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OAKDENE HOLLINS

# Mapping Waste in the Food Industry

for

Defra  
and the  
Food and Drink  
Federation

August 2008

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## Acknowledgements

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# 1 Executive Summary

This report was commissioned by the Food and Drink Federation (FDF) and Defra to assess the amount of food and packaging waste arising across FDF's membership, the geographic spread of this waste and how it is being managed against the waste hierarchy.

This report aggregates survey returns from 236 production sites by area, usually counties. Counties with low (or high) numbers of site returns were aggregated (or split) to maintain confidentiality (or meaningful analysis). The survey provides a snapshot of the quantity and distribution of food and packaging waste arising across FDF's member companies during 2006.

The survey found that overall, the quantity of food and packaging waste sent directly to landfill was modest, with just under 138,000t of waste sent to landfill in 2006 (16.5% of total tonnage). This was not uniformly distributed across the UK: over a quarter of the waste was produced by Scotland, Lincolnshire and North Yorkshire.

All parts of the country employed some method of recovery for at least part of their waste. Of the total 835,000t of waste produced, 686,000t (82%) were recycled or recovered in some way. An additional 512,000t of potential waste was avoided through the use of by-products, in for example animal feed.

The report gives a geographical breakdown of waste by type and disposal/recovery method. It highlights the areas in which waste is potentially available for exploitation as a resource, and the recovery routes which may be appropriate.

Although mixed waste comprised only 135,000t of the total waste, it represented a much higher proportion of landfilled waste (110,000t of 138,000t). This suggests that a future priority could be segregation methods for such waste, preferably at source, in order to save valuable resources.

## 2 Introduction

In October 2007 the Food and Drink Federation (FDF) committed, on behalf of its members, to making a significant contribution to improving the environment by targeting priorities where they can make the biggest difference. Working collectively, their 'Five-fold Ambition' is to:

- i. show leadership nationally and internationally by achieving a 20% absolute reduction in CO<sub>2</sub> emissions by 2010 compared to 1990<sup>a</sup> and aspiring to a 30% reduction by 2020;
- ii. send zero food and packaging waste to landfill from 2015;
- iii. make a significant contribution to WRAP's work to achieve an absolute reduction in the level of packaging reaching households by 2010 compared to 2005 and provide more advice to consumers on how best to recycle or otherwise recover used packaging;
- iv. achieve significant reductions in water use<sup>b</sup> and contribute to an industry-wide absolute target<sup>c</sup> to reduce water use by 20% by 2020 compared to 2007;
- v. embed environmental standards in their transport practices, including contracts with hauliers as they fall for renewal, to achieve fewer and friendlier food transport miles and contribute to an absolute target for the food chain to reduce its environmental and social impacts by 20% by 2012 compared to 2002.<sup>d</sup>

This survey was commissioned jointly by FDF and Defra. It is important to FDF for the delivery of its ambition to send zero food and packaging waste to landfill by 2015. It is important to Defra given the Government's waste priorities set out in its 2007 Waste Strategy and, in particular, Defra's interest in identifying where waste is arising as a first step to understanding the causes and opportunities for preventing some of this waste occurring.

The survey provides a snapshot of the level of food and packaging waste arising across FDF's member companies during 2006 and its geographical distribution. It will help inform FDF, Defra and WRAP's work with the

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<sup>a</sup> Proposed in the Food Industry Sustainability Strategy published by Defra in 2006

<sup>b</sup> Water use outside of that embedded in products themselves

<sup>c</sup> Proposed in the Food Industry Sustainability Strategy published by Defra in 2006

<sup>d</sup> Proposed in the Food Industry Sustainability Strategy published by Defra in 2006

waste industry to encourage new waste treatment capacity in areas where waste arisings are the highest and therefore demand likely to be greatest.

## **2.1 Survey Methodology**

FDF is a trade association representing the interests of food and drink manufacturers in the UK. Its members account for over a third of the turnover of the UK food and drink industry overall. Questionnaires were sent to all FDF members to survey their food and packaging waste arisings at food production sites in the UK for 2006, along with disposal and recovery routes for each type of waste created. Member companies with a combined turnover of £17bn responded, providing data in respect of 236 sites. Although the survey did not set out to cover waste prevention, it became apparent there was abundant waste avoidance through use of by-products, and this has therefore been noted.

Individual site waste data has been aggregated into area totals, e.g. counties, based on the postcode of each site. To avoid breaching commercial confidentiality, where there are only a few sites in a particular area, data has been combined with another area to form larger groupings. For greater comparability, larger counties with numerous sites (such as Yorkshire) have been subdivided.

The main body of this report (Section 3) is subdivided as follows:

- amount of waste produced
- total waste to landfill
- landfill waste by type
- anaerobic digestion
- landspreading
- thermal treatment
- composting
- breakdown of waste type and quantity by RDA/country
- disposal/recovery routes of food by RDA/country.

The final two subsections provide a more detailed breakdown of waste by Regional Development Agency (RDA) / country. Full county lists for these areas are in Appendix 1.

### 3 Distribution of Waste Produced

Reducing waste plays an important role in meeting the global challenges posed by society's over-consumption of resources, including reducing greenhouse gas emissions. Waste policy in the UK (including the Government's Waste Strategy for England) builds on the current EU legislative framework along with the broader global action to tackle climate change.

Central to the Waste Strategy is the waste hierarchy, which places waste prevention as the priority, followed by reuse, recycling, recovery and lastly disposal. Focusing on waste prevention takes precedence for business and is less likely to give rise to economic, social and environmental costs than activities closer to the base of the hierarchy.

This report brings together FDF members' responses to the survey of food, packaging and mixed food/packaging waste arisings on a site basis, and goes on to consider how each of these waste streams is currently disposed of, or recovered, according to the hierarchy.

Whilst waste prevention achieved through best practice was not within the scope of the survey, it is evident from the responses received that the utilisation of by-products from food and drink production in a range of food and non-food applications represents a significant element of waste prevention across the food and drink industry. (In fact the survey showed that some half a million tonnes of by-products generated by FDF members in 2006 were reused as, for example, animal feed).

Of the waste that was not or could not be prevented, Table 1 shows the survey results against the Government's waste hierarchy and split between food, packaging, and mixed food and packaging waste. In summary it shows that 40% of the waste in 2006 was recycled (including by anaerobic digestion and composting), 42% was recovered (by other means than recycling) and 18% sent to final disposal, predominantly landfill. Recycling and landspreading were the most common forms of recovery, while incineration without energy recovery was the least common.

Table 2 shows the survey results for food, packaging and mixed food and packaging waste by area. It reveals which areas of the country produce the highest concentrations of food and packaging waste within the food and drink industry. Each of the following sections breaks the data down into greater detail regarding the tonnages and disposal or recovery routes of the waste arising.

Table 1: Disposal and recovery routes for each waste type according to FDF member site returns

Waste hierarchy	Recovery & disposal options	Food waste <sup>a</sup> (tonnes)	Packaging waste <sup>b</sup> (tonnes)	Mixed food & packaging waste <sup>c</sup> (tonnes)	Total (tonnes)
Prevention ( <i>highest</i> )					
Reuse					
Recycle/compost	Anaerobic digestion	66,239	0	0	66,239
	Composting	34,607	3,120	2,599	40,326
	Recycling	162,633	58,556	7,315	228,504
Recovery	Landspreading <sup>d</sup>	216,345	0	1,980	218,325
	Thermal treatment <sup>e</sup>	93,975	296	0	94,271
	Other recovery	5,392	21,352	11,805	38,549
Disposal ( <i>lowest</i> )	Incineration without energy recovery	4,037	1,065	1,424	6,526
	Landfill	17,569	10,511	109,686	137,766
	Other disposal	4,086	0	10	4096
	<b>TOTAL</b>	<b>604,883</b>	<b>94,900</b>	<b>134,819</b>	<b>834,602</b>

- Notes: a This represents the total **food waste** arisings which left via the backdoor of the factory in 2006, unmixed. It includes any inedible fraction, possibly also some materials considered as by-products utilised for example in animal feed or human food (see discussion below) but not food waste mixed with packaging waste.
- b This represents the total **packaging waste** arisings which left the factory via the backdoor in 2006, unmixed. It does not include reusable packaging unless it had reached the end of its life nor any packaging mixed in with food waste.
- c This represents the total **mixed food and packaging waste** arisings, i.e. finished goods or food and packaging waste which arose separately but was mixed on site before leaving via the factory backdoor, e.g. in a single skip.
- d This represents **liquid wastes and sludges** (e.g. from on-site effluent plant, fat traps, etc) that were landspread (including soil injection) or tankered overland to a sewage treatment plant. It does not include trade effluent transferred via public sewer to a municipal waste water treatment plant.
- e **Thermal treatment** includes traditional mass burn along with alternative processes based on a combination of pyrolysis and gasification, all of which involve energy recovery.

In addition the survey showed that 506,898t of by-products were generated by FDF members in 2006 and reused mainly as animal feed, thus avoiding waste. A further 5,023t of mixed wrapped food, for further sorting at the production site, was also likely to fall into this category.

There is a possibility that, as the survey did not set out to collect data on 'by-products', some members may have included these amongst their recycling or 'other recovery' tonnages particularly as there were a number of unspecified routes in these areas. We estimate, based on analysis of individual questionnaires, that this may increase the by-product tonnage by up to 147,000t making a total of 659,000t. However this is somewhat speculative as it may be that other recycling routes were used.

### **3.1 Amount of Waste Produced**

The following section examines the total amount of food, packaging and mixed food/packaging waste produced in 2006 by responding FDF member sites.

As a combined total of sites within an area, Shropshire produced the greatest quantity of total waste, with 100,780t generated in 2006. Surrey showed the least waste produced, with 1,098 tonnes. The detail of how this waste was recovered/disposed of, and of what it comprised, is discussed later in the report.

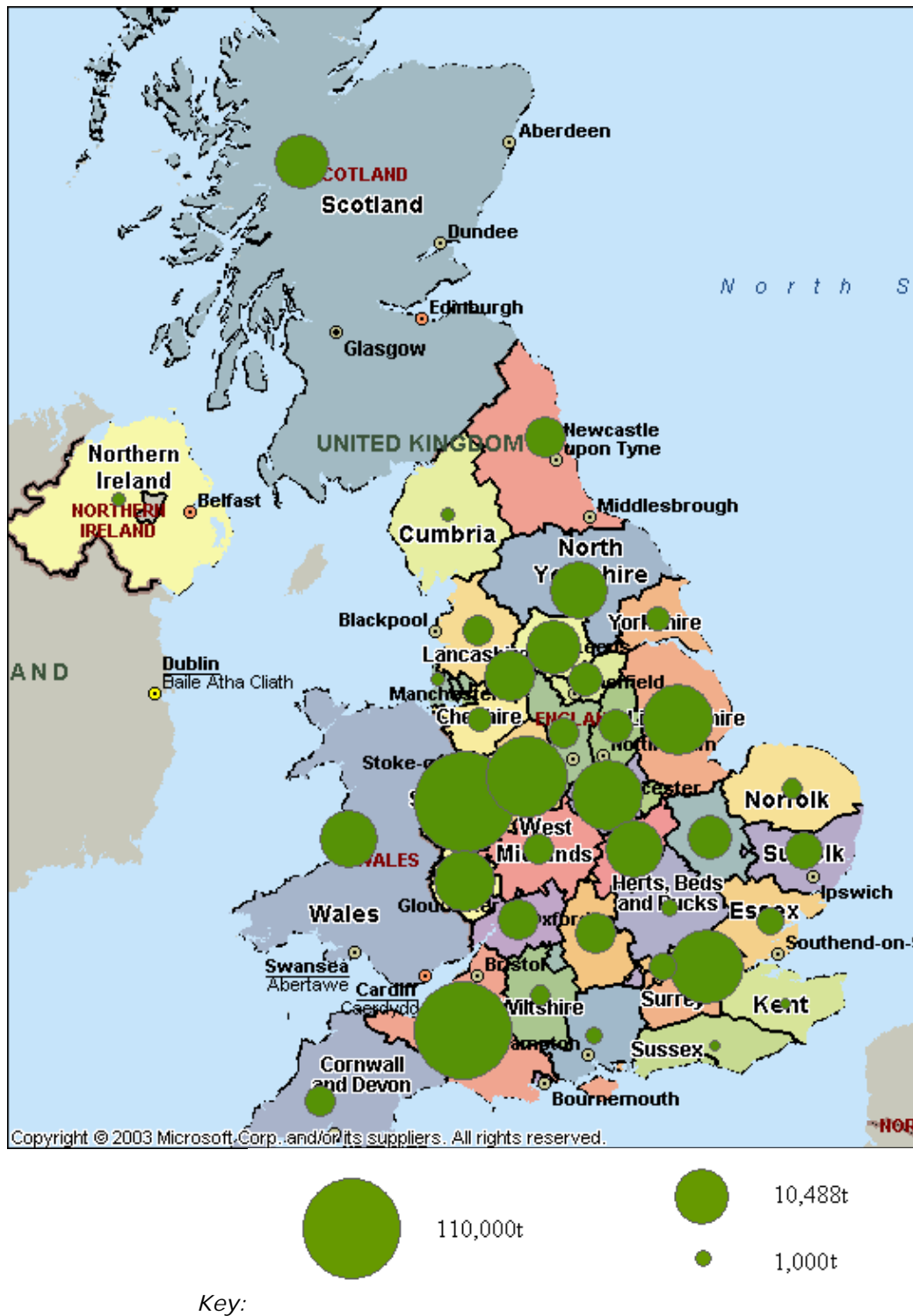
Table 2 shows the survey results for food, packaging and mixed food and packaging waste by area.

Figure 1 shows the geographical distribution of the waste produced, with Yorkshire, Shropshire and the South West Counties clearly shown to have generated the greatest quantities.

Table 2: Tonnage of waste produced by reporting FDF member sites during 2006, aggregated by area

Area	Food waste	Packaging waste	Mixed waste	Total waste
Shropshire	92,456	2,128	6,196	100,780
South West Counties	88,003	770	2,816	91,589
Staffordshire	71,017	1,966	712	73,695
London	23,153	25,886	7,408	56,447
Leicestershire	28,776	1,875	18,514	49,165
Lincolnshire	35,944	4,568	7,903	48,415
Herefordshire	34,173	1,007	1,407	36,587
Northamptonshire	28,400	3,070	2,498	33,968
North Yorkshire	17,309	3,842	12,115	33,266
West Yorkshire	19,930	7,850	2,780	30,560
Wales	18,108	1,854	8,109	28,071
Scotland	12,662	3,951	11,415	28,028
Cambridgeshire	12,766	3,455	3,647	19,868
Oxon and Berks	15,206	971	2,015	18,192
Lancashire	10,938	1,927	5,110	17,975
Gloucestershire	13,143	2,897	1,727	17,767
Greater Manchester	12,156	1,467	3,223	16,846
Co. Durham & Northumberland	12,831	1,299	2,430	16,560
Suffolk	6,485	6,214	2,680	15,379
South Yorkshire	6,759	479	4,537	11,775
Nottinghamshire	5,287	918	5,552	11,757
West Midlands	6,929	3,878	177	10,984
Cornwall and Devon	6,157	793	3,005	9,955
Kent	4,742	1,703	1,084	7,529
Essex	4,622	2,367	343	7,332
Yorkshire	2,920	843	2,226	5,989
Northern Ireland	2,932	368	2,569	5,869
Cheshire	368	566	4,625	5,559
Wiltshire	3,350	350	1,027	4,727
Norfolk	1,276	1,546	1,715	4,537
Hants	2,396	947	616	3,959
Herts, Beds & Bucks	1,438	1,085	718	3,241
Merseyside	1,148	708	765	2,621
Cumbria	88	366	1,435	1,889
Derbyshire	0	702	803	1,505
Sussex	421	194	503	1,118
Surrey	594	90	414	1,098
<b>Grand Total for UK</b>	<b>604,883</b>	<b>94,900</b>	<b>134,819</b>	<b>834,602</b>

Fig. 1: Tonnage of waste produced, by area, in 2006



### **3.2 Total Waste to Landfill**

Landfilling is a form of waste disposal that is placed at the bottom of the waste hierarchy and is therefore generally regarded as the option of last resort. Landfilling is costly to the environment (particularly emissions from food waste), has limited availability and is becoming increasingly expensive. Under the Five-Fold Environmental Ambition, FDF's aspiration is that members send zero waste to landfill from 2015.

As aggregations of total waste sent to landfill by area, Scotland and Lincolnshire had the greatest amounts, with 13,159 and 13,156 tonnes respectively, as can be seen in Table 3 and Figure 2.

Out of the 37 areas into which the UK has been divided for the purposes of this report, only three (the aforementioned two, plus North Yorkshire) sent a tonnage higher than 10,000t to landfill. These three were responsible for 26.8% of the total waste to landfill from reporting members across the whole of the UK.

Surrey sent the least waste to landfill, with 414t per year. Five counties sent less than 1,000t.

Table 3: Food and packaging waste to landfill, by area, in 2006

Area	Landfill total (tonnes)
Scotland	13,159
Lincolnshire	13,156
North Yorkshire	10,633
Wales	8,149
London	7,884
Shropshire	5,827
Northamptonshire	5,465
West Yorkshire	4,843
Leicestershire	4,840
Cheshire	4,725
Nottinghamshire	4,434
South Yorkshire	4,424
Lancashire	3,895
Co. Durham & Northumberland	3,824
Cambridgeshire	3,647
Wiltshire	3,545
Greater Manchester	3,439
Yorkshire	3,047
South West Counties	2,816
Norfolk	2,520
Cornwall and Devon	2,477
Northern Ireland	2,438
Gloucestershire	2,252
Oxon and Berks	2,215
Kent	1,768
Herefordshire	1,590
Cumbria	1,523
Herts, Beds and Bucks	1,487
Staffordshire	1,456
Hants	1,342
Merseyside	1,058
Suffolk	1,015
West Midlands	758
Essex	611
Derbyshire	587
Sussex	503
Surrey	414
<b>Total</b>	<b>137,766</b>

Fig. 2: Tonnage of waste sent to landfill, by area, in 2006



It is worth considering, however, the number of sites per area. Scotland had a total of 26 site returns with the result that average waste to landfill per site was lower than for a number of other areas. The average waste to landfill per site for the top five counties is shown in Table 4 below.

Table 4: Average waste to landfill per site for 2006

Area	Landfill total (tonnes)	Average landfill per site (tonnes)
Scotland	13,159	506
Lincolnshire	13,156	1,644
North Yorkshire	10,633	1,063
Wales	8,149	741
London	7,884	493

### 3.3 Landfill Waste by Type

Table 5 and Figure 3 show the breakdown of waste sent to landfill by type, whether food, packaging, or mixed.

Most of the landfilled waste appeared to be 'mixed' in most counties, with six counties sending no other type of waste to landfill. In nearly half of all the counties (17 out of 37) mixed waste amounted to over 90% of landfill waste.

There are, however, some exceptions to this. The majority of waste sent to landfill in Suffolk and the West Midlands was packaging. In contrast, over half the waste sent to landfill in Staffordshire, Northamptonshire and Wiltshire was exclusively food waste.

Table 5: Breakdown of landfilled waste, by area, in 2006

Area	Food (tonnes)	Packaging (tonnes)	Mixed (tonnes)
Scotland	463	1,281	11,415
North Yorkshire	150	222	10,261
Wales	3	37	8,109
Lincolnshire	5,378	0	7,778
London	153	324	7,407
Shropshire	0	0	5,827
Cheshire	0	100	4,625
South Yorkshire	13	0	4,411
Nottinghamshire	0	68	4,366
Cambridgeshire	0	0	3,647
Lancashire	79	380	3,436
Leicestershire	1,054	560	3,226
Greater Manchester	167	49	3,223
South West Counties	0	0	2,816
West Yorkshire	51	2,012	2,780
Cornwall and Devon	0	1	2,476
Co. Durham & Northumberland	1,194	200	2,430
Northern Ireland	0	9	2,429
Yorkshire	821	0	2,226
Oxon and Berks	200	0	2,015
Norfolk	614	191	1,715
Gloucestershire	0	551	1,701
Northamptonshire	2,552	1,415	1,498
Cumbria	88	0	1,435
Herefordshire	150	33	1,407
Kent	250	434	1,084
Wiltshire	2,518	0	1,027
Merseyside	293	0	765
Herts, Beds and Bucks	403	366	718
Staffordshire	744	0	712
Hants	200	526	616
Derbyshire	0	0	587
Sussex	0	0	503
Surrey	0	0	414
Essex	31	237	343
West Midlands	0	581	177
Suffolk	0	934	81
<b>Total</b>	<b>17,569</b>	<b>10,511</b>	<b>109,686</b>



### 3.4 Anaerobic Digestion

Anaerobic digestion (AD) is a process by which micro-organisms break down biodegradable material in the absence of oxygen. Providing the resultant gas is captured, AD reduces the emission of greenhouse gases to the atmosphere, has the capability to produce renewable energy, and the digestate can be spread on land as fertiliser (subject to waste management controls).

Table 6 shows that in 2006 sites in seven areas sent waste to AD plants for recovery, though most of these sent relatively modest amounts.

Table 6: Waste sent for anaerobic digestion, by area, in 2006

Area	Total waste sent to anaerobic digestion (tonnes)
Staffordshire	63,464
Suffolk	1,401
Herts, Beds and Bucks	1,035
Scotland	285
Northern Ireland	24
Wales	21
Cornwall and Devon	9
<b>Total</b>	<b>66,239</b>

Figure 4 clearly illustrates that distribution is not uniform across the UK, with Staffordshire sending a significantly greater quantity of waste to AD than any of the other areas.

Fig. 4: Tonnage of food waste sent to anaerobic digestion plants, by area, in 2006



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Key:

### 3.5 *Landspreading*

Landspreading is a process in which liquid wastes and sludges (e.g. from on-site effluent plant, fat traps, etc) are applied to agricultural land. Providing this results in agricultural benefit or ecological improvement and complies with the exemptions under the Environmental Permitting Regulations, landspreading is regarded as a form of 'recovery' in the waste hierarchy.

Landspreading was the most popular recovery route after recycling (Table 1). This was carried out within 27 areas, with seven sending more than 10,000t (Table 7).

Table 7: Waste sent for landspreading by area, in 2006

Area	Landspread (tonnes)
Shropshire	79,470
Lincolnshire	16,733
Northamptonshire	14,805
North Yorkshire	12,574
Co. Durham & Northumberland	11,045
Cambridgeshire	10,292
Oxon and Berks	10,016
West Yorkshire	9,737
Herefordshire	9,047
Wales	8,130
South Yorkshire	6,126
Staffordshire	5,822
Cornwall and Devon	5,686
Greater Manchester	4,770
Scotland	3,773
Gloucestershire	2,710
Lancashire	2,385
Northern Ireland	1,558
Leicestershire	950
London	539
Nottinghamshire	464
Sussex	419
Cheshire	326
South West Counties	300
Merseyside	278
Yorkshire	250
Norfolk	120
<b>Total</b>	<b>218,325</b>

Although Figure 5 shows Shropshire to be dominant, the cumulative impact of the other areas is significant, with landspreading totalling over 200,000t in the UK.

Fig. 5: Waste sent to landspreading, by area, in 2006



### 3.6 Thermal Treatment

Thermal treatment, for the purposes of this survey, covers both traditional mass burn as well as alternative processes based on a combination of pyrolysis and gasification. In both cases energy recovery must take place (as distinct from incineration without energy recovery), and as such it is regarded as a recovery process in the waste hierarchy.

FDF member sites in four areas sent waste to thermal treatment plants, and two of these sent significant quantities, with the South West Counties sending a greater tonnage to thermal treatment than any single disposal route used in any other county (see Table 8 and Figure 6).

Table 8: Tonnage of waste sent for thermal treatment, by area, in 2006

Area	Waste sent for thermal treatment (tonnes)
South West Counties	83,363
Herefordshire	10,612
Herts, Beds and Bucks	177
London	119
<b>Total</b>	<b>94,271</b>

Fig. 6: Total waste sent to thermal treatment, by area, in 2006



Key:

### 3.7 Composting

Composting falls under “recycling” in the waste hierarchy and can reduce the quantity of biodegradable waste reaching landfill. Compost has various uses including acting as a soil conditioner and a growing medium for the horticultural industry.

Composting appears to be a more widely practised method of recycling than anaerobic digestion, although not uniformly adopted by FDF member sites across the UK with most areas (24 of 37) recording no activity. Suffolk and Herefordshire account for almost half of the amount reported (Table 9).

Table 9: Tonnage of waste sent for composting, by area, in 2006

Area	Waste to composting (tonnes)
Suffolk	9,695
Herefordshire	9,269
Oxon and Berks	4,927
North Yorkshire	4,874
Scotland	3,901
Lancashire	3,650
Lincolnshire	2,425
Yorkshire	809
Nottinghamshire	437
Cambridgeshire	213
Merseyside	100
Essex	25
London	1
<b>Total</b>	<b>40,326</b>

Figure 7 shows the distribution of areas employing composting and, unlike for other recovery routes such as thermal treatment and landspreading, there is no single dominant area. Two areas sent large amounts, with a number of others located across the whole of the UK, without showing any clear pattern.

Fig. 7: Tonnage of waste composted, by area, in 2006



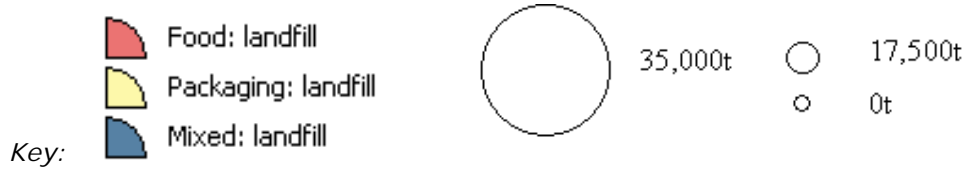
### **3.8 Breakdown of Waste Type and Quantity by RDA/Country**

A detailed geographical representation by waste type, as well as tonnage, could not easily be generated, due to overlap of pie charts. An alternative analysis, therefore, was to aggregate areas by Regional Development Agency/country, as this also has some relevance to economic and waste planning.

Figure 8 shows that the Yorkshire Forward region generated the greatest tonnage of waste to landfill in 2006. The majority was mixed waste and therefore likely to present challenges for recycling. More than 18% was food waste, which we anticipate should be more straightforward to exploit.

Wales and Northern Ireland both had a very low percentage of total waste to landfill. In both cases this was comprised entirely of mixed waste.

Fig 8: Breakdown of landfill waste-type and quantity, by RDA/Country, in 2006

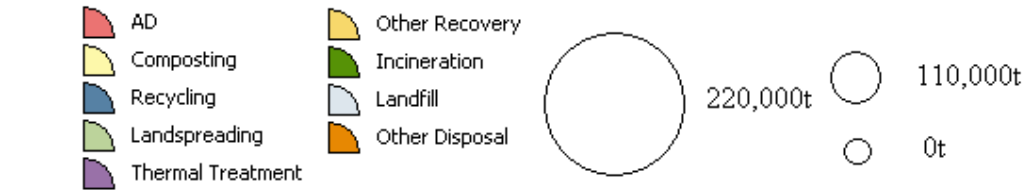


### ***3.9 Disposal/Recovery Routes for Food Waste by RDA/Country***

The majority of regions across the UK seem to utilise at least a part of this fraction of the waste stream as a resource. With the exception of Northern Ireland, none of the regions utilise landfill as their primary route.

Most regions had a broadly similar make-up of waste recovery and disposal routes, with landspreading, recycling and landfill making up the majority. The exceptions to this were the SWRDA (South West Regional Development Agency) region, which showed a significant majority going to thermal treatment, Advantage West Midlands, with almost a third of all waste going to anaerobic digestion, and London, being the only region to show any substantial quantity going to 'other recovery' (see Figure 9).

Fig 9: Waste by disposal/recovery route, by RDA/country, in 2006



Key:

## 4 Waste Prevention: By-Products

It is typical in the food sector that when raw materials are processed, a range of products is produced in addition to the 'main' product. Known as 'by-products', these are commonly put to further use in a range of food (e.g. food ingredients) and non-food (e.g. animal feed) applications. This has several important benefits, not least in resource efficiency and waste prevention. Having said this, it remains important to try to minimise the amount of by-products which arise as a result of production inefficiencies.

This survey showed that in 2006, the utilisation of by-products, particularly as animal feed, was distributed throughout the UK without a clear pattern (though Northern Ireland shows no use of by-products). Table 10 and Figure 10 show Greater Manchester, North Yorkshire and Hampshire recorded the largest tonnages.

Use of by-product as animal feed does not appear to be directly related to locality of livestock farms, with Greater Manchester recording the largest tonnage despite being relatively urban.

Table 10: By-products produced, by area, in 2006

Area	By-products (tonnes)
Greater Manchester	71,330
Hants	68,658
North Yorkshire	61,496
Northamptonshire	45,254
Scotland	31,573
Wales	31,485
South Yorkshire	29,542
South West Counties	27,667
Herts, Beds and Bucks	26,930
Suffolk	23,089
Shropshire	18,300
London	11,072
Merseyside	10,911
County Durham and	10,819
Cornwall and Devon	9,638
West Yorkshire	6,527
Leicestershire	5,654
Gloucestershire	4,012
Lancashire	3,867
Cumbria	3,482
Nottinghamshire	2,989
Lincolnshire	2,056
Yorkshire	1,562
West Midlands	1,431
Essex	1,132
Derbyshire	650
Oxon and Berks	421
Cheshire	294
Surrey	80
Cambridgeshire	0
Herefordshire	0
Kent	0
Norfolk	0
Northern Ireland	0
Staffordshire	0
Sussex	0
<b>Total</b>	<b>511,921</b>

Fig. 10: By-products produced, by area, in 2006



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## 5 Conclusions

Overall, quantities of food and packaging waste going directly to landfill in 2006 from FDF member sites surveyed appear modest compared to total tonnages of waste arising. Only seven of 37 areas sent more than 5,000t of waste to landfill per year, with five areas sending less than 1,000t. This still leaves a total of 137,766t going to landfill, however, with three areas producing over a quarter of this amount. In view of this, with regard to use of waste as a resource, Scotland, Lincolnshire and North Yorkshire have the greatest potential available to them, in respect of tonnage alone.

The figures show that where a particular county is recovering a large proportion of its waste, the same is not generally the case in adjacent areas. A clear example of this can be seen (in Figure 2) for Lincolnshire, which landfills over 13,000t per year while its surrounding areas dispose of less than 5,000t waste to landfill, with Norfolk having around half that amount. This may be due to the heterogeneity of the food industry, but may also represent an opportunity for creating better prevention, recycling and recovery opportunities.

The survey did not set out to measure waste prevention at source. However, it has uncovered substantial evidence of waste prevention through the use of secondary materials from processing as by-products, principally as animal feedstuffs. The majority of areas utilised this method, avoiding 512,000t of waste, with the possibility of this figure being even higher.

Overall, the most widely used recovery or recycling method was landspreading. The vast majority of this appears to take place in Shropshire, with the remainder occurring relatively evenly across the UK.

The majority of landfilled waste was mixed food and packaging (see Table 1). This suggests that a future priority area should be segregation of such waste, preferably at source, in order to save valuable resources. It is also important to ensure awareness of opportunities to recover mixed waste via anaerobic digestion, advanced composting facilities or thermal treatment, and to encourage treatment providers to offer facilities in the areas with the greatest potential feedstock.

## Appendices

### ***A1 Allocations of counties and boroughs to RDAs and countries***

<b>County/Borough</b>	<b>Territory</b>
Birmingham	Advantage West Midlands
Coventry	Advantage West Midlands
Dudley	Advantage West Midlands
Herefordshire	Advantage West Midlands
Sandwell	Advantage West Midlands
Shropshire	Advantage West Midlands
Solihull	Advantage West Midlands
Staffordshire	Advantage West Midlands
Stoke-on-Trent	Advantage West Midlands
Telford and Wrekin	Advantage West Midlands
Walsall	Advantage West Midlands
Warwickshire	Advantage West Midlands
Wolverhampton	Advantage West Midlands
Worcestershire	Advantage West Midlands
Bedfordshire	EEDA
Cambridgeshire	EEDA
Essex	EEDA
Hertfordshire	EEDA
Luton	EEDA
Norfolk	EEDA
Peterborough	EEDA
Southend-on-Sea	EEDA
Suffolk	EEDA
Thurrock	EEDA
City of Derby	EMDA
City of Leicester	EMDA
Derbyshire	EMDA
Leicestershire	EMDA
Lincolnshire	EMDA
Northamptonshire	EMDA
Nottingham City	EMDA
Nottinghamshire	EMDA
Rutland	EMDA
Barking and Dagenham	London
Barnet	London
Bexley	London

<b>County/Borough</b>	<b>Territory</b>
Brent	London
Bromley	London
Camden	London
City of London	London
Croydon	London
Ealing	London
Enfield	London
Greenwich	London
Hackney	London
Hammersmith and Fulham	London
Haringey	London
Harrow	London
Havering	London
Hillingdon	London
Hounslow	London
Islington	London
Kensington and Chelsea	London
Kingston-upon-Thames	London
Lambeth	London
Lewisham	London
Merton	London
Newham	London
Redbridge	London
Richmond-upon-Thames	London
Southwark	London
Sutton	London
Tower Hamlets	London
Waltham Forest	London
Wandsworth	London
Westminster	London
Antrim	Northern Ireland
Ards	Northern Ireland
Armagh	Northern Ireland
Ballymena	Northern Ireland
Ballymoney	Northern Ireland
Banbridge	Northern Ireland
Belfast City	Northern Ireland
Carrickfergus	Northern Ireland
Castlereagh	Northern Ireland
Coleraine	Northern Ireland
Cookstown	Northern Ireland
Craigavon	Northern Ireland
Derry City	Northern Ireland
Down	Northern Ireland
Dungannon	Northern Ireland

<b>County/Borough</b>	<b>Territory</b>
Fermanagh	Northern Ireland
Larne	Northern Ireland
Limavady	Northern Ireland
Lisburn	Northern Ireland
Magherafelt	Northern Ireland
Moyle	Northern Ireland
Newry and Mourne	Northern Ireland
Newtownabbey	Northern Ireland
North Down	Northern Ireland
Omagh	Northern Ireland
Strabane	Northern Ireland
Blackburn with Darwen	NWDA
Blackpool	NWDA
Bolton	NWDA
Bury	NWDA
Cheshire	NWDA
Cumbria	NWDA
Halton	NWDA
Knowsley	NWDA
Lancashire	NWDA
Liverpool	NWDA
Manchester	NWDA
Oldham	NWDA
Rochdale	NWDA
Salford	NWDA
Sefton	NWDA
St Helens	NWDA
Stockport	NWDA
Tameside	NWDA
Trafford	NWDA
Warrington	NWDA
Wigan	NWDA
Wirral	NWDA
Darlington	One North East
Durham	One North East
Gateshead	One North East
Hartlepool	One North East
Middlesbrough	One North East
Newcastle-upon-Tyne	One North East
North Tyneside	One North East
Northumberland	One North East
Redcar and Cleveland	One North East
South Tyneside	One North East
Stockton-on-Tees	One North East
Sunderland	One North East

<b>County/Borough</b>	<b>Territory</b>
Aberdeen City	Scotland
Aberdeenshire	Scotland
Angus	Scotland
Argyll and Bute	Scotland
Clackmannanshire	Scotland
Dumfries and Galloway	Scotland
East Ayrshire	Scotland
East Dunbartonshire	Scotland
East Lothian	Scotland
East Renfrewshire	Scotland
Edinburgh City	Scotland
Falkirk	Scotland
Fife	Scotland
Glasgow City	Scotland
Highland	Scotland
Inverclyde	Scotland
Midlothian	Scotland
Moray	Scotland
North Ayrshire	Scotland
North Lanarkshire	Scotland
Perth and Kinross	Scotland
Renfrewshire	Scotland
Scottish Borders	Scotland
South Ayrshire	Scotland
South Lanarkshire	Scotland
Stirling	Scotland
West Dunbartonshire	Scotland
West Lothian	Scotland
Western Isles	Scotland
Bracknell Forest	SEEDA
Brighton and Hove	SEEDA
Buckinghamshire	SEEDA
East Sussex	SEEDA
Hants	SEEDA
Isle of Wight	SEEDA
Kent	SEEDA
Medway Towns	SEEDA
Milton Keynes	SEEDA
Oxon	SEEDA
Portsmouth	SEEDA
Reading	SEEDA
Slough	SEEDA
Southampton	SEEDA
Surrey	SEEDA
West Berkshire	SEEDA

<b>County/Borough</b>	<b>Territory</b>
West Sussex	SEEDA
Windsor and Maidenhead	SEEDA
Wokingham	SEEDA
Bath and North East Somerset	SWRDA
Bournemouth	SWRDA
Bristol	SWRDA
Cornwall	SWRDA
Devon	SWRDA
Dorset	SWRDA
Gloucestershire	SWRDA
North Somerset	SWRDA
Plymouth	SWRDA
Poole	SWRDA
Somerset	SWRDA
South Gloucestershire	SWRDA
Swindon	SWRDA
Torbay	SWRDA
Wiltshire	SWRDA
Blaenau Gwent	Wales
Bridgend	Wales
Caerphilly	Wales
Cardiff	Wales
Carmarthenshire	Wales
Ceredigion	Wales
Conwy	Wales
Denbighshire	Wales
Flintshire	Wales
Gwynedd	Wales
Isle of Anglesey	Wales
Merthyr Tydfil	Wales
Monmouthshire	Wales
Neath Port Talbot	Wales
Newport	Wales
Pembrokeshire	Wales
Powys	Wales
Rhondda Cynon Taff	Wales
Swansea	Wales
Torfaen	Wales
Vale of Glamorgan	Wales
Wrexham	Wales
Barnsley	Yorkshire Forward
Bradford	Yorkshire Forward
Calderdale	Yorkshire Forward
Doncaster	Yorkshire Forward
East Riding of Yorkshire	Yorkshire Forward

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<b>County/Borough</b>	<b>Territory</b>
Kingston-upon-Hull	Yorkshire Forward
Kirklees	Yorkshire Forward
Leeds	Yorkshire Forward
North East Lincolnshire	Yorkshire Forward
North Lincolnshire	Yorkshire Forward
North Yorkshire	Yorkshire Forward
Rotherham	Yorkshire Forward
Sheffield	Yorkshire Forward
Wakefield	Yorkshire Forward
York	Yorkshire Forward

## ***A2 Groupings of sites to protect commercially sensitive material***

<b>Site</b>	<b>Grouped with</b>
Bournemouth	Bournemouth
Bracknell Forest	Bracknell Forest
Brighton and Hove	Brighton and Hove
Cambridgeshire	Cambridgeshire
Peterborough	Cambridgeshire
Cheshire	Cheshire
Warrington	Cheshire
Cornwall	Cornwall and Devon
Devon	Cornwall and Devon
Plymouth	Cornwall and Devon
Torbay	Cornwall and Devon
Darlington	County Durham and Northumberland
Durham	County Durham and Northumberland
Gateshead	County Durham and Northumberland
Hartlepool	County Durham and Northumberland
Middlesbrough	County Durham and Northumberland
Newcastle-upon-Tyne	County Durham and Northumberland
North Tyneside	County Durham and Northumberland
Northumberland	County Durham and Northumberland
Redcar and Cleveland	County Durham and Northumberland
South Tyneside	County Durham and Northumberland
Stockton-on-Tees	County Durham and Northumberland
Sunderland	County Durham and Northumberland
Cumbria	Cumbria
City of Derby	Derbyshire
Derbyshire	Derbyshire
Essex	Essex
Southend-on-Sea	Essex
Thurrock	Essex
Gloucestershire	Gloucestershire
Manchester	Greater Manchester
Oldham	Greater Manchester
Rochdale	Greater Manchester
Stockport	Greater Manchester
Tameside	Greater Manchester
Trafford	Greater Manchester
Halton	Halton
Hants	Hants
Southampton	Hants
Herefordshire	Herefordshire
Bedfordshire	Herts, Beds and Bucks

Site	Grouped with
Buckinghamshire	Herts, Beds and Bucks
Hertfordshire	Herts, Beds and Bucks
Luton	Herts, Beds and Bucks
Milton Keynes	Herts, Beds and Bucks
Isle of Wight	Isle of Wight
Kent	Kent
Medway Towns	Kent
Knowsley	Knowsley
Blackburn with Darwen	Lancashire
Blackpool	Lancashire
Bolton	Lancashire
Bury	Lancashire
Lancashire	Lancashire
Salford	Lancashire
Wigan	Lancashire
City of Leicester	Leicestershire
Leicestershire	Leicestershire
Lincolnshire	Lincolnshire
North East Lincolnshire	Lincolnshire
North Lincolnshire	Lincolnshire
Barking and Dagenham	London
Barnet	London
Bexley	London
Brent	London
Bromley	London
Camden	London
City of London	London
Croydon	London
Ealing	London
Enfield	London
Greenwich	London
Hackney	London
Hammersmith and Fulham	London
Haringey	London
Harrow	London
Havering	London
Hillingdon	London
Hounslow	London
Islington	London
Kensington and Chelsea	London
Kingston-upon-Thames	London
Lambeth	London
Lewisham	London
Merton	London
Newham	London

Site	Grouped with
Redbridge	London
Richmond-upon-Thames	London
Southwark	London
Sutton	London
Tower Hamlets	London
Waltham Forest	London
Wandsworth	London
Westminster	London
Liverpool	Merseyside
Sefton	Merseyside
Wirral	Merseyside
Norfolk	Norfolk
North Yorkshire	North Yorkshire
York	North Yorkshire
Northamptonshire	Northamptonshire
Antrim	Northern Ireland
Ards	Northern Ireland
Armagh	Northern Ireland
Ballymena	Northern Ireland
Ballymoney	Northern Ireland
Banbridge	Northern Ireland
Belfast City	Northern Ireland
Carrickfergus	Northern Ireland
Castlereagh	Northern Ireland
Coleraine	Northern Ireland
Cookstown	Northern Ireland
Craigavon	Northern Ireland
Derry City	Northern Ireland
Down	Northern Ireland
Dungannon	Northern Ireland
Fermanagh	Northern Ireland
Larne	Northern Ireland
Limavady	Northern Ireland
Lisburn	Northern Ireland
Magherafelt	Northern Ireland
Moyle	Northern Ireland
Newry and Mourne	Northern Ireland
Newtownabbey	Northern Ireland
North Down	Northern Ireland
Omagh	Northern Ireland
Strabane	Northern Ireland
Nottingham City	Nottinghamshire
Nottinghamshire	Nottinghamshire
Oxon	Oxon and Berks
Reading	Oxon and Berks

<b>Site</b>	<b>Grouped with</b>
West Berkshire	Oxon and Berks
Poole	Poole
Portsmouth	Portsmouth
Rutland	Rutland
Aberdeen City	Scotland
Aberdeenshire	Scotland
Angus	Scotland
Argyll and Bute	Scotland
Clackmannanshire	Scotland
Dumfries and Galloway	Scotland
Dundee City	Scotland
East Ayrshire	Scotland
East Dunbartonshire	Scotland
East Lothian	Scotland
East Renfrewshire	Scotland
Edinburgh City	Scotland
Falkirk	Scotland
Fife	Scotland
Glasgow City	Scotland
Highland	Scotland
Inverclyde	Scotland
Midlothian	Scotland
Moray	Scotland
North Ayrshire	Scotland
North Lanarkshire	Scotland
Orkney Islands	Scotland
Perth and Kinross	Scotland
Renfrewshire	Scotland
Scottish Borders	Scotland
South Ayrshire	Scotland
South Lanarkshire	Scotland
Stirling	Scotland
West Dunbartonshire	Scotland
West Lothian	Scotland
Western Isles	Scotland
Shropshire	Shropshire
Slough	Slough
Bath & NE Somerset	South West Counties
Bristol	South West Counties
Dorset	South West Counties
North Somerset	South West Counties
Somerset	South West Counties
South Gloucestershire	South West Counties
Doncaster	South Yorkshire
Rotherham	South Yorkshire

Site	Grouped with
Sheffield	South Yorkshire
St Helens	St Helens
Staffordshire	Staffordshire
Stoke-on-Trent	Staffordshire
Suffolk	Suffolk
Surrey	Surrey
East Sussex	Sussex
West Sussex	Sussex
Swindon	Swindon
Telford and Wrekin	Telford and Wrekin
Blaenau Gwent	Wales
Bridgend	Wales
Caerphilly	Wales
Cardiff	Wales
Carmarthenshire	Wales
Ceredigion	Wales
Conwy	Wales
Denbighshire	Wales
Flintshire	Wales
Gwynedd	Wales
Isle of Anglesey	Wales
Merthyr Tydfil	Wales
Monmouthshire	Wales
Neath Port Talbot	Wales
Newport	Wales
Pembrokeshire	Wales
Powys	Wales
Rhondda Cynon Taff	Wales
Swansea	Wales
Torfaen	Wales
Vale of Glamorgan	Wales
Wrexham	Wales
Birmingham	West Midlands
Coventry	West Midlands
Dudley	West Midlands
Sandwell	West Midlands
Solihull	West Midlands
Walsall	West Midlands
Warwickshire	West Midlands
Wolverhampton	West Midlands
Worcestershire	West Midlands
Barnsley	West Yorkshire
Bradford	West Yorkshire
Calderdale	West Yorkshire
Kirklees	West Yorkshire

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<b>Site</b>	<b>Grouped with</b>
Leeds	West Yorkshire
Wakefield	West Yorkshire
Wiltshire	Wiltshire
Windsor and Maidenhead	Windsor and Maidenhead
Wokingham	Wokingham
East Riding of Yorkshire	Yorkshire
Kingston-upon-Hull	Yorkshire