094	4,346	89,074	11,829	-
Batteries	14,114	826	550	9,147	919	-
Clinical waste	26,756	660	1,043	1,037	1,550	-
Paint/varnish	34,007	39,416	1,325	1,566	10,128	-
Oil	1,845	425	72	6,110	187	-
Garden herbicides & pesticides	12,348	3,066	481	1,037	1,299	-
Disposable nappies	693,208	8,929	3,821	-	26,884	-
Other (sanpro and dressings)	57,215	378	295	-	2,143	-
Furniture	5,055	136,889	255,888	92,158	28,946	-
Mattresses	-	78,158	75,676	2,941	16,527	-
Carpet/underlay	57,260	220,071	21,905	3,023	68,437	-
Other combustibles	186,741	67,073	20,589	15,050	85,607	-
Bricks, blocks, plaster	134,801	75,884	18,069	45,209	30,890	56,961
Other non-combustibles	164,627	74,671	27,061	11,951	33,918	-
Soil	88,655	23,546	599	23,177	4,979	-
Other wastes	252,641	6,682	13,999	30,257	8,634	-
Unspecified Fine material <10mm	249,928	13,057	66,021	-	6,602	-
Total	**11,048,000**	**1,635,000**	**1,047,000**	**9,724,000**	**1,882,000**	**139,636**