

Mapping Waste in the Food and Drink Industry

Sustainable products and services
Clean technologies
Resource efficiency

A report for
Defra and
The Food and Drink Federation

November 2010

This report has been prepared by: Caroline Bartlett

Checked as a final copy by: Katie Deegan

Reviewed by: Nick Morley

Date: 01 November 2010

Contact: caroline.bartlett@oakdenehollins.co.uk

File reference number: DEFRO1 235 summary.doc

Oakdene Hollins provides clients with these services:

- Modelling and impact assessment
- Programme management and evaluation
- Project management
- Ecolabelling advice
- Carbon footprinting
- Critical review of life cycle assessment
- Policy and strategy development
- Lean manufacturing
- Economic analysis
- Market appraisal.

For more information visit www.oakdenehollins.co.uk

Oakdene Hollins is registered to ISO 9001:2008



We print our reports on Ecolabel / recycled paper

Contents

1	Executive summary	1
2	Introduction	2
2.1	FDF Five-Fold Environmental Ambition	2
2.2	Previous report	2
2.3	Survey methodology	2
3	Distribution of waste produced	4
3.1	Waste breakdown and recovery/disposal routes	4
3.2	Amount of waste produced	7
3.3	Total waste to landfill	10
3.4	Landfill waste by type	13
3.5	Anaerobic digestion	16
3.6	Composting	19
3.7	Landspreadering	22
3.8	Thermal treatment	25
3.9	Recovery/disposal routes for waste by country	28
4	By-products and surpluses	31
5	Trends in waste arisings	34
5.1	Trends in waste arisings and management	34
5.2	Data limitations	38
6	Conclusions	39

Acknowledgements

We would like to thank Defra for funding the study. We would also like to thank the Food and Drink Federation for preparing and circulating the survey, and their members who took the time to complete the questionnaires and answer queries when they arose. In particular, thank you to David Bellamy and Peter Andrews at FDF, and Lucy Foster and Farhana Amin at Defra for their input and feedback on the report.

1 Executive summary

In 2008, Defra and the Food and Drink Federation (FDF) commissioned a report to assess the amount of food and packaging waste arising from FDF member manufacturing sites across the UK during 2006. This study examined the geographic distribution of waste and management techniques utilised. It also sought to highlight any areas where significant landfilling or low value recovery was being carried out, with the intention of promoting management techniques at higher tiers of the waste hierarchy.

This 2010 report builds on the previous study to provide an updated snapshot of the amount and geographical distribution of food and packaging waste arising across FDF member sites along with how this waste is being managed. Data were gathered for both 2008 and 2009 from 149 manufacturing sites and, where appropriate, were also compared to the 2006 data from the previous report. A smaller sub sample of 115 sites providing data for all three years was analysed in order to identify trends.

The 2008 and 2009 returns have also been amalgamated to give a representation of FDF member practices according to different geographical areas. These areas were determined according to the number of sites responding from specific counties. Those areas showing small number of responding sites were combined to maintain confidentiality.

Of the 481,000 tonnes waste produced in 2009 by the 149 responding sites, only 43,000 tonnes (9%) was sent to landfill, with 435,000 tonnes (90.3%) recovered or recycled in some manner. This was a significant improvement on both the 2006 and the 2008 data, where 16.5% and 12.5% of arisings were sent to landfill respectively. This shows that FDF is making good progress towards meeting its target of seeking to send zero food and packaging waste

to landfill from 2015, part of its 'Five-Fold Environmental Ambition'.

There were no substantial 'hotspots' for landfill; no area sent more than 5,000 tonnes to landfill in 2009; eight areas sent less than 1,000 tonnes. The majority of waste sent to landfill in both 2008 and 2009 was mixed food and packaging waste, which is similar to the findings of the first survey. Also the majority of the arisings occurred due to food waste yet only a small fraction (i.e. 1.7% in 2009) of this was landfilled. In both years, FDF members produced over 340,000 tonnes of by-products and surpluses, with a significant tonnage (approx 98% of total) going to animal feed.

Analysis of the sub sample of 115 sites providing data for all three years suggested that a decoupling of waste generation against production has taken place, in line with the 'more for less' approach. Actual waste arisings have decreased by 16.5% over the three years surveyed whilst production has increased over the period by 3%.

A shift towards the middle tier of the waste hierarchy is apparent. As in 2006, landspreading was the dominant waste management option, its share increasing to 63% of all waste generated. Two areas used anaerobic digestion (AD) in 2009. The results show growth in uptake of AD, albeit from a modest base. There clearly remains ample opportunity for broader uptake of this technology.

The previous report suggested that targeting waste segregation at source should be prioritised, to reduce the tonnage of mixed waste going to landfill. The latest survey data showed a decrease in mixed waste as a proportion of total waste arisings, suggesting that more segregation is occurring although there is still opportunity for improvement.

2 Introduction

2.1 FDF Five-Fold Environmental Ambition

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, the FDF 'Five-fold Ambition' aims to:

- Show leadership nationally and internationally by achieving a 20% absolute reduction in CO₂ emissions by 2010 compared to 1990¹ and aspiring to a 30% reduction by 2020;
- Send zero food and packaging waste to landfill from 2015;
- 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;
- Achieve significant reductions in water use² and contribute to an industry-wide absolute target³ to reduce water use by 20% by 2020 compared to 2007, and
- 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 UK food chain to reduce the environmental and social costs of its domestic food transportation by 20% by 2012 compared to 2002⁴.

This survey was commissioned jointly by FDF and Defra to collect data on food and packaging waste arisings from FDF member manufacturing sites in 2008 and 2009, its geographical distribution and the management routes utilised. This report will help FDF track delivery

of its Ambition to send zero food and packaging waste to landfill from 2015, inform development of waste treatment capacity and to move waste management up the hierarchy. The insight that this report provides is important to Defra given the coalition Government's aims of taking steps to achieve a zero waste economy.

The survey follows on from a joint FDF and Defra report commissioned in 2008⁵, which provided a snapshot of the level of food and packaging waste arising across FDF member sites during 2006, its geographical distribution and management routes.

2.2 Previous report

The survey distributed by FDF in 2008, looked at 2006 data and generated returns from 236 sites. This data showed over 800,000 tonnes of waste arisings across the members. At 138,000 tonnes (equivalent to 16.5% of the total arisings), food and packaging waste sent to landfill was found to be modest. The majority comprised mixed food and packaging waste, with 110,000 tonnes of the 135,000 tonnes arising, sent to landfill. Food waste was the most recovered type of waste, the majority (36%) being sent for landspeading, with uptake of anaerobic digestion also being significant, at 11% of food waste

All parts of the country employed some method of recovery, with 82% of total arisings recycled or recovered in some way. An additional 512,000 tonnes of potential waste was avoided due to use of by-products, principally as animal feed.

2.3 Survey methodology

The 2010 survey provides an updated snapshot of the level of food and packaging waste arising across FDF member manufacturing sites and makes comparison with the previous 2008 survey of 2006 data. Two years' worth of data

¹ Proposed in the Food Industry Sustainability Strategy published by Defra in 2006

² Water use outside of that embedded in products themselves

³ Proposed in the Food Industry Sustainability Strategy published by Defra in 2006

⁴ Proposed in the Food Industry Sustainability Strategy published by Defra in 2006

⁵ FDF (2008) Mapping Waste in the food industry Report available from http://www.fdf.org.uk/publicgeneral/mapping_waste_in_the_food_industry.pdf

were requested (2008 and 2009). Data on by-products and surpluses were also collected and broken down by destination following feedback from members responding to the previous survey. The use of by-products in, for example, animal feed is considered to be a beneficial avoidance of waste. This survey therefore included a table in which respondents could enter the tonnage of by products and surpluses going to animal feed, charity (human) or other destination, material that would otherwise have become a waste if it had been discarded.

Questionnaires were sent to all FDF members to survey food and packaging waste arisings at their food manufacturing sites in the UK for 2008 and 2009, along with recycling, recovery and disposal routes according to whether it was food, packaging or mixed food and packaging waste. Member companies with a combined turnover of £15bn responded, providing data in respect of 149 sites. This equates to about 20% of the UK food and drink manufacturing industry by value.

Individual site waste data was aggregated into different geographic areas (e.g. counties) based on the postcode of each site. Where there were only a few sites in a particular area data were combined with another area to form larger groupings, to avoid breaching commercial confidentiality. Due to the smaller number of responses than the previous survey, larger county groupings were necessary, meaning that the geographic areas were not directly

comparable to those created for the 2008 report. A total of 24 areas were created, and these can be seen in Appendix 1.

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
- composting
- landspreading
- thermal treatment
- disposal/recovery routes by country.

Section 4 provides detail of the waste avoidance in terms of use of by-products and surpluses and presents this information graphically by geographical area.

Section 5 analyses the sub sample of 115 sites which provided data for all three survey years in order to identify trends. Due to the heterogeneity of the food and drink industry, it is not appropriate to make direct comparisons, such as average waste production per site or per tonne of product, between sites in different sub sectors. However by analysing aggregate data from a sub sample of like-for-like sites, a more accurate understanding of trends can be developed.

Section 6 summarises the conclusions and progress since the 2006 survey.

3 Distribution of waste produced

3.1 *Waste breakdown and recovery/disposal routes*

The waste hierarchy is a useful tool for defining best practice in waste management, with the options higher in the list typically offering the greatest environmental benefit. Whilst this cannot be considered absolute (distance to available facilities being a factor for example), the general consensus is to promote the higher tiers when considering waste management.

The hierarchy is now enshrined in EU Law, being incorporated into the revised 2008 EU Waste Framework Directive. It is used as a basis for evaluation within this report, with management techniques incorporating those higher tier options usually considered as the best practice.

The responding FDF members showed minimal utilisation of the lowest tier of the hierarchy, the 'disposal' options, which accounted for only 12.8% and 9.7% of the waste arisings in 2008 and 2009 respectively. However, the highest tier was also under-utilised, with the majority of the arisings 'recovered', mainly through landspreading, for both years.

Details of the waste arisings as well as the recovery/ disposal routes used by FDF member sites for both 2008 and 2009 can be seen in Table 3.1.

Table 3.1 does not show the 'waste' that is prevented from arising – whilst this is more difficult to quantify when considering resource efficiency or similar, it is possible to quantify by-product and surplus food tonnages. The main use of these materials - as animal feed - offers significant opportunity for maximising value. In both the reporting years, FDF members produced over 340,000 tonnes of by-products and surpluses, with a significant tonnage [approx 98% of total] going to animal feed. By products and surpluses are discussed in greater detail in Section 4.

Whilst a slightly larger tonnage of waste was generated in 2009 compared to 2008, the general trend over the two years has been a positive one, with a 3.1% reduction in waste sent to the lowest tier 'disposal' options. In particular, waste to landfill has fallen from 59,000 tonnes to 43,000 tonnes. Two of the highest tier recycling options, anaerobic digestion (AD) and composting, have both shown increases in utilisation. In contrast, recycling overall has shown a lower level of uptake, falling from 80,000 to 76,000 tonnes.

Table 3.2 provides a comparison of the recovery and disposal routes for the two years, and these findings are examined in more detail in the subsequent sections.

Table 3.1: Total breakdown of recovery and disposal routes (in tonnes) used by FDF member sites in 2008 and 2009 by waste arising type

Management route	Treatment and disposal options	Food waste[see footnote ¹]		Packaging waste[see footnote ²]		Mixed food & packaging waste[see footnote ³]		Total [see footnote ⁴]	
		2008	2009	2008	2009	2008	2009	2008	2009
Recycle/ compost	Anaerobic digestion	2,865	4,625	0	0	0	0	2,865	4,625
	Composting	7,901	13,311	367	848	4,656	7,540	12,924	21,699
	Recycling	23,945	11,693	41,347	49,215	6,725	14,764	79,992	75,672
	Other recycling	7,599	7,747	0	0	3,176	2,627	10,775	10,374
Recovery	Landspreading ⁵	280,066	302,105	0	0	907	1,567	281,193	303,871
	Thermal treatment ⁶ with energy recovery	16,542	12,252	722	737	4,623	4,104	21,887	17,093
	Other recovery	279	378	304	796	1,763	0	2,346	1,174
Disposal (lowest) ⁷	Thermal treatment ⁸ without energy recovery	523	196	0	0	0	0	523	196
	Landfill	12,162	6,288	11,510	6,345	35,107	30,771	59,179	43,389
	Other disposal	300	2,821	157	124	180	159	637	3,104
TOTAL		352,182	361,416	54,407	58,065	57,137	61,532	472,320	481,196

¹ This should represent the total food waste arisings which left via the backdoor of the factory unmixed including any inedible fraction but not food waste mixed with packaging waste. It should not include any data on by-products and surpluses.

² This should represent the total packaging waste arisings which left the factory via the backdoor, unmixed. It should not include reusable packaging unless it had reached the end of its life or any packaging mixed in with food waste.

³ This should represent the total mixed food & packaging waste arisings, i.e. finished goods or food & packaging waste which arose separately but was mixed on site before leaving via factory backdoor, e.g. in a single skip. It should not include any data on by-products and surpluses.

⁴ This includes the tonnage arising from a small number of sites not able to provide a breakdown by waste type

⁵ This covers direct landspreading of liquid wastes or sludges for agricultural benefit or ecological improvement and includes soil injection. The spreading of outputs from A/D or composting should not to be included to avoid double counting.

⁶ Thermal treatment includes the technologies of incineration, gasification and pyrolysis.

⁷ Trade effluent disposed of via public sewer to a municipal waste water treatment plant was not included.

⁸ Thermal treatment includes the technologies of incineration, gasification and pyrolysis.

Table 3.2: Comparison of recovery and disposal routes (in tonnes) used by FDF member sites in 2008 and 2009

Year	Total waste(tonnes)										Grand total
	AD	Composting	Recycling	Other recycling	Land-spreading	Thermal trtmt, + energy recovery	Other recovery	Thermal trtmt, no energy recovery	Landfill	Other disposal	
2008	2,865	12,924	79,992	10,775	281,193	21,887	2,346	523	59,179	637	472,320
2009	4,625	21,699	75,672	10,374	303,871	17,093	1,174	196	43,389	3,104	481,196

3.2 Amount of waste produced

Responding FDF member sites located in Staffordshire produced the largest tonnage of waste during both reporting years, with a substantial increase of 22.9% in 2009 (Table 3.3). Half the areas showed an overall increase in arisings, the most noticeable being Lancashire, with an increase of 96.3%, though from a relatively small base in comparison to the others. The remaining areas all produced lower tonnages than the previous year, with the West Midlands reducing waste generation by 39.1%.

Figure 3.1 and Figure 3.2 show the geographical distribution of waste arisings for the responding

sites in each year.

Table 3.3: Tonnes of food and packaging waste arisings from FDF member sites, by area, for 2008 and 2009

County	Waste arisings (tonnes)	
	2008	2009
Staffordshire	54,541	67,049
South Yorkshire	49,230	43,670
Gloucestershire and Wiltshire	40,877	46,451
Shropshire and Herefordshire	40,523	39,193
Norfolk and Suffolk	40,343	42,598
South West Counties	37,053	36,503
Cambridgeshire	28,117	23,944
Leicestershire and Rutland	21,511	17,680
Oxon, Herts, Beds, Bucks and Berks	20,090	18,131
Cumbria, County Durham and Northumberland	19,895	23,975
Derbyshire and Nottinghamshire	17,609	19,643
Wales	15,465	18,939
Lincolnshire	15,302	12,731
London	13,592	13,621
Greater Manchester	10,677	10,603
West Midlands	10,408	6,342
Scotland	10,371	8,766
Northamptonshire	6,175	6,709
Cheshire and Merseyside	5,505	4,824
Kent and Essex	5,485	7,143
Northern Ireland	2,956	3,209
Lancashire	2,883	5,659
North Yorkshire	2,560	2,520
Hants	1,152	1,294
Total	472,320	481,197

Figure 3.1: Tonnes of food and packaging waste arisings from FDF member sites, by area, in 2008

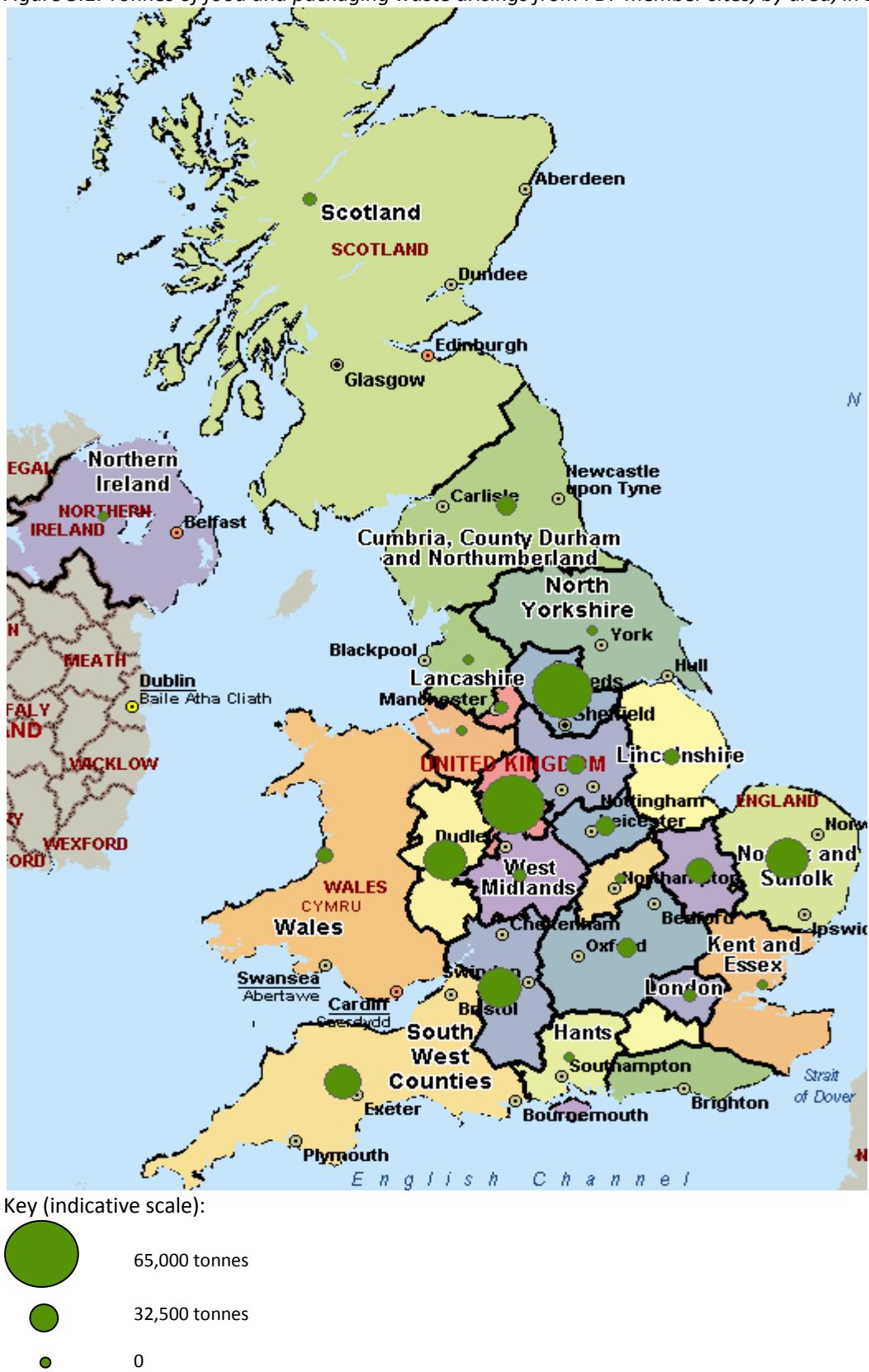
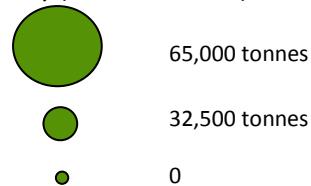


Figure 3.2: Tonnes of food and packaging waste arisings from FDF member sites, by area, in 2009



Key (indicative scale):



3.3 Total waste to landfill

According to the waste hierarchy, landfill is one of the least desirable management routes and should be avoided wherever possible. It is also a costly option, and many organisations find diverting waste from landfill can often offer a financial as well as an environmental benefit. Food waste, in particular, is very damaging when landfilled, releasing harmful greenhouse gases as the matter decomposes. There is also the loss of resources that went into producing the food in the first place to consider. For these reasons, the FDF has a target of zero food and packaging waste to landfill from 2015 as one of its 'Five-Fold Environmental Ambitions'.

Table 3.4 shows the waste sent to landfill by responding member sites aggregated by geographic area for each of the two years. The overall trend has been positive, with total landfilled waste falling by over 15,000 tonnes (26.7%) between 2008 and 2009.

Gloucestershire and Wiltshire were found to have sent the greatest tonnages in both 2008 and 2009. The tonnage sent by that area has shown improvement, however, with a decrease of 37.6% over the period.

Figure 3.3 and Figure 3.4 show the geographical distribution of waste arisings sent to landfill in each year.

Table 3.4: Tonnes of waste arisings sent to landfill from FDF member sites, by area, in 2008 and 2009.

County	Waste to landfill (tonnes)	
	2008	2009
Gloucestershire and Wiltshire	7,877	4,913
London	4,998	3,625
Wales	4,368	3,521
Lincolnshire	4,153	3,344
Norfolk and Suffolk	4,109	2,167
Cambridgeshire	4,082	2,896
Scotland	3,894	3,809
South Yorkshire	3,257	2,073
Leicestershire and Rutland	3,003	2,109
Derbyshire and Nottinghamshire	2,974	1,737
Cumbria, County Durham and Northumberland	2,772	1,827
Cheshire and Merseyside	2,166	1,598
Staffordshire	1,725	1,371
Greater Manchester	1,595	1,111
West Midlands	1,443	974
South West Counties	1,423	1,333
North Yorkshire	1,164	650
Oxon, Herts, Beds, Bucks and Berks	940	1,011
Northern Ireland	837	694
Lancashire	751	793
Hants	725	727
Kent and Essex	365	279
Northamptonshire	297	316
Shropshire and Herefordshire	261	511
Total	59,179	43,389

Figure 3.3: Tonnes of waste arisings sent to landfill from FDF member sites, by area, in 2008



Key (indicative scale):

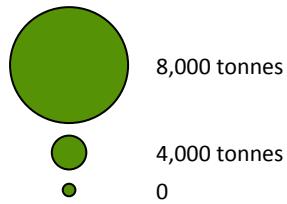
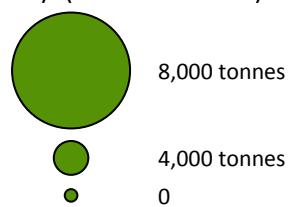


Figure 3.4: Tonnes of waste arisings sent to landfill from FDF member sites, by area, in 2009



Key: (indicative scale):



3.4 Landfill waste by type

This section examines the type of waste sent to landfill in the different geographic areas, whether food, packaging or mixed food and packaging (see Figure 3.5 and Figure 3.6).

The responding sites did not appear to send large proportions of food waste to landfill (20.6% in 2008 dropping to 14.5% by 2009). Of the 24 areas examined, 14 did not send any food waste to landfill.

Packaging waste was also a minor proportion of landfill waste, with mixed waste dominating the

landfill tonnages for most areas. There were some exceptions, however; Northamptonshire's landfill waste, for example, was 100% packaging. In 2008 only two areas had landfill waste comprising of over 50% food; three in 2009, the most notable of these being Norfolk and Suffolk.

Kent and Essex's landfill waste changed in composition from mainly food (67%) to mainly packaging, with less than 10% mixed waste in either year.

Figure 3.5: Landfill waste by type and by area for FDF member sites in 2008



Key:

- The legend consists of three colored pie slices with corresponding labels: a red slice labeled 'Food: landfill', a yellow slice labeled 'Packaging: landfill', and a blue slice labeled 'Mixed: landfill'.

Figure 3.6: Landfill waste by type and by area for FDF member sites in 2009



Key:

- Food: landfill
- Packaging: landfill
- Mixed: landfill

3.5 Anaerobic digestion

Anaerobic digestion (AD) is the process of breaking down organic material with the use of micro-organisms, in an oxygen free environment. It is an effective method of generating renewable energy, if managed adeptly and the digestate can also be used as a fertiliser and soil conditioner. For food waste that does arise, AD is therefore one of the best currently available treatment options. Government has committed to a huge increase in renewable energy from AD.

Table 3.5 shows that the AD process is not yet widely used by responding FDF members, with only three areas sending waste to AD. Whilst only small tonnages were involved, the total waste recovered in this manner has increased by over 61%. This is shown graphically in Figure 3.7 and Figure 3.8.

Table 3.5: Tonnes of waste arisings sent to anaerobic digestion from FDF member sites, by area, in 2008 and 2009

County	Anaerobic digestion (tonnes)	
	2008	2009
Northamptonshire	1,340	1247
Gloucestershire and Wiltshire	1,104	3378
London	421	0
Total	2,865	4,625

Figure 3.7: Tonnes of waste arisings sent to anaerobic digestion from FDF member sites, by area, in 2008



Kev (indicative scale):

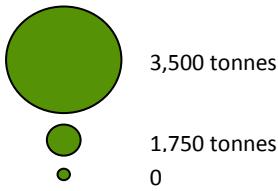
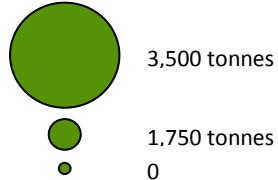


Figure 3.8: Tonnes of waste arisings sent to anaerobic digestion from FDF member sites, by area, in 2009



Key (indicative scale):



3.6 Composting

Composting is another option within the waste hierarchy for treating food waste that has environmental benefits. The resulting compost can be used as a soil conditioner to enhance biological activity and encourage growth. The survey data suggests the use of composting is growing, though uptake still remains fairly uneven across the UK. In 2008, nine areas out of a total of 24 carried out composting, albeit at low levels in some cases. By 2009 a further two areas had also started. In 2008, composting was utilised for just 2.7% of total food and packaging waste arisings; by 2009 this had grown to 4.5%, with nearly 21,700 tonnes recovered in this manner (Table 3.6).

As can be seen in

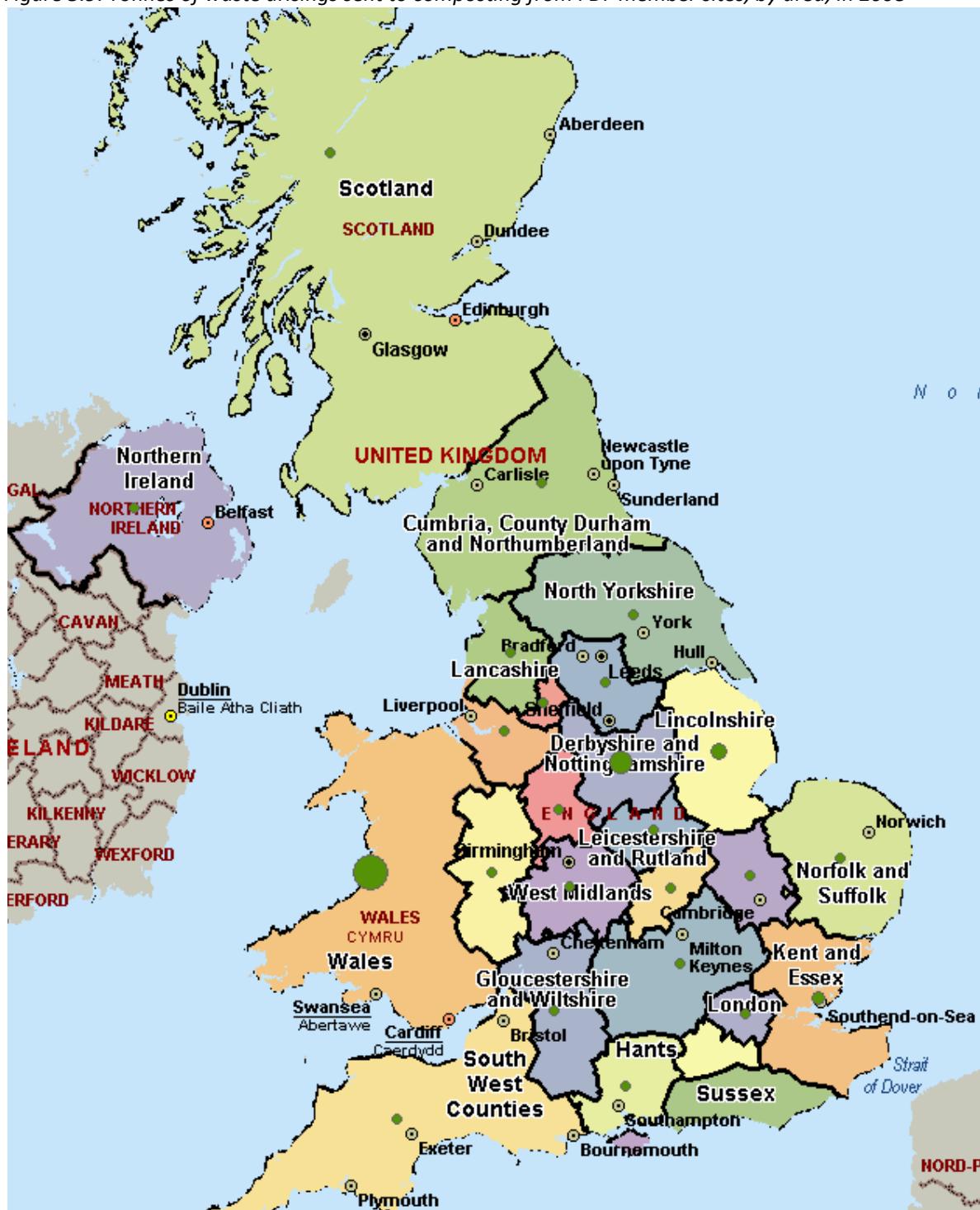
Figure 3.9 and Figure 3.10, Wales composted the largest tonnage of material for both years. Staffordshire was also significant, with an increase from 2,950 tonnes in 2008, to 4,244 tonnes in 2009. Both London and South

Yorkshire sites have started utilising this process since 2008, with the result that in 2009 London composted the third largest tonnage of all the areas.

Table 3.6: Tonnes of waste arisings sent for composting from FDF member sites, by area, in 2008 and 2009

County	Composting (tonnes)	
	2008	2009
Wales	4,500	7,468
Staffordshire	2,950	4,244
Lincolnshire	2,213	1,698
Kent and Essex	1,424	2,627
Oxon, Herts, Beds, Bucks and Berks	694	728
Cumbria, County Durham and Northumberland	380	736
Lancashire	367	652
Scotland	240	266
North Yorkshire	156	414
London	0	2,670
South Yorkshire	0	196
Total	12,924	21,699

Figure 3.9: Tonnes of waste arisings sent to composting from FDF member sites, by area, in 2008



Key (indicative scale):

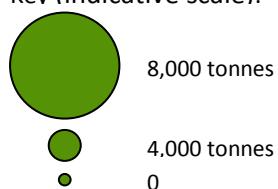
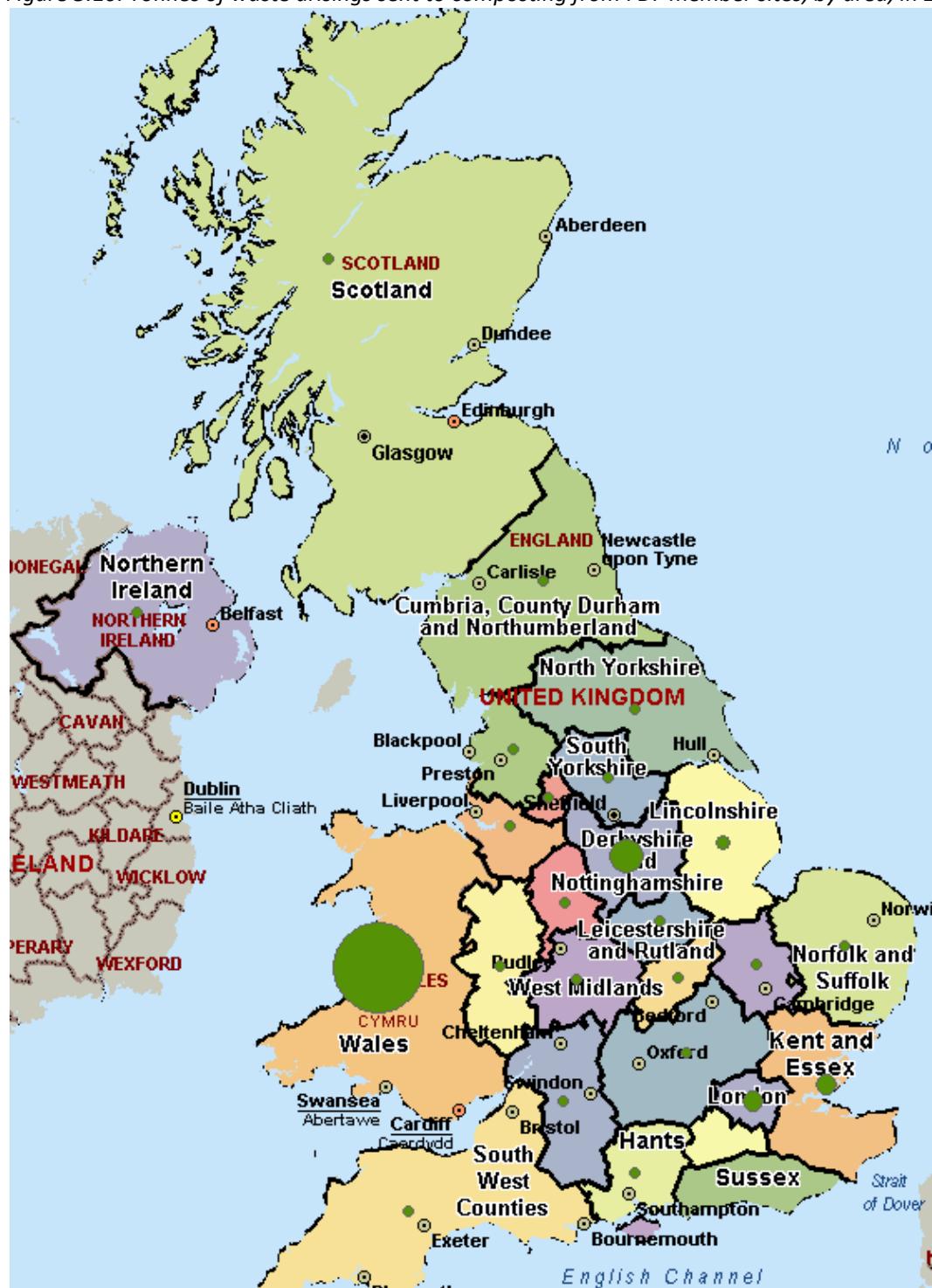
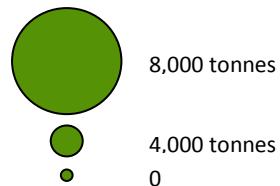


Figure 3.10: Tonnes of waste arisings sent to composting from FDF member sites, by area, in 2009



Kev (indicative scale):



3.7 Landspreading

Landspreading was the dominant waste management route utilised by responding member sites, accounting for 59% of total arisings in 2008 and 63% in 2009. When considering food waste alone, this percentage becomes more significant, with 83.6% of food waste recovered in this manner in 2009. Whilst a better environmental option compared to landfill or other disposal options, it is worth considering that landspreading only falls within the mid-range of the waste hierarchy, being deemed a recovery option. It therefore falls 'below' composting, AD and other recycling methods. One reason why landspreading predominates could be due to the fact that it is

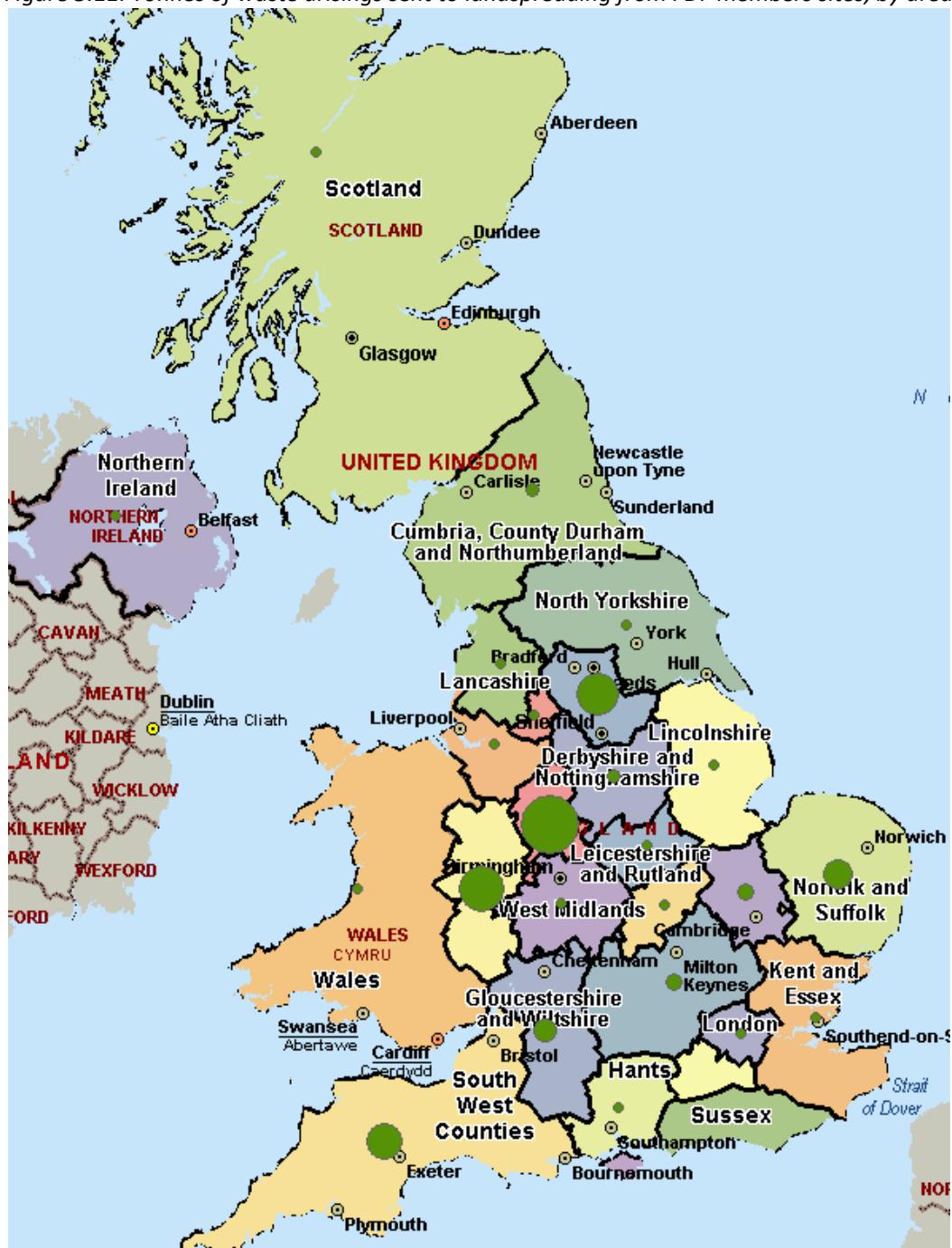
often a more financially favourable option, particularly when the site is based in a rural area and agricultural land is plentiful. Transportation costs may also have an influence on its uptake.

Staffordshire showed the greatest tonnage of waste to landspreading, contributing 19% of the total for the UK. Most areas have shown an increase in tonnage of waste used for landspreading. In some cases this increase is substantial, such as in London (over 150%), and Leicestershire and Rutland (127%). Geographical distribution can be seen in Figure 3.11 and Figure 3.12

Table 3.7: Tonnes of waste arisings sent to landspreading, from FDF member sites, by area, in 2008 and 2009

County	Landspreading(tonnes)	
	2008	2009
Staffordshire	46,721	57,875
Shropshire and Herefordshire	40,032	38,403
South Yorkshire	38,936	36,142
South West Counties	34,391	34,022
Norfolk and Suffolk	28,047	30,897
Gloucestershire and Wiltshire	24,730	30,701
Oxon, Herts, Beds, Bucks and Berks	16,214	13,992
Cambridgeshire	15,275	12,723
Derbyshire and Nottinghamshire	12,101	13,730
Cumbria, County Durham and Northumberland	11,052	14,555
Greater Manchester	4,784	7,921
Northamptonshire	4,380	4,780
Kent and Essex	2,056	2,425
Northern Ireland	934	900
Cheshire and Merseyside	576	344
Lincolnshire	428	2,004
London	413	1,043
Leicestershire and Rutland	103	234
Scotland	20	20
Wales	0	1,160
Total	281,193	303,871

Figure 3.11: Tonnes of waste arisings sent to landspeading from FDF members sites, by area, in 2008



Key (indicative scale):

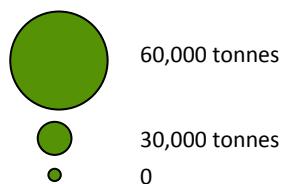
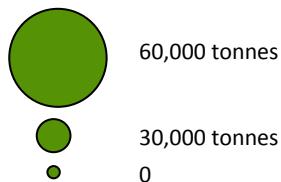


Figure 3.12: Tonnes of waste arisings sent to landspeading from FDF member sites, by area, in 2009



Key (indicative scale):



3.8 Thermal treatment

Thermal treatment with energy recovery was not a significantly used waste management route for the sites responding to this survey. Only 4.6% of the total waste arisings were treated in this manner in 2008. This decreased to 3.6% in 2009, with members seemingly opting for landspreading or higher recycling/composting routes. Leicestershire and Rutland sent the most waste to thermal treatment in both years, with a decrease from 13,000 tonnes to 9,000 tonnes within that period.

Table 3.8 shows an increase in the number of areas with recovery via thermal treatment: however, the actual tonnages involved are minimal, and all areas which sent over 1,000 tonnes to thermal treatment in 2008 have since reduced this tonnage. Excluding the three areas with no thermal treatment in 2008, and showing a small tonnage for 2009, Scotland is the only area which has seen a growth in waste to thermal treatment.

Geographical distribution can be seen in

Figure 3.13 and Figure 3.14, with Leicester and Rutland the clear 'hotspot' for thermal

treatment of waste.

Table 3.8: Tonnes of waste arisings sent for thermal treatment with energy recovery from FDF members' sites, by area, in 2008 and 2009

County	Thermal treatment with energy recovery (tonnes)	
	2008	2009
Leicestershire and Rutland	13,003	9,491
Wales	4,592	3,988
Cambridgeshire	2,574	2,318
South Yorkshire	1,002	66
Kent and Essex	351	325
Oxon, Herts, Beds, Bucks and Berks	199	185
London	117	81
Scotland	30	474
South West Counties	18	0
Staffordshire	0	80
West Midlands	0	45
Lincolnshire	0	40
Total	21,886	17,093

Figure 3.13: Tonnes of waste arisings sent to thermal treatment (with energy recovery) from FDF member sites, by area, in 2008



Figure 3.14: Tonnes of waste arisings sent to thermal treatment (with energy recovery) from FDF member sites, by area, in 2009



3.9 Recovery/disposal routes for waste by country

In England the dominant waste recovery/disposal option for the responding sites was landspreading as shown in both Figure 3.15 and Figure 3.16. Scottish sites appeared to use recycling (more favoured in the waste hierarchy) as the key waste management pathway, while Northern Ireland typically sent waste to landfill. Only three recovery or disposal options were utilised in Northern Ireland, with recycling, landspreading and landfill the only pathways opted for by responding members. It is important to factor in sample size, however. Responses from Northern Ireland for this survey were low, so

individual site responses are likely to skew data slightly and this may not be an accurate representation of all food and drink manufacturing sites within the country.

No single recovery/disposal route dominated in Wales, with roughly a quarter of the waste generated going to each of composting, thermal treatment and landfill in 2008. In 2009, there was a greater trend towards composting, the top tier option in the waste hierarchy, with both thermal treatment and landfill (mid- and lower-tier options) losing share.

Figure 3.15: Recovery/disposal routes for waste arisings by country for FDF member sites in 2008

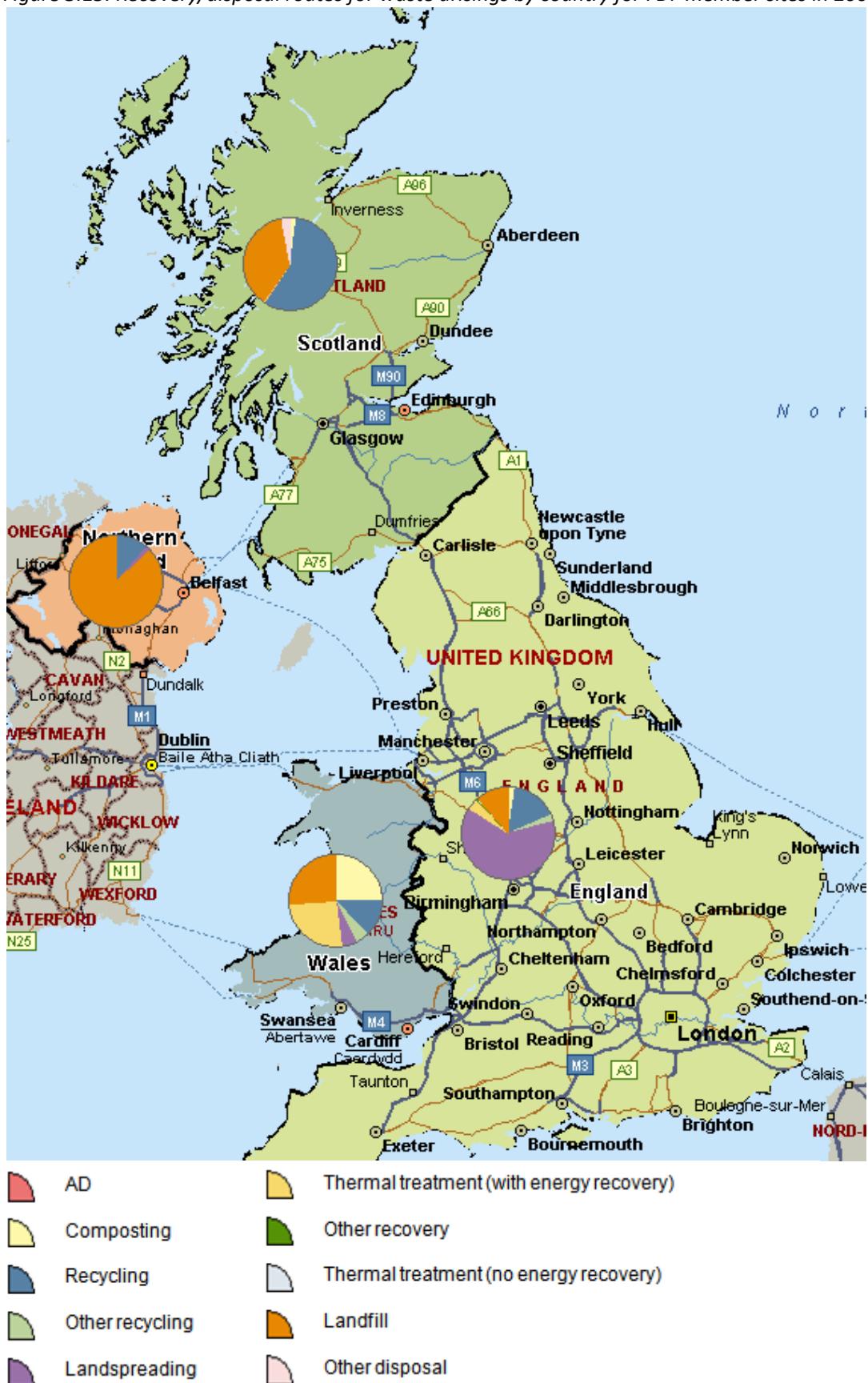
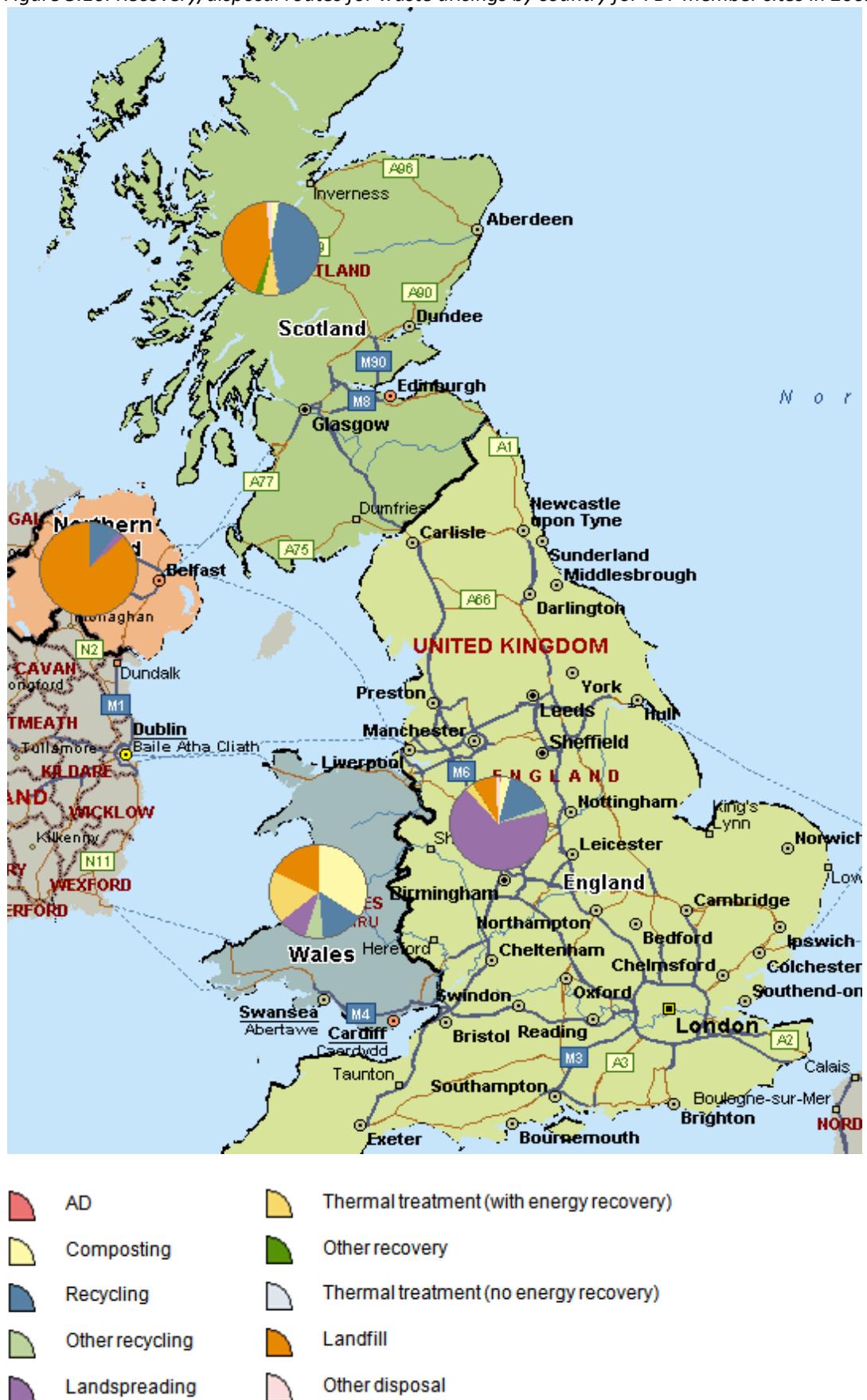


Figure 3.16: Recovery/disposal routes for waste arisings by country for FDF member sites in 2009



4 By-products and surpluses

During manufacture of the 'main' product, additional co or by-products are often produced. Product returns and other 'surpluses' can also arise due for example change in customer demands. Where these materials are further utilised, for example in animal feed or redistributed to charities, they are not considered waste.

For both years covered by this survey, over 340,000 tonnes of potential waste were prevented from entering the waste stream (Table 4.1) by being used for human consumption (e.g. surpluses given to charity) or as animal feed (e.g. by products). This avoidance of waste has a large environmental benefit for several reasons. Firstly, without waste there is no landfilling, with its associated greenhouse gas emissions. Secondly, some of the embodied energy used to create what is a high value end product and to acquire the raw material for it, is conserved. Resources that

would otherwise have been consumed (in the production of animal feed, for example) are also saved. However, it is still important to minimise surpluses and by-product creation which result from production inefficiencies.

Figure 4.1 and Figure 4.2 show the tonnage of by-product and surpluses arising by geographic area for 2008 and 2009. The majority is by-product, though both Derbyshire and Nottinghamshire and Gloucestershire and Wiltshire showed no by-product generation in either year.

Greater Manchester had the greatest tonnage of by-products and surpluses for both years, with over 73,000 tonnes generated in 2008, increasing by 12% to more than 82,000 tonnes by 2009. This was almost exclusively sent for animal feed, though a small proportion of surplus product was also apparent.

Table 4.1: Tonnes of by-products and surpluses from FDF member sites in 2008 and 2009

Year	Animal feed	Human consumption via charity	Other	Total (tonnes)
2008	341,828	171	5,966	347,965
2009	357,256	111	9,091	366,458

Figure 4.1: Tonnes of by-products and surpluses from FDF member sites, by area, in 2008



Figure 4.2: Tonnes of by-products and surpluses from FDF member sites, by area, in 2009



5 Trends in waste arisings

5.1 Trends in waste arisings and management

In order to create a like to like comparison with the previous survey data, a sub sample of sites providing arisings data for each of the three years was created and analysed. (Possible limitations of this approach are discussed in Section 5.2) A total of 115 sites fitted this criterion, and the aggregated tonnages are given in Table 5.1.

There is a positive trend showing that, whilst total production has grown from 5.2 to 5.4 million tonnes per year (equivalent to a 3% increase), the quantity of waste produced has decreased by 16.5%. The waste produced has

therefore dropped from 0.06 tonnes per tonne of product, to 0.05 tonnes per tonne of product (Figure 5.1). This suggests that a decoupling of waste generation against production has taken place in line with the ‘more for less’ approach.

Total waste avoided, measured according to tonnes of by-products and surpluses created, has also decreased. This suggests that the overall material input to create product has been minimised and possibly that manufacturing methods have moved towards leaner production rather than focussing on waste segregation. This is again in line with the waste hierarchy, with the preferred option being prevention rather than reuse, recycling or other recovery practices.

Table 5.1: Total production and waste arisings from FDF member sites providing data for 2006, 2008 and 2009 in tonnes

Year	Total production (tonnes)	Total by-products/surpluses(tonnes)	Total waste (excl byproducts/surpluses) (tonnes)
2006	5,246,540	330,880	315,519
2008	5,255,394 ^a	309,879	269,806
2009	5,401,461 ^b	316,797	263,414

^a This figure includes a small percentage of estimated production, taken from 2006 data, due to a small number of sites being wary over provision of production data.

^b As above.

Figure 5.1: Total waste produced per tonne of product from FDF member sites providing data for 2006, 2008 and 2009

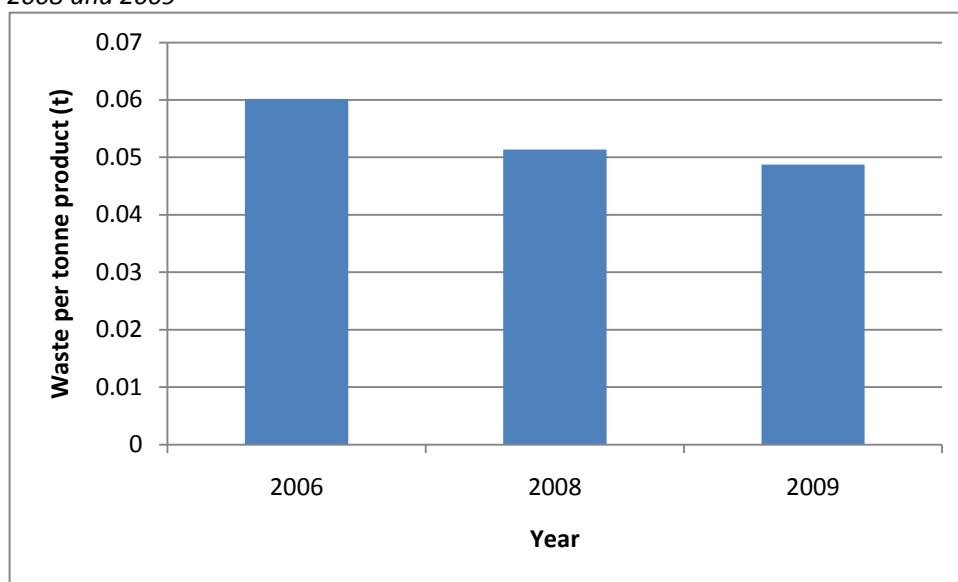


Table 5.2: Use of recovery/disposal routes (in tonnes) by FDF member sites providing data for 2006, 2008 and 2009

Year	AD	Com-posting	Recycling	Other recycling	Land-spreading	Thermal trtmt (with energy recovery)	Other recovery	Thermal trtmt (no energy recovery)	Land-fill	Other disposal	Total (tonnes)
2006	21	13,851	107,748	637	99,428	2,493	5,721	2,284	63,984	14,819	315,519
2008	2,865	12,230	66,256	10,775	102,745	21,856	2,067	523	49,952	537	269,806
2009	4,625	20,971	61,861	10,374	111,634	16,534	996	196	35,940	283	263,414

Table 5.3: Waste arisings by type for FDF member sites providing data for 2006, 2008 and 2009

Year	Total food waste		Total packaging waste		Total mixed waste		Total waste (tonnes)
	(t)	(%)	(t)	(%)	(t)	(%)	
2006	204,328	65	41,509	13	69,682	22	315,519
2008	168,660	63	48,455	18	52,691	20	269,806
2009	161,464	61	49,665	19	52,285	20	263,414

The 2008 survey to collect 2006 data did not originally set out to record the tonnages of by-products and surpluses which do not enter the waste stream. However, many respondents included these tonnages, and therefore an incomplete figure was created, with a strong possibility that some respondents included these materials within the 'recycling' figure. This may partly explain the 39% drop in recycling between 2006 and 2008 (43% by 2009). However, the tonnage of by-products produced (the vast majority of which went to animal feed) was also greater in 2006 (see Figure 5.2). It is more likely, therefore, that the

reduction may in part be due to improvements in overall resource efficiency, leaving less tonnage requiring waste management.

Figure 5.3 and Table 5.2 show that responding member sites appear to be moving towards more use of landspreading in recent years, with a greater proportion of food waste going to this recovery method than any other. Recycling has seen the greatest percentage loss, emphasising the move from top tier to middle tier of the waste hierarchy.

Figure 5.2: Tonnes of by-products and surpluses produced by FDF member sites providing data for 2006, 2008 and 2009

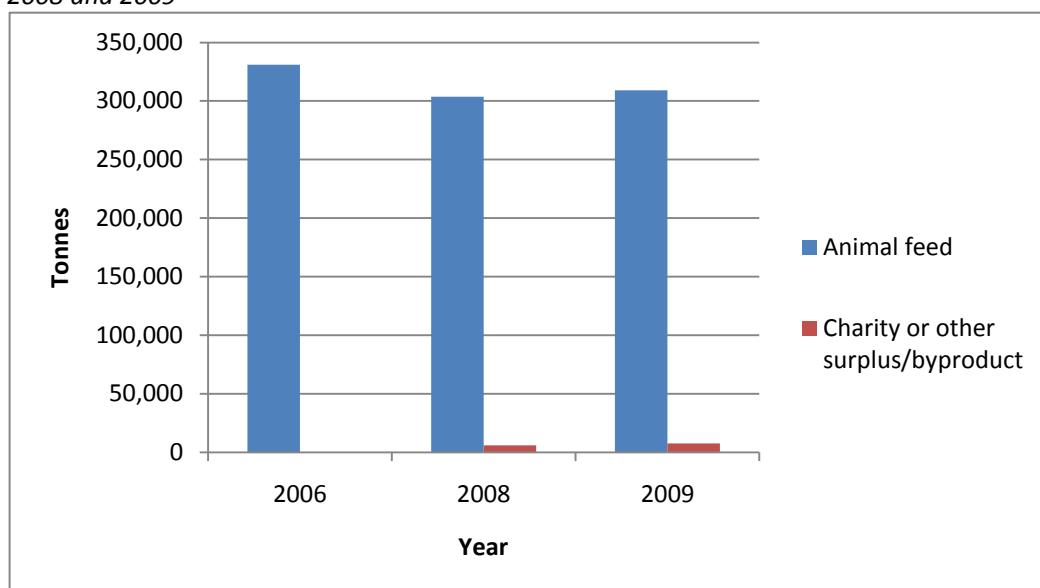


Figure 5.3: Use of recovery/disposal routes (in tonnes) by FDF member sites providing data for 2006, 2008 and 2009

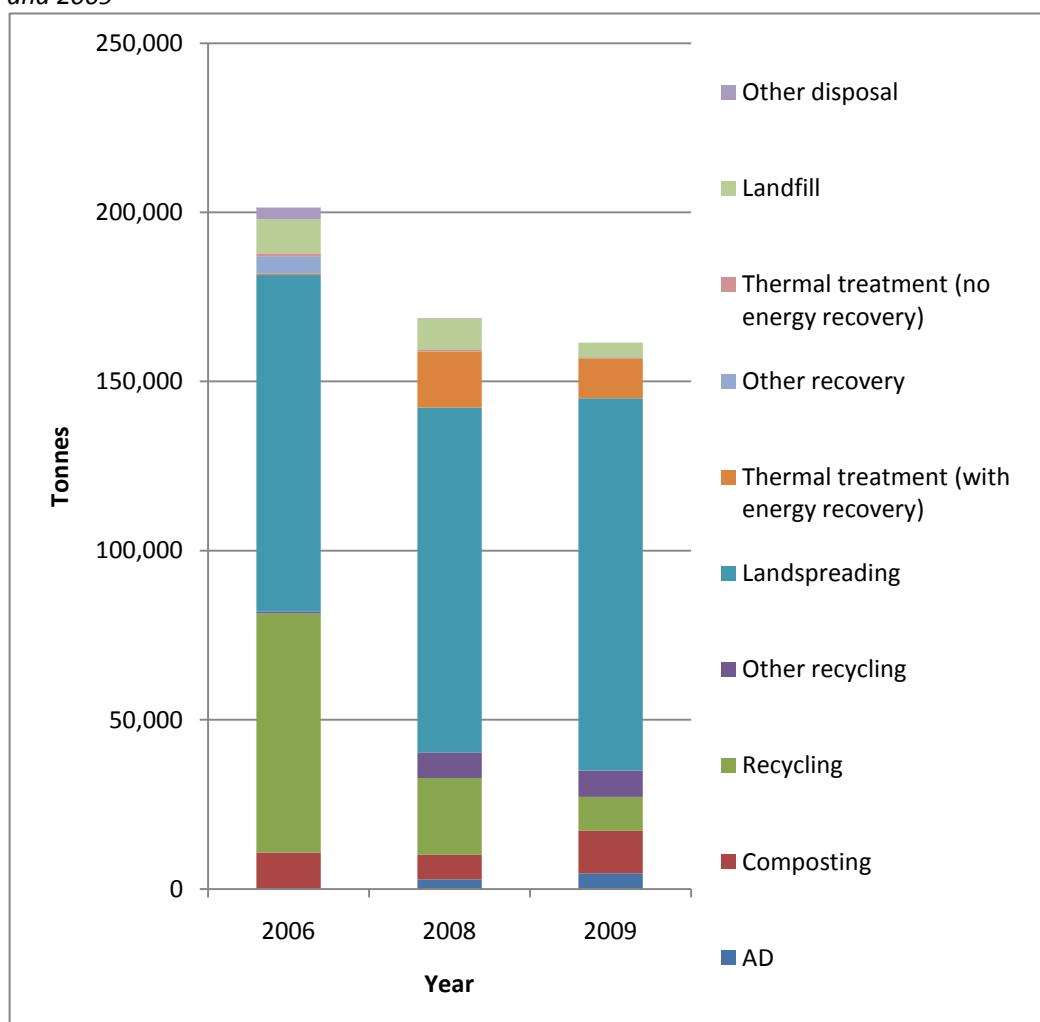
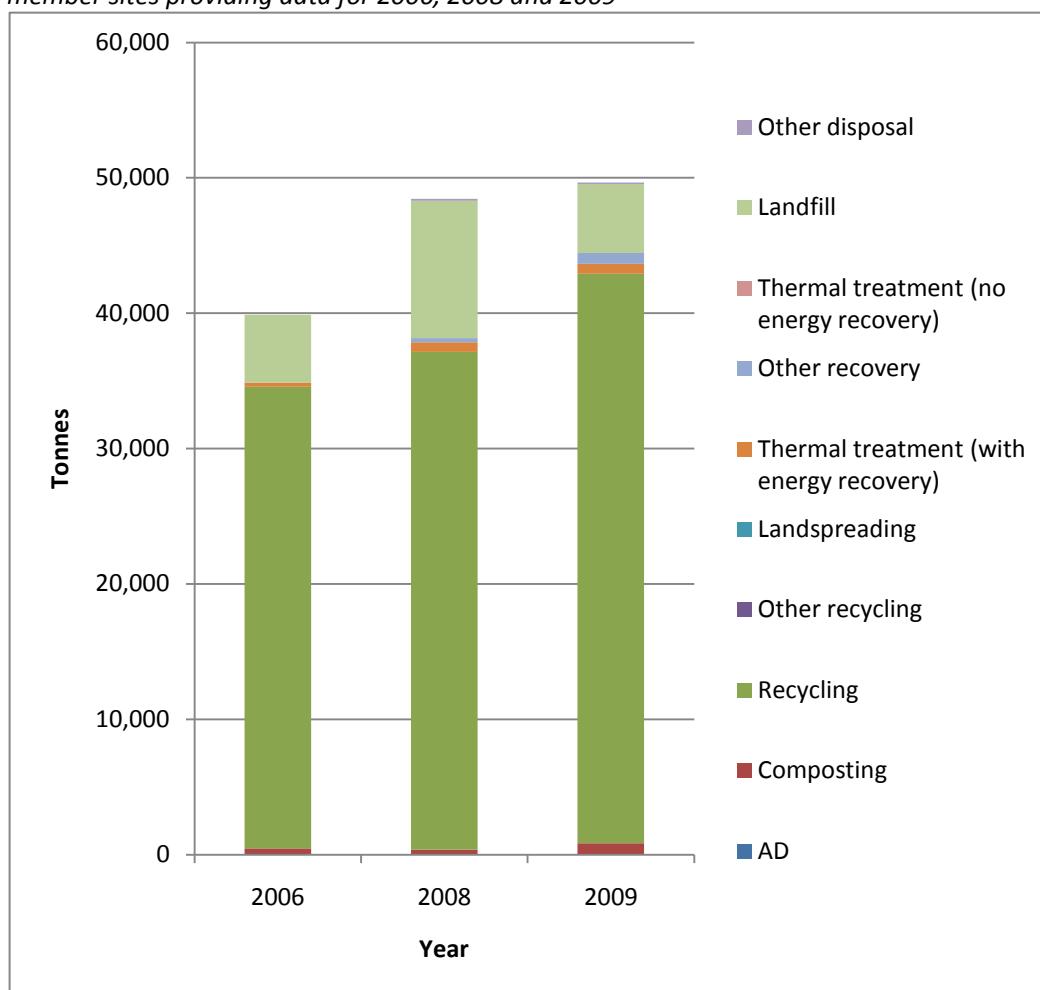


Figure 5.4: Breakdown of recovery/disposal routes for packaging waste arisings (in tonnes) from FDF member sites providing data for 2006, 2008 and 2009



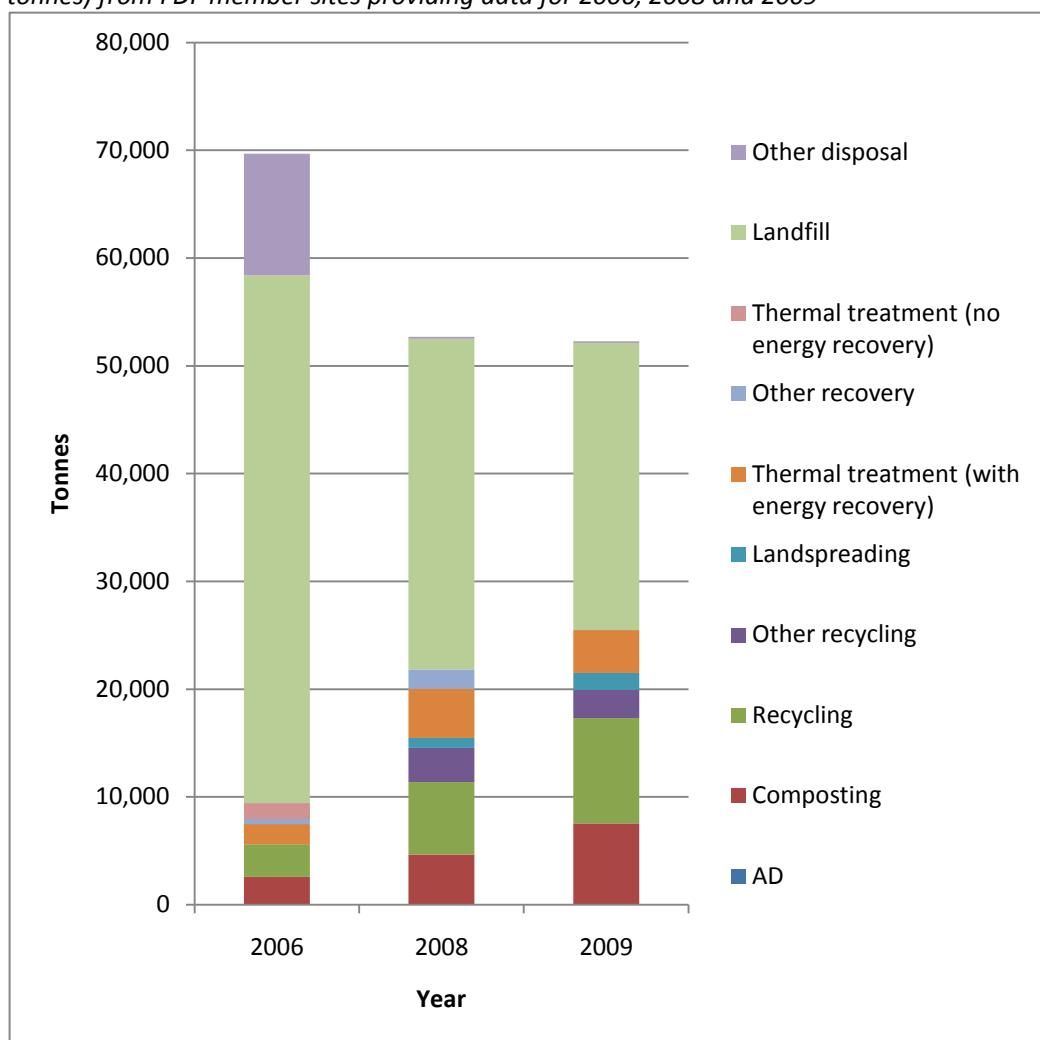
No significant changes appear to have occurred regarding packaging waste disposal/ recycling/ recovery practices since 2006, though the tonnage of packaging waste has increased (see Figure 5.4). This may not necessarily be a negative trend, with greater segregation increasing ‘purer’ waste streams, allowing larger proportions of the total waste to be recycled. This may also be linked to the recorded increase in total production since 2006.

The majority of packaging arisings are recycled, in each of the three survey years. A very small increase has been seen in composting of packaging waste, and this is perhaps a reflection of increasing treatment facility availability, though with tonnages ranging from 367 to 868 tonnes, this is still an infrequent recovery option.

Figure 5.5 shows a decrease in tonnage of mixed food and packaging waste arising, yet this is only notable when considering the 2006 data. The arisings for 2008 and 2009 are similar, with less than 500 tonnes difference between the two years.

Whilst the dominant end route for mixed food and packaging waste continues to be landfill, the proportion of arisings sent for disposal in this manner has decreased each year, with increasing diversion to recycling and composting. There has been a small increase in thermal treatment with energy recovery and a reduction in thermal treatment without energy recovery.

Figure 5.5: Breakdown of recovery/disposal routes for mixed food and packaging waste arisings (in tonnes) from FDF member sites providing data for 2006, 2008 and 2009



5.2 Data limitations

For the 2010 survey there was a reduced number of responding member sites (149) compared to the 2008 survey (236). Therefore it was not possible to directly compare waste management trends for all sites. It is also important to recognise that being a snapshot survey of a sample of FDF members, the trends recorded are not necessarily a reflection of the

industry as a whole (see also Section 2.3). Due to the heterogeneity of the food and drink industry, it is not appropriate to make direct comparisons, such as average waste production per site or per tonne of product, between sites in different sub sectors. However analysing aggregate data from a sub sample of like-for-like sites can provide a useful comparison.

6 Conclusions

This survey shows that FDF is making good progress towards meeting its target of seeking to send zero food and packaging waste to landfill from 2015, part of its 'Five-Fold Environmental Ambition'. Of the 481,000 tonnes waste produced in 2009 by the 149 responding sites, only 43,000 tonnes (9%) was sent to landfill, with 435,000 tonnes (90.3%) recovered or recycled in some manner. This was a significant improvement on both the 2006 and the 2008 data, where 16.5% and 12.5% of arisings were sent to landfill respectively.

There were no substantial 'hotspots' for landfill; no area sent more than 5,000 tonnes to landfill in 2009; eight areas sent less than 1,000 tonnes. The majority of waste sent to landfill in both 2008 and 2009 was mixed food and packaging waste, which is similar to the findings of the first survey. Also the majority of the arisings occurred due to food waste yet only a small fraction (i.e. 1.7% in 2009) of this was landfilled. In both years, FDF members produced over 340,000 tonnes of by-products and surpluses, with a significant tonnage (approx 98% of total) going to animal feed.

Analysis of the sub sample of 115 sites providing data for all three years suggested that a

decoupling of waste generation against production has taken place, in line with the 'more for less' approach. Actual waste arisings have decreased by 16.5% over the three years surveyed whilst production has increased over the period by 3%.

A shift towards the middle tier of the waste hierarchy is apparent. As in 2006, landspreading was the dominant waste management option, its share actually increasing to 63% of all waste generated. Two areas used anaerobic digestion (AD) in 2009. The results show growth in uptake of AD, albeit from a modest base. There clearly remains ample opportunity for broader uptake of this technology.

The previous report suggested that targeting waste segregation at source should be prioritised, to reduce the tonnage of mixed waste going to landfill. The latest survey data showed a decrease in mixed waste as a proportion of total waste arisings, suggesting that more segregation is occurring although there is still opportunity for improvement.

Appendix 1

Geographic areas allocated to given territories

Site data from the following counties and cities were aggregated together to protect commercial sensitivity.

County	Territory
Cambridgeshire	Cambridgeshire
Peterborough	Cambridgeshire
Cheshire	Cheshire and Merseyside
Halton	Cheshire and Merseyside
Knowsley	Cheshire and Merseyside
Liverpool	Cheshire and Merseyside
Sefton	Cheshire and Merseyside
St Helens	Cheshire and Merseyside
Warrington	Cheshire and Merseyside
Wirral	Cheshire and Merseyside
Cumbria	Cumbria, County Durham and Northumberland
Darlington	Cumbria, County Durham and Northumberland
Durham	Cumbria, County Durham and Northumberland
Gateshead	Cumbria, County Durham and Northumberland
Hartlepool	Cumbria, County Durham and Northumberland
Middlesbrough	Cumbria, County Durham and Northumberland
Newcastle-upon-Tyne	Cumbria, County Durham and Northumberland
North Tyneside	Cumbria, County Durham and Northumberland
Northumberland	Cumbria, County Durham and Northumberland
Redcar and Cleveland	Cumbria, County Durham and Northumberland
South Tyneside	Cumbria, County Durham and Northumberland
Stockton-on-Tees	Cumbria, County Durham and Northumberland
Sunderland	Cumbria, County Durham and Northumberland
City of Derby	Derbyshire and Nottinghamshire
Derbyshire	Derbyshire and Nottinghamshire
Nottingham City	Derbyshire and Nottinghamshire
Nottinghamshire	Derbyshire and Nottinghamshire
Gloucestershire	Gloucestershire and Wiltshire
Swindon	Gloucestershire and Wiltshire
Wiltshire	Gloucestershire and Wiltshire
Manchester	Greater Manchester
Oldham	Greater Manchester
Rochdale	Greater Manchester
Stockport	Greater Manchester
Tameside	Greater Manchester
Trafford	Greater Manchester
Hants	Hants
Portsmouth	Hants
Southampton	Hants
Isle of Wight	Isle of Wight
Essex	Kent and Essex
Kent	Kent and Essex
Medway Towns	Kent and Essex
Southend-on-Sea	Kent and Essex
Thurrock	Kent and Essex
Blackburn with Darwen	Lancashire
Blackpool	Lancashire

County	Territory
Bolton	Lancashire
Bury	Lancashire
Lancashire	Lancashire
Salford	Lancashire
Wigan	Lancashire
City of Leicester	Leicestershire and Rutland
Leicestershire	Leicestershire and Rutland
Rutland	Leicestershire and Rutland
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
Redbridge	London
Richmond-upon-thames	London
Southwark	London
Sutton	London
Tower Hamlets	London
Waltham Forest	London
Wandsworth	London
Westminster	London
Norfolk	Norfolk and Suffolk
Suffolk	Norfolk and Suffolk
East Riding of Yorkshire	North Yorkshire
Kingston-upon-Hull	North Yorkshire
North Yorkshire	North Yorkshire
York	North Yorkshire
Northamptonshire	Northamptonshire
Antrim	Northern Ireland
Ards	Northern Ireland
Armagh	Northern Ireland
Ballymena	Northern Ireland
Ballymoney	Northern Ireland

County	Territory
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
Bedfordshire	Oxon, Herts, Beds, Bucks and Berks
Bracknell Forest	Oxon, Herts, Beds, Bucks and Berks
Buckinghamshire	Oxon, Herts, Beds, Bucks and Berks
Hertfordshire	Oxon, Herts, Beds, Bucks and Berks
Luton	Oxon, Herts, Beds, Bucks and Berks
Milton Keynes	Oxon, Herts, Beds, Bucks and Berks
Oxon	Oxon, Herts, Beds, Bucks and Berks
Reading	Oxon, Herts, Beds, Bucks and Berks
Slough	Oxon, Herts, Beds, Bucks and Berks
West Berkshire	Oxon, Herts, Beds, Bucks and Berks
Windsor and Maidenhead	Oxon, Herts, Beds, Bucks and Berks
Wokingham	Oxon, Herts, Beds, Bucks and Berks
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

County	Territory
Renfrewshire	Scotland
Scottish Borders	Scotland
South Ayrshire	Scotland
South Lanarkshire	Scotland
Stirling	Scotland
West Dunbartonshire	Scotland
West Lothian	Scotland
Western Isles	Scotland
Herefordshire	Shropshire and Herefordshire
Shropshire	Shropshire and Herefordshire
Telford and Wrekin	Shropshire and Herefordshire
Bath and North East Somerset	South West Counties
Bournemouth	South West Counties
Bristol	South West Counties
Cornwall	South West Counties
Devon	South West Counties
Dorset	South West Counties
North Somerset	South West Counties
Plymouth	South West Counties
Poole	South West Counties
Somerset	South West Counties
South Gloucestershire	South West Counties
Torbay	South West Counties
Barnsley	South Yorkshire
Bradford	South Yorkshire
Calderdale	South Yorkshire
Doncaster	South Yorkshire
Kirklees	South Yorkshire
Leeds	South Yorkshire
Rotherham	South Yorkshire
Sheffield	South Yorkshire
Wakefield	South Yorkshire
Staffordshire	Staffordshire
Stoke-on-Trent	Staffordshire
Surrey	Surrey
Brighton and Hove	Sussex
East Sussex	Sussex
West Sussex	Sussex
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

County	Territory
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

About the author:



Caroline Bartlett BSc (Hons)

Caroline is a Research Consultant at Oakdene Hollins. Her degree in Environmental Biology gives her a great understanding of waste management techniques and barriers to recovery and recycling across many waste streams. In particular, Caroline's expertise lies in textiles and food and drink, and previous work includes projects evaluating hospitality sector glass arisings, refillable beverage system opportunities and the economics of bulk wine importation. She also co-authored the previous report 'Mapping waste in the food industry', based on FDF member survey responses in 2008.

Disclaimer:

Oakdene Hollins Ltd believes the content of this report to be correct as at the date of writing. The opinions contained in this report, except where specifically attributed, are those of Oakdene Hollins Ltd. They are based upon the information that was available to us at the time of writing. We are always pleased to receive updated information and opposing opinions about any of the contents.

The listing or featuring of a particular product or company does not constitute an endorsement by Oakdene Hollins, and we cannot guarantee the performance of individual products or materials. This report must not be used to endorse, or suggest Oakdene Hollins' endorsement of, a commercial product or service.

We have prepared this report with all reasonable skill, care and diligence within the terms of the contract with the client. Although we have made all reasonable endeavours to ensure the accuracy of information presented in this report, we make no warranties in this respect. Factors such as prices and regulatory requirements are subject to change, and users of the report should check the current situation. In addition, care should be taken in using any of the cost information provided as it is based upon specific assumptions (such as scale, location, context, etc.). Clients should satisfy themselves beforehand as to the adequacy of the information in this report before making any decisions based on it.

Oakdene Hollins Ltd

Pembroke Court
22-28 Cambridge Street
Aylesbury
Buckinghamshire
HP20 1RS

T: +44 (0)1296 423915
E: admin@oakdenehollins.co.uk
www.oakdenehollins.co.uk
www.remanufacturing.org.uk

Registered in England No. 2937129