Working together for a world without waste

Final Report

A survey of the UK organics recycling industry in 2010

A report on the structure of the UK organics processing/recycling sector and the markets for its outputs

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Executive summary

The purpose of this study is to quantify the recycling of organic wastes in the UK via a survey of key facilities – those involved in composting, anaerobic digestion (AD) and mechanical & biological treatment (MBT).

This survey was carried out between January and April of 2012, collecting data on the state of the sector in 2010. This report summarises the methodology employed, and the results obtained, from this survey.

Background

A survey of the organics processing industry has been undertaken since the mid-1990s, originally by The Composting Association (with WRAP support in later years) and more recently by WRAP with the support of the Association for Organics Recycling (AfOR), the Anaerobic Digestion and Biogas Association (ADBA) and the Renewable Energy Association (REA). For this latest survey, the support of the Environmental Services Association (ESA) was also enlisted. The additional sector bodies have been included in recognition of the diverse range of technologies now operating in the organics recycling sector and to enable a representation of the wider industry, in particular of AD.

The results of earlier surveys have underpinned the annual State of the Composting and Biological Waste Treatment Industry report produced by AfOR. The 2009 survey can be found on the WRAP website www.wrap.org.uk and previous reports can be found on the AfOR website www.organics-recycling.org.uk. While this survey has been repeated annually since the mid 1990's, it is important to recognise that there have been differences in delivery methodology between surveys and this needs to be taken into account when comparing data from individual surveys or looking for trends.

Methodology

The survey used questionnaires to capture organics recycling industry data. Separate questionnaires were developed for permitted composting, AD, thermophilic aerobic digestion (TAD) and MBT along with exempt composting and AD. A database of sites to be contacted to participate in the survey was produced using information provided by the Environment Agency (EA), the Scottish Environmental Protection Agency (SEPA) and the Northern Ireland Environment Agency (NIEA). To this was added information made available by the project steering group and from other databases held by WRAP.

Two different approaches to engaging with sites were used. Permitted sites were contacted by telephone and the survey conducted by organic recycling consultants who were able to sense check the data as it was received. Data was inputted into an online questionnaire system at the time of the interview. Exempt sites were contacted by post, providing hard copies of the questionnaire for completion and details of the link to the online survey. All permitted sites were targeted as were all exempt sites in Scotland and Northern Ireland. For exempt sites in England and Wales, only those that have made the transition to the new exempt registration system were contacted in order to make the number of sites more manageable.

After quality checks, the collected data was analysed by waste management process and nation, and separately for permitted and exempt sites, using the following methods:

- Grossing of the collected quantitative data was carried out to take account of those companies which did not take part in the interview, either through choice (for permitted sites) or because they were not contacted (exempt survey). The stratified grossing methodology used is an accepted method utilised in many past surveys of this type (e.g. commercial & industrial waste surveys delivered by Defra and the Environment Agency) and is explained in full detail in Appendix 3.
- Qualitative data, where collected, is provided in Appendix 5 and summarised in the report.
- Distribution plots were produced to represent the spread of responses to questions such as selling prices of outputs, to indicate precision.

The 2009 survey presented results based upon available input data (ie. from the survey and from EA/SEPA returns data) and did not gross this up to represent the sector as a whole. So that results can be directly compared, we have also grossed the 2009 raw data using the same methodology as applied to the 2010 data.

UK Organic Recycling

On the basis of the grossing carried out, the survey estimated 7.2 million tonnes of organic waste input into composting and AD organic waste recycling facilities, plus 1.3 million tonnes of mixed waste input to those MBT facilities which produce an organic output, in 2010, as shown in Table 1.

Table 1: UK Organic Recycling 2010 (input in tonnes)

	England	Northern Ireland	Scotland	Wales	UK	UK in 2009
Compost (inc IVC)	4,673,719	85,568	564,273	120,532	5,444,092	4,517,594 (1) 5,265,711 (2)
AD	629,036	7,000	514,151	2,680	1,152,867	105,110 (1)
Exempt	598,638	2,337	23,016	11,684	636,560	902,277
Sub-total	**5,901,393**	**94,905**	**1,101,440**	**134,896**	**7,233,519**	
MBT (3)	1,217,060	0	65,000	0	1,282,060	438,101
Total	**7,118,453**	**94,905**	**1,166,440**	**134,896**	**8,515,579**	

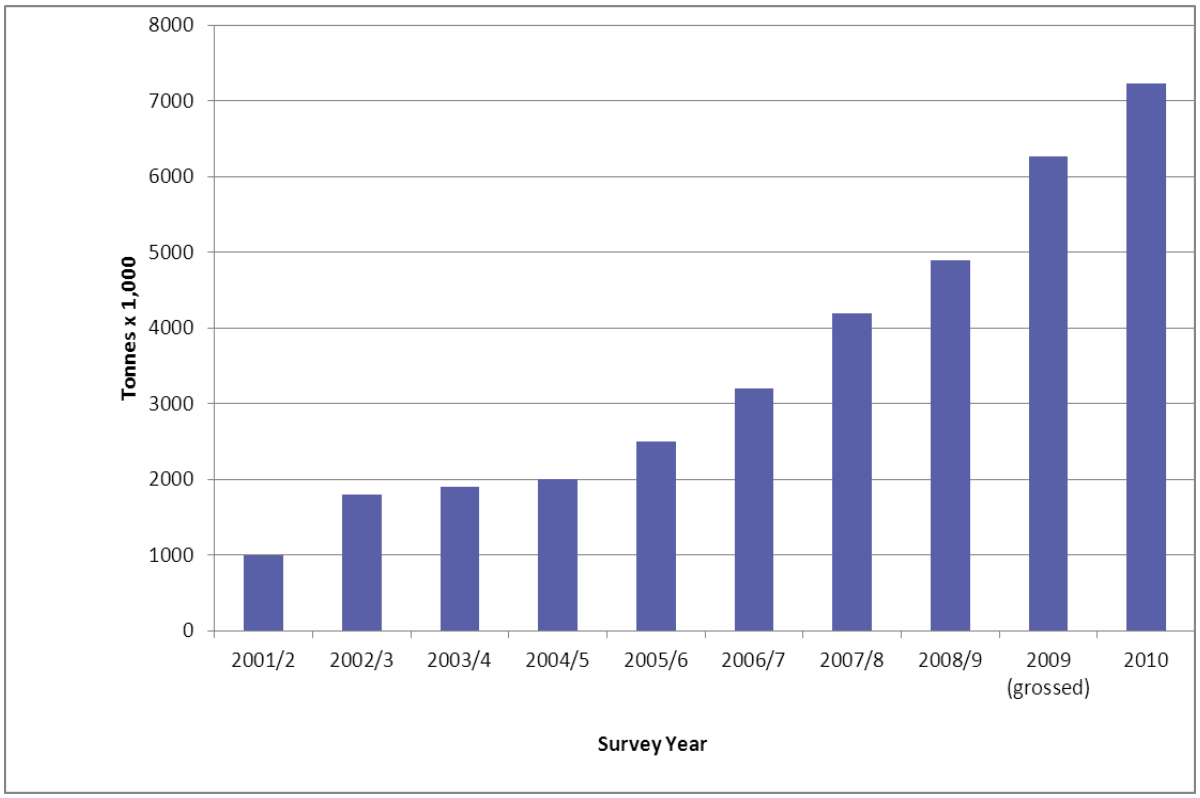
(1) Un-grossed input tonnage reported in the 2009 study
(2) Grossed input tonnage using 2010 methodology
(3) MBT capacity figures presented as mixed input waste stream

Composting processed the majority of this waste, at a total input of 5.44 million tonnes, with AD at 1.15 million tonnes, and MBT at 1.28 million tonnes of mixed waste capacity.

After adjusting for the difference in grossing methodology from the last survey, the figures suggest that composting input volumes have stayed fairly static between 2009 and 2010. Because the base for AD facilities was very low in 2009 (just 8 sites were surveyed, although this would have been a significant proportion of the industry at that time) no attempt was made to gross up to national figures, so comparison between the 2009 and 2010 AD figures is not valid.

Although changes in methodology, particularly in survey scope and in approaches to grossing up from survey results, make comparisons problematic, the figures for total organic recycling inputs, produced by successive surveys, are presented in Figure 1 below:

Figure 1: Organic Recycling - total UK input volumes from 2000 to 2010 (excluding MBT)



Note: The 2009 bar represents data grossed using the 2010 methodology, not the figure in the 2009 report.

Composting

Regulatory and other data identified 308 composting sites in the UK for 2010 (a 9.6% increase on the survey of 2009). The 2010 survey of permitted composting sites collected data from 173 sites - 28 more sites than 2009 (+19.3%). Regulatory returns data provided by DOENI, EA and SEPA were used to estimate waste inputs to permitted sites. Sites were asked to confirm this regulatory data during interview and where it was incorrect changes were made.

The regulatory data on inputs from 202 sites amounted to 3.86 million tonnes. When grossed to represent the input tonnage of the composting sector in the UK as a whole, this came to 5.4 million tonnes. The 2009 UK total (as reported) was based solely on input data and would imply an increase of 20.5%. However, when the same grossing methodology is applied as for the 2010 survey, the 2009 total comes to 5,265,711 tonnes i.e. an increase of 3.9% between 2009 and 2010.

In this year's survey sites were asked for their practical capacity (as opposed to their permitted capacity) and grossing these figures gave an overall UK capacity of 7.0 million tonnes, suggesting a capacity utilisation of 78% (ie. 2010 input divided by practical capacity). This 22% spare capacity was also reflected in 46% of respondents saying that they have free capacity in the summer months, the busiest period for composting sites. Of course, under-utilisation of composting facilities in the winter months will always mean that full utilisation will be difficult to achieve.

Examining input wastes showed that in 2010, 88% came from municipal sources and 12% from commercial and industrial sources. Comparing tonnages showed that despite the similar overall throughput to 2009, inputs from non-municipal sources were reduced. As most organic waste from commercial sources is food waste, this reduction could well be a reflection of the increase in AD tonnages in 2010 (see below).

Open windrow remains by far the most common processing technique accounting for 65% of the input tonnage, with IVC representing 33%, and aerated static pile 1%.

The survey also showed that the quantity of compost output was similar in 2010 to 2009, at 2.81 million tonnes (grossed tonnage; surveyed tonnage was 1.8 million tonnes) compared to 2.76 million tonnes in 2009. The majority of compost output is a coarse 0-40mm grade, most of which is used in agriculture. Significant volumes of finer grade materials are also produced, although again agriculture is the main market for these materials. Landscaping (at 10% of total tonnage) and land restoration (at 8%) are also important and growing markets.

Pricing varies significantly, although some added value benefit is seen from specialist markets such as horticulture and sports turf. Overall, prices seem to have firmed between 2009 and 2010, although there is still considerable material being supplied to agriculture and landscaping at zero or negative prices (where a negative price represents the site paying for the removal of material). Total market value is estimated at £9.2 million in 2010.

In 2010, data supplied by the certification body showed that 115 sites were certified to PAS 100. Of the composting sites interviewed for this survey, 36 (21%) had PAS 100 certification and they processed around 712,000 tonnes (18.5% of the total input surveyed). More than twice as much input was processed by sites with both PAS 100 and CQP certification (508,000 tonnes) as by sites with PAS 100 only (204,000 tonnes). Although it is recognised that certification applies to a specific quality of compost which may only be a proportion of the production of a specific site, results do suggest that where sample size is reasonable (e.g. agriculture, landscaping) that certification does produce a premium in selling price. For instance, for agriculture average price per tonne for PAS 100 certified sites is £1.69 (8 records), PAS 100 & CQP £1.76 (17 records) compared to £1.00 for non-certificated sites (88 records).

Sites were also asked about their *current* intention with regard to PAS 100 and CQP. The majority of sites surveyed in the UK planned to pursue or maintain PAS 100 (78% of sites that responded) with 49% of these saying they will pursue or maintain CQP as well. In Scotland, where the CQP does not operate, those intending to pursue or maintain PAS 100 certification accounted for 80% of responses. Those who were not intending to do so cited cost and complexity amongst their reasons.

Anaerobic Digestion

The number of permitted AD sites in the UK increased significantly between 2009 and 2010, to 48 sites. The 2010 survey captured data from 19 sites with input data available from 37 sites altogether compared with 8 sites in 2009.

When grossed, the input to the sites in 2010 is estimated to be 1.15m tonnes. The figure reported for 2009 (105,000 tonnes) was not grossed and so is not comparable, however it is safe to assume that the increase in the number of sites between 2009 and 2010 led to an increase in total inputs. Similarly, the increase in the number of sites undoubtedly means that the production of biogas, electricity and heat has also increased. Digestate production

was grossed for 2009 and therefore direct comparison can be made, suggesting an 850,000 tonnes increase in digestate production between the two years.

The significant increase in AD throughput can be explained by a number of factors:

- the increase in the total number of permitted sites;
- increased recycling of food waste; and
- a bigger sample size resulting in greater confidence in the collected data.

In this year's survey sites were asked for their practical capacity (as opposed to their permitted capacity) and grossing these figures gave an overall UK capacity of 1.7 million tonnes, suggesting a 67% utilisation in 2010 – 73% of sites reported having spare capacity. This high proportion of sites with spare capacity could be due to many of the sites being new in 2010 and therefore commissioning and/or looking to secure contracts to take them to maximum utilisation.

The proportions and quantity of municipal, non-municipal and non-waste materials entering AD facilities in 2010 in the UK were 37%, 52% and 11% respectively. If we discount the non-waste feedstocks, 58% are from non-municipal sources and 42% from municipal sources. This compares with 2009 when the results showed that 56% of feedstocks came from municipal sources and 44% from non-municipal sources. This reverse could be partially explained by the decrease in feedstock from non-municipal sources shown for composting sites in 2010 (it is possible that some of this non-municipal waste now goes to AD) and also by the small sample size in 2009.

Maceration was the most common method of pre-processing used; it was utilised at 64% of sites with blending/mixing at 55% of sites and screening also at 55%. The proportion of sites using depackaging is noted as being surprisingly low (27%), given the importance of this in AD. No hand picking was undertaken at any of the sites.

Of the sites surveyed, 71% reported using mesophilic (100% in 2009) with the remainder using thermophilic systems (0% in 2009). 94% of systems were reported as wet and 6% as dry (the dry system surveyed is the only dry facility in the UK) and 94% of sites used continuous processing with 6% using batch. For those sites that reported using pasteurisation 62% did so post-digestion and 38% pre-digestion.

Biodegradable bags were received at 29% of sites which represents 7% of total inputs. During the survey the majority of these sites (80%) stated that these bags were an issue to them and this was usually because the bags break down poorly or do not break down at all.

The estimated output of biogas was 210 million m^3 in 2010, this was based on a surveyed amount of 26 million m^3 from 13 sites at an average of 2 million m^3 per site. The vast majority (98%) of biogas was used for combined heat & power (CHP) with the remainder used for heat only (on-site boiler). This compares with 2009 when 72% was utilised by CHP and none for heat only. This biogas was used to generate an estimated 110,000 MWh of electricity and 331,000 MWh of heat.

The whole digestate produced at the sites surveyed was 135,000 tonnes, which, when grossed, amounts to a UK wide estimate of just over 1 million tonnes. Only one site reported separating the digestate into fibre and liquor and did so using a press. The surveyed amount of fibre was just 50 tonnes and liquor 1,200 tonnes.

Agriculture was the dominant end market for digestate, fibre and liquor with all recorded outputs being used in agriculture except a small fraction of the whole digestate that went to land restoration. This is similar to the end uses reported in 2009, when all digestate, fibre and liquor was used in agriculture. Around 38% of the agricultural use was reported as being on the same site as the AD facility, with 62% going for off-site use – a very similar split to 2009.

38% of whole digestate produced in 2010 was used on-site (37% in 2009); 22% was sold (12% in 2009); 22% was supplied to the end user free of charge (39% in 2009); and 10% was paid to be taken away (12% in 2009). The destination of the remaining 8% of digestate was not provided.

All the liquor noted as being produced was used on the operator's own site which is the same result as 2009. However, one site that did not report quantities of liquor did report that they paid a fee for discharging liquor to the sewer, so a quantity is disposed of by this means.

The majority of fibre was sold to users off site with the remainder being used on the operator's own land (although data is limited to two sites here). 100% of the fibre was used on the operator's own land in 2009.

Of those sites that responded to the question regarding the monetary value of their outputs, only a single site reported that any money changed hands, the rest stated that the charge was £0 per tonne for all outputs.

As only a single site reported any transactions with a value other than £0, the total value of the market for outputs from AD sites has not been estimated.

In 2010 no sites had been certified to PAS 110. Sites were asked what their current (i.e. 2012) intention is with regards to PAS 110 and the ADQP with the result that:

- 56% of sites were planning to maintain or pursue certification to PAS 110 and the ADQP while 44% were not;
- there was no clear trend as to why sites were not certifying to PAS 110, but some examples of reasons were:
    - cost;
    - outputs used on site, so certification not required; and
    - not able to conform at this time.

It is clear from the results of this survey that the UK AD industry expanded between 2009 and 2010 with a 182% increase in sites between the two years. This increase is reflected in the volume of materials being received at sites and in the volume of outputs.

Mechanical Biological Treatment

Of a UK population of 23 MBT facilities, input data was available for 10 surveyed sites.

As the input to such facilities tends to be residual "black bin" waste from municipal sources, input weights were not recorded via the survey as only a proportion of the processed waste could be described as organic. However, estimates were obtained for practical input capacity and organic output, and grossing these figures showed that total UK capacity in 2010 was

some 1.28 million tonnes of mixed waste producing 273,400 tonnes of an organic fraction, usually fibre.

The process that treated the most organic waste was aerobic bio-drying at 46%, with thermal treatment (28%) and aerobic IVC (26%), being the other processes identified as treating organic waste at MBT plants. The two main products were refuse derived fuel (RDF) – 48% of outputs – used for energy recovery, and compost like output (CLO) – 33% of outputs – used for land restoration.

All the respondents that commented on the sales value of their outputs, reported that use of their organic output by end users represented a cost to their business.

Exempt Composting

A postal and telephone survey of exempt sites yielded data from 90 facilities out of around 3,000 in the UK. Grossing the data provided a UK recycling input of 636,560 tonnes, significantly lower than seen in 2009.

The majority of sites surveyed processed municipal waste (94%), with 95% of all site inputs coming from external third party sources. The surveyed sites supplied the majority of the compost they produced for agricultural application (672%) and land restoration/daily cover (21%).

Although there may be a number of reasons why throughput at exempt sites may have reduced in 2010, both this survey and that conducted in 2009 only sampled a small number of potential sites, and not in a manner which could be described as statistically valid, due to the lack of basic data available from the regulatory authorities on individual sites. For this survey the confidence in the grossed input data is $\pm$41.8% at 90% ie. we are 90% certain that the total input tonnage was in the range 370,478 to 902,642 tonnes. With this level of uncertainty, care needs to be taken in interpreting the results of this part of the survey.

No attempt has been made to analyse the data from the four exempt AD sites that responded to the survey. Only three reported inputs and these totalled just 76t/annum. Similarly, only three sites noted biogas outputs and these amounted to 845m^3/annum.

The exempt composting sector remains of interest because it represents 91% of all composting sites in the UK (although the survey results suggest 1 in 4 of these sites were not operational in 2010). Yet in 2010 it is estimated that this sector received just over 10% of the inputs of organic material to all composting sites. Surveying such an industry is a sizeable task and the lack of responses over the most recent two years of the annual organics survey suggests that a different approach is needed.

It is clear from discussions with the project steering group for this survey that the exempt sites are of interest and there is a consensus that it would be worthwhile continuing to capture this data. Therefore, it is recommended that either the exempt sites survey is conducted entirely separately, say, by combining with an annual survey conducted by the Community Composting Network, with greater resources made available to ensure that significant data is captured, or the project manager and delivery team for future surveys place the same emphasis on the exempt sites survey as the permitted sites' survey. This latter approach would likely also require the input of greater resources. One other action that would help with capturing data on this sector is to have other UK regulatory authorities collect a small data set from each exempt site as SEPA does.

Contents

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1. Introduction

1.1. Purpose of the study

The purpose of this in depth survey is to generate estimates of organic waste processed in the UK, the capacity of the UK organics processing/recycling infrastructure, and the nature, volume and value of the markets available for the outputs.

1.2. Scope of the work

WRAP and other public bodies require information and data on the UK organics recycling sector covering a range of organic waste recycling processes operating across the UK, to assist in directing support resources and in developing policy. In particular, data is required on biological treatment techniques, such as composting and anaerobic digestion (AD), as well as thermophilic aerobic digestion (TAD) and residual waste processing through mechanical biological treatment (MBT). WRAP wishes to undertake this work because the data collected in the survey is widely used by industry bodies, WRAP itself and bodies distributing industry funding to monitor inputs, outputs and markets. Repeated annually since the mid-1990s, this report has come to be regarded as the definitive data on the sector.

This study involved using a range of sources of data, including site returns from the regulatory agencies (EA, NIEA & SEPA) and sample surveys of processors of organic waste.

The results of the survey build on those from previous years, and include information and data from composting, AD and MBT facilities. The results will help WRAP inform its work and assess the extent to which it is meeting its objectives with respect to developing both capacity and markets for the outputs.

Within this report the term "organic waste" has been assumed to refer to "waste of animal or plant origin which, for recovery purposes, can be decomposed by micro-organisms, or other larger soil-borne organisms or enzymes". There are some overlaps here with definitions of "bio-waste" and "biodegradable waste" used in current legislation. Note that for the purposes of this report, this does not include sewage sludge.

1.3. Background

A survey of the organics processing industry has been undertaken since the mid-1990s, originally by The Composting Association (with funding from the Environment Agency and WRAP support in later years) and more recently by WRAP with the support of the Association for Organics Recycling (AfOR), the Anaerobic Digestion and Biogas Association (ADBA) and the Renewable Energy Association (REA). For this latest survey, the support of the Environmental Services Association (ESA) was also enlisted. The additional sector bodies have been included in recognition of the diverse range of technologies now operating in the organics recycling sector and to enable a representation of the wider industry, in particular AD.

The results of earlier surveys have underpinned the annual State of the Composting and Biological Waste Treatment Industry report produced by AfOR. The 2009 survey can be found on the WRAP website www.wrap.org.uk and previous reports can be found on the AfOR website www.organics-recycling.org.uk.

1.4. Context

The UK Government made a commitment to work towards a 'zero waste' economy in the Coalition Programme for Government, published in May 2010. It is estimated that in the UK over 10 million tonnes of organic material has been going to landfill. A key focus for WRAP, in support of the Government's objectives, is the reduction in organic waste sent to landfill and an increase in the amount of this waste stream that is recycled. WRAP's work in this area takes two forms: supporting growth in organics recycling infrastructure and developing the markets for the recycled materials (compost and digestate). In particular, WRAP's organics programme is working with Defra to implement their Anaerobic Digestion Strategy and Action Plan[1], which recognises the role of AD in both diverting organic waste from landfill and generating energy.

The Scottish Government launched Scotland's first Zero Waste Plan in June 2010, setting out the Scottish Government's vision for a zero waste society: a Scotland where all waste is seen as a resource; waste is minimised; valuable resources are not disposed of in landfills, and most waste is sorted and recycled, leaving only limited amounts to be treated. In the context of organic waste, the role for Zero Waste Scotland (ZWS) is to provide practical help and support to enable a sustainable and profitable organics recycling industry. It does this through its support to organics reprocessing facilities to improve their efficiencies and the quality of their compost, digestate and biogas output products; work to improve market confidence in compost and digestate products derived from food waste; work with the food & drink sector to encourage greater uptake of AD.

The Welsh Government has set ambitious targets to achieve zero waste by 2050. In the context of organic waste, WRAP Cymru is working in partnership to develop Wales' infrastructure for recycling and reprocessing its waste and to increase the diversion of biodegradable waste into quality products such as compost and digestate and create demand for these products.

The Department of the Environment in Northern Ireland works with WRAP NI to provide support to the organics recycling industry. Currently the Northern Ireland Waste Management Strategy is under review. New policies, such as the introduction of a statutory 60% recycling target for local authority collected municipal waste and a proposal for a food waste ban, will assist in increasing the diversion of biodegradable waste from landfill.

[1] *http://www.defra.gov.uk/publications/files/anaerobic-digestion-strat-action-plan.pdf*

2. Methodology

2.1 Introduction

The data on which this study is based, was collected via a structured telephone survey (of permitted sites) and mailed/web survey (of exempt sites), supported with a number of additional data sets supplied by the environment agencies in each UK country and WRAP.

The survey used questionnaires to capture data appertaining to the organics recycling industry. Separate questionnaires were developed for permitted composting, AD, thermophilic aerobic digestion (TAD) and MBT[2] along with exempt composting and AD. A database of sites to be contacted to participate in the survey was produced using information provided by the Environment Agency (EA), the Scottish Environmental Protection Agency (SEPA) and the Northern Ireland Environment Agency (NIEA). To this was added information made available by the project steering group and from other databases held by WRAP.

Two different approaches to engaging with sites were used. Permitted sites were contacted by telephone and the survey conducted by organic recycling consultants who were able to sense check the data as it was received. Data was inputted into an online questionnaire system at the time of the interview. Exempt sites were contacted by post (with telephone follow up) with hard copies of the relevant questionnaire enclosed for completion and a link to an online survey also provided. All permitted sites were targeted as were all exempt sites in Scotland and Northern Ireland. For exempt sites in England and Wales only, those that have made the transition to the new exempt registration system were contacted in order to make the number of sites more manageable.

The survey was widely marketed through steering group members. In particular ADBA, AfOR, ESA and REA publicised the work with their members. In addition, news releases were prepared and these were distributed by WRAP. The aim of marketing the work was to heighten awareness of the survey in the industry so that when approached to take part individuals already had some knowledge of the research. A page was also established on the WRAP website with information on the survey; this provided details of the work and also served to validate the research for any contacts that required it.

This research focuses on the calendar year 2010 and follows on from the 2009 survey, which was delivered in 2011. The survey takes such a retrospective look at the industry principally because of the timing of data availability. The regulatory returns data on which the survey is based becomes available around 11 months after the year in question. Therefore, 2010 data was not available until the end of 2011.

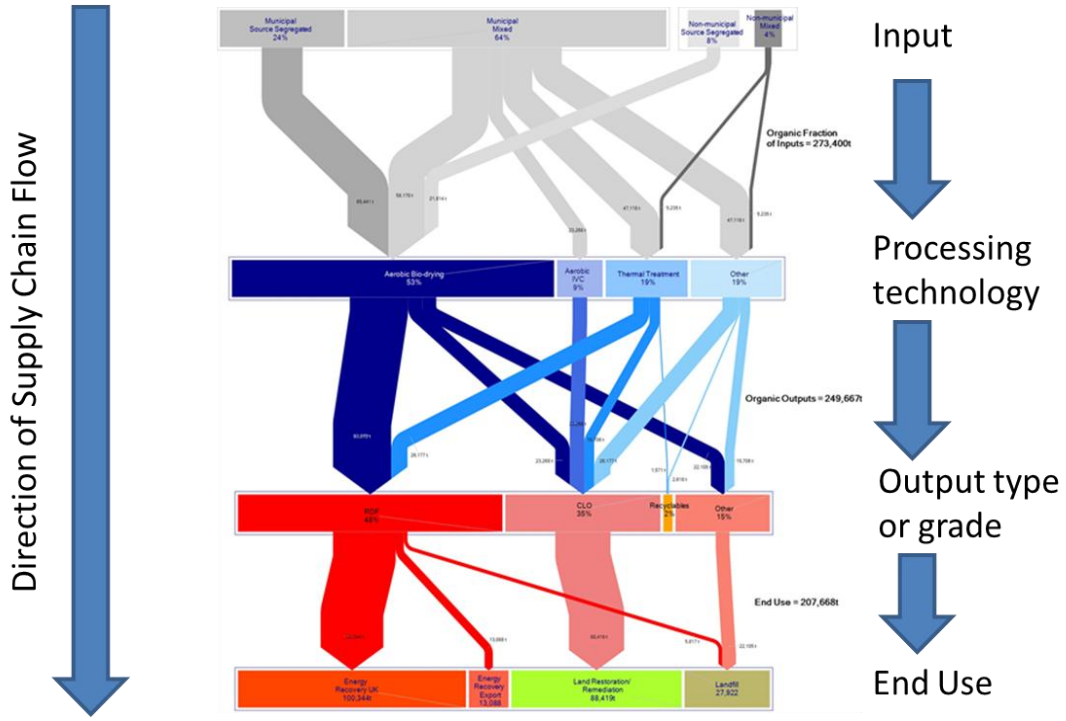
The methodology used for this data collection is explained in detail in Appendix 2.

[2] *For the purposes of this report an MBT plant is one that processes waste using mechanical sorting and biological treatment and produces a discernible organic product as a result - compost, digestate or a biomass rich refuse derived fuel (RDF). MBT does not include autoclave.*

2.2 Diagrammatic representation of the results

The compiled data has been brought together in "Sankey" flow diagrams. These give a graphical representation of the flows of the organic material for each process type, from collection to final market application running top to bottom in the direction of the arrows.

Figure 2: Example Sankey diagram layout



NB the diagram above is for example only and the individual labels are not intended to be legible; the Sankey diagrams shown later in the report are larger scale and labels are intended to be read.

The width of the boxes in these Sankey diagrams is proportional to the quantity of material in tonnes. Similarly the width of arrows between process stages represents the tonnage flow (for each arrow, quantities are also given in figures). In other Sankey diagrams in this report other units (MWh and m^3) are also used.

2.3 Comments on methodology and lessons learned

A number of observations on the methodology were recorded by the project team during the delivery of this research. The aim of these is to aid the continuous improvement of the methodology. A discussion of these is contained in Appendix 4, with the main recommendations below.

2.4 Recommendations

Maintain ORSR – the "Organic Recycling Site Register" (ORSR) is the comprehensive contact list of organic recycling sites throughout the UK which has been built from a variety

of different sources as part of this work. For this survey, those facilities surveyed were asked for permission to use their contact data for future surveys. Of the sites that answered this question, 96% agreed for records to be kept, this equates to 192 sites. We therefore propose that this database forms the basis of the next and subsequent surveys, and that time is taken during each survey to ensure the contact database is kept accurate and up to date.

Survey Promptly – many respondents pointed out that we were asking for responses for 2010 in 2012. In the future we suggest that either new surveys are carried out as soon as the EA input data is available, meaning that the 2011 survey can be carried out later this year, or that input data is collected purely by survey allowing the date of delivery to be brought forward.

Exempt Survey – for this and previous surveys, it has not been possible to survey exempt sites in a representative manner. The data is complicated by the inclusion of sites which are very small, non-operational or organisations that have applied for exemptions "just in case". The only way to get an accurate picture of composting activity in this sector would appear to be to use a different and targeted survey methodology.

The number of exempt sites (nominally over 3,000) means that there continues to be interest in capturing data on their activity. Therefore, it is recommended that either the exempt sites survey is conducted entirely separately, say by combining with an annual survey conducted by the Community Composting Network, with greater resources made available to ensure that significant data is captured, or the project manager and delivery team for future surveys place the same emphasis on the exempt sites survey as the permitted sites survey. This latter approach would likely also require the input of greater resources. One other action that would help with capturing data on this sector is to have regulatory authorities collect a small dataset from each exempt site as SEPA does. In 2004, SEPA introduced a compulsory procedure for gathering information from waste management sites registered as exempt. Under this procedure, SEPA gathers data annually from the operators, including the type, quantity and geographical origin of waste handled. This data is then reported and made publicly available.

3. Results

This section outlines the results of the analysis of the regulatory data and the survey responses, providing narrative where necessary.

Of the permitted sites, 202 survey responses were collected, comprising 173 composting sites, 19 AD sites and 10 MBT sites. In addition, 90 exempt site surveys were carried out, 4 of which were with exempt AD sites. This compares with 155 responses from permitted sites (145 composting, 8 AD and 2 MBT) and 49 responses from exempt composting sites for 2009.

3.1 Permitted Composting

3.1.1 Survey Performance and Participation

During the telephone survey of UK composting sites, successful contact was made with 199 sites out of a UK population of 308 sites (population 9.6% greater than 2009 survey). From these sites, 173 completed surveys were achieved, compared to 145 surveyed in 2009 (ie 19.3% increase in responses compared to 2009). Of the 199 sites where contact was made, 17 were not operating in 2010 and 9 chose not to take part. Considerable attempts were made to contact the remaining 109 sites, but for a number of reasons surveys were not collected from these sites (e.g. key contact not available, telephone not answered etc.).

By combining input data from interviews with regulatory data on inputs from sites which were not interviewed, data on tonnages processed was collated for 202 sites. The breakdown of participation rates per country is summarised in the Table 2 below.

Table 2: UK Composting site survey - 2010 participation rates

	England	Northern Ireland	Scotland	Wales	UK	UK in 2009	Change 2009 to 2010 %
Population	244	10	36	18	308	281	+9.6
Not operational in 2010	9	3	1	4	17		
Refused	4	1	2	2	9		
No response	99	2	8	0	109		
Surveyed	132	4	25	12	173	145	+19.3
Proportion surveyed %	54.1	40.0	69.4	66.7	56.2	51.6	
Input data (1)	158	5	28	11	202		
Proportion with input data %	64.8	50.0	77.8	61.1	65.6	51.6	

(1) Sites for which input data was available either from the survey or EA/SEPA/NIEA returns

To estimate the size of the total UK and individual national inputs and outputs, the data from these 202 sites was applied to the whole population of the 291 operational sites in the UK, using the methodology summarised in Appendix 3. As there are legitimate reasons for sites not to be included in the Environment Agency returns (e.g. some sites with longstanding

permits are not required by regulation to produce returns[3]) we feel this grossing of inputs and outputs is appropriate to fill this data gap.

Table 3 provides grossing inputs and outputs produced and the market size estimates.

Table 3: Size of the UK and National Composting Sector 2010

	England	Northern Ireland	Scotland	Wales	UK	UK in 2009	Change 2009 to 2010 (%)
Total surveyed inputs (tonnes)	3,226,702	84,406	455,134	95,077	3,861,319	4,517,594 (1)	
Grossed inputs (tonnes)	4,673,719	85,568	564,273	120,532	5,444,092	5,265,711 (2)	+3.4%
Surveyed input capacity (tonnes) (3)	3,375,515	101,477	456,923	244,134	4,178,049		
Grossed input capacity (tonnes)	5,942,339	126,846	660,906	284,823	7,014,914		
Total compost output surveyed (tonnes)	1,448,636	34,900	211,812	78,581	1,773,929	2,364,673 (1)	
Grossed compost output (tonnes)	2,392,944	64,912	279,146	80,515	2,817,517	2,756,265 (2)	+1.9%
Total employees surveyed	531	9	141	82	763	797	
Grossed employees	949	14	196	96	1,255	1,184	+6.0%

(1) Reported 2009 totals
(2) Totals for 2009 all composting population, grossed using 2010 methodology
(3) Operators were asked for the practical capacity of their site

3.1.2 Data Precision

The method for calculating data precision is explained in Appendix 3.

For the 2010 gross composting inputs, calculated precision at UK level is $\pm$ 9.8% at 90% i.e. we are 90% certain that the grossed figure for inputs is 4,910,570 - 5,977,612 tonnes (5,444,092 +/- 9.8%). For grossed outputs the UK figure is $\pm$9.4% at 90%. This compares to a calculated $\pm$12.2% at 90% for the 2009 survey data (calculated from raw data).

[3] *Some sites that were first permitted before the formation of the Environment Agency in 1996 do not have the requirement to submit a waste return. Before this time there were 83 separate Waste Regulation Authorities and permit conditions were not standardised - some authorities required returns to be made, some did not. Furthermore, some sites may have been registered before these authorities were formed in 1992 and be subject to different requirements again. Therefore, some, but not all, sites with a longstanding permit are not required to submit returns and hence some data is not available.*

3.1.3 Results Summary

These results show:

- a UK market size of 5.4 million tonnes input volume, up 3.9% on the 2009 survey (using the 2010 grossing methodology), with compost outputs of 2.8 million tonnes, 2.2% up on the 2009 survey (again using 2010 grossing methodology);
- a UK total composting capacity of 7.0 million tonnes, suggesting a 78% capacity utilisation; and
- a total UK employment in composting of 1,255 full time equivalents.

Comparing 2010 results to those generated in 2009:

- Using the raw data from the 2009 survey, average input per site was 21,212 tonnes. However the 2009 data includes *all* input to the composting sites ie. including non-organic materials such as metals, cement and other construction materials. These non-compostable materials have been removed for the calculated grossed 2009 estimates, giving an average per site of 19,186 tonnes. This compares to 19,083 tonnes per site for 2010.
- The 2010 population figures show 26 more composting sites in the UK than 2009. Of the sites surveyed, 17 reported they had started operation in 2010 of which 5 were IVCs.

3.1.4 Survey Response Analysis and Summary

The responses for each individual survey question asked are summarised in Appendix 5. The interpretation of this extensive dataset follows.

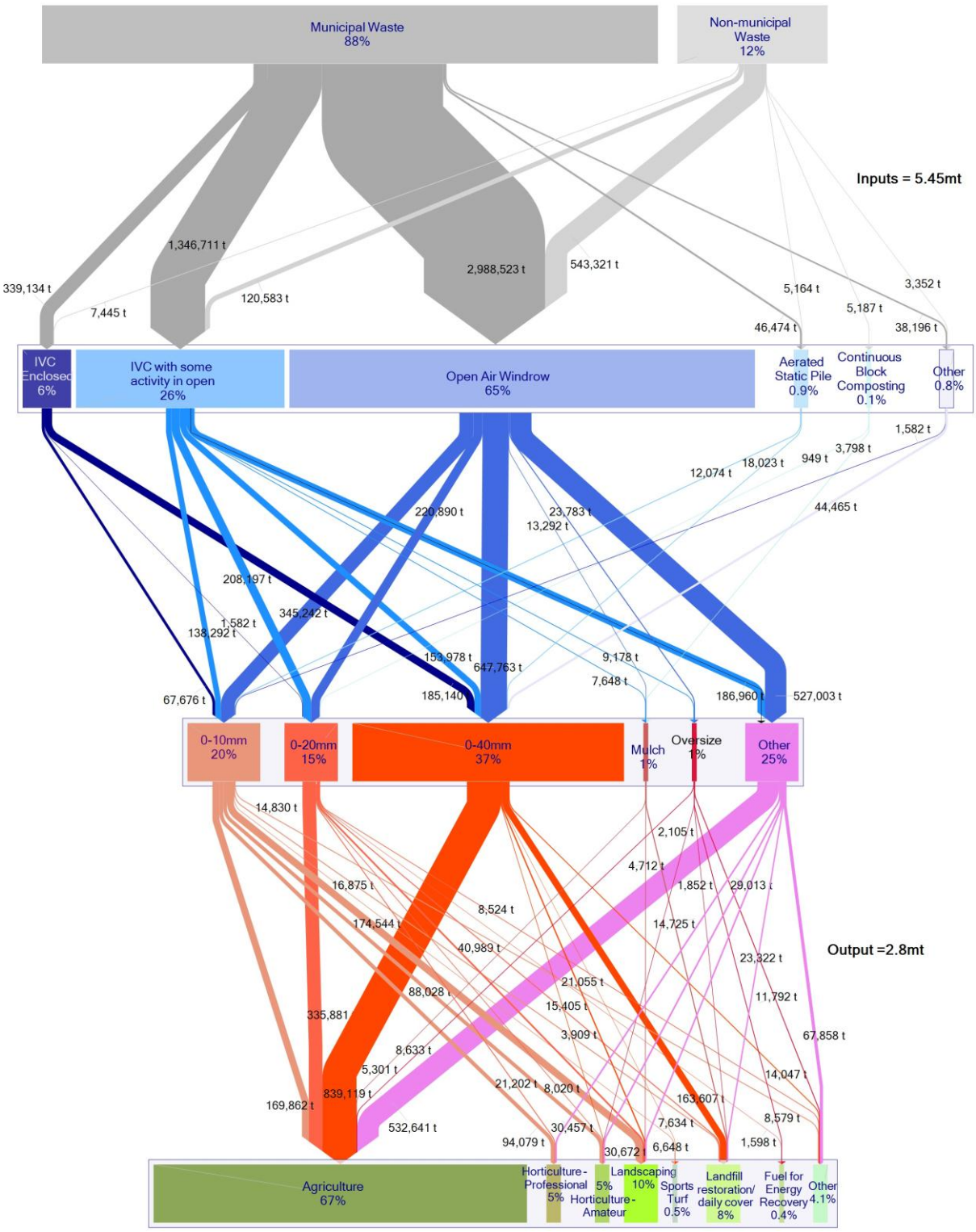
Supply Chain Flow

As previously described, Sankey diagrams are a useful tool for visually presenting complex data. They can help structure collected data to give a detailed picture of the composting supply chain from site inputs to final end markets for the compost produced via process type and grades of compost. While the diagram looks complex (Figure 3), it is in fact a fairly simple representation of the flow of organic waste through composting sites in the UK and warrants the attention of the reader.

As explained earlier, the horizontal width of both directional flow arrows and destinations, is proportional to the amount of material the flow represents. Tonnage figures quoted for each flow are the **grossed** figures and represent the estimated totals for the UK. The proportions quoted for the destinations are proportions of the total material flow at that stage in the chain e.g. material graded at 0-10mm is 20% of the total compost outputs of the sites. NB. some of the rows do not add to 100% due to rounding.

In the Sankey diagram (and later in the report) distinction is made between in-vessel composting (IVC) and IVC with some activities in the open. The difference between the two is that at sites using the latter system, part of the process, e.g. maturation, occurs away from the in-vessel system as the next stage in the composting process i.e. in series.

Figure 3: UK Composting 2010 supply chain flow



The diagram shows the flow of inputs to the composting sector of 5.4 million tonnes in 2010 and an output of 2.8 million tonnes. The narrative below follows the flow of this diagram and provides extra detail where this has been collected by the survey.

Waste feedstock sources

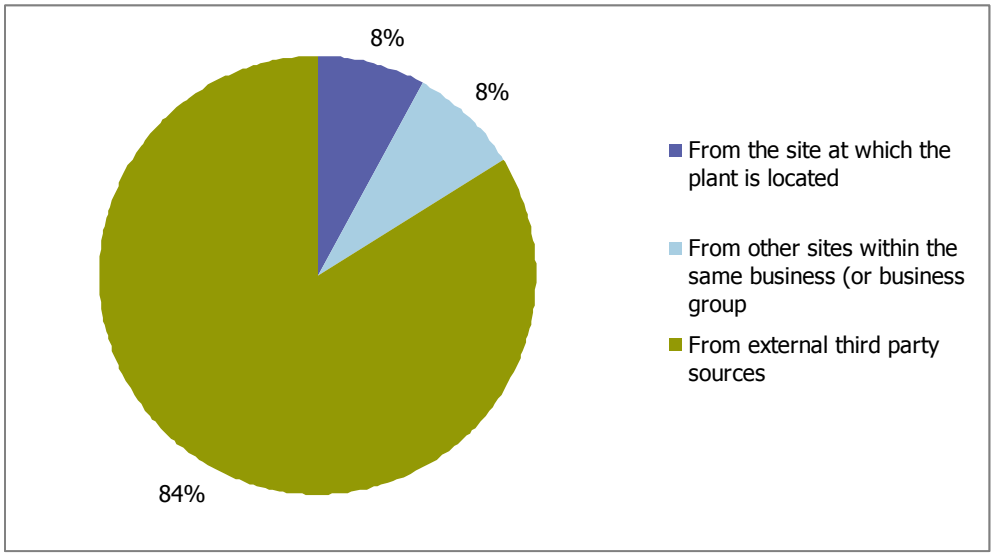
Further to the detail provided in the Sankey diagram, the survey results noted (comparisons with 2009 based on surveyed rather than grossed results):

- The input waste feedstock was mainly from sources outside the site at which the plant is located and outside the site's own business group, with over 3.8 million tonnes (84.83%) recorded from external sources i.e. local authorities and external C&I sources combined.
- There has been a rise in municipal waste source feedstock of 33% (1.2 million tonnes) between 2009 and 2010. This is to be expected as initiatives are in place to increase local authority organic waste collections.
- Commercial waste inputs have decreased significantly from 915,000 tonnes in 2009 to 685,000 in 2010, a reduction of 40% which could be a result of more commercial waste going to AD.
- Amounts that came from the site at which the plant is located and from the same business/group were similar at around 350,000 tonnes.
- Those sites that received non-municipal waste were asked about the source of the food waste[4] (if any) contained in this. Of the sites that stated they received non-municipal food waste in 2010 the sources were:
    - Supermarkets – 75%
    - Agriculture – 69%
    - Food manufacturers – 61%
    - Hospitality – 51%

  (Note: most sites that reported receiving food waste obtained it from multiple sources, hence figures add to greater than 100%).
- Out of 29 sites that provided data on sources of food waste, 25 were IVC and four were open air windrow (OAW).

[4] *Food waste was not defined in the question and so may be from any stage of the food production, retail and consumption process including crop residues, out of date stock and preparation and leftovers from catering.*

Figure 4: Sources of composting input by weight (% of total, UK)



Technology types and inputs

Proportionally, the majority of waste is recycled using open windrow systems. This is currently the most cost effective way of recycling organic waste that is not animal by-product (ABP) within the UK regulatory and planning framework.

IVC technology covers a myriad of systems largely designed to meet the requirements of the ABPR. The higher capital cost of enclosing composting systems means that many operators opt to complete some of the process outside using conventional open windrow or partially mechanised aerated static pile systems. The survey results show that 74% of sites operating IVC systems also utilised an open air system in series with the IVC system, and that these sites handled 81% of the organic waste treated by IVC.

- Open windrow composting was used at 70% of the sites in operation covering 65% of the inputs, which is an increase of 8% by sites and 12% by inputs on 2009.
- IVC totally enclosed composting accounts for 8% of the systems and 6% of inputs; IVC with some open activities accounts for 21% of sites and 26% of inputs. Combined this is 29% of sites and 32% of inputs which compares with 33% and 43% in 2009.
- There were no survey responses from operators with windrow under cover systems.
- Aerated static pile composting accounts for 0.8% of sites and 1% of inputs.
- Continuous block composting accounts for 0.42% of sites and 0.1% of inputs.

The above does not add to 100% due to rounding.

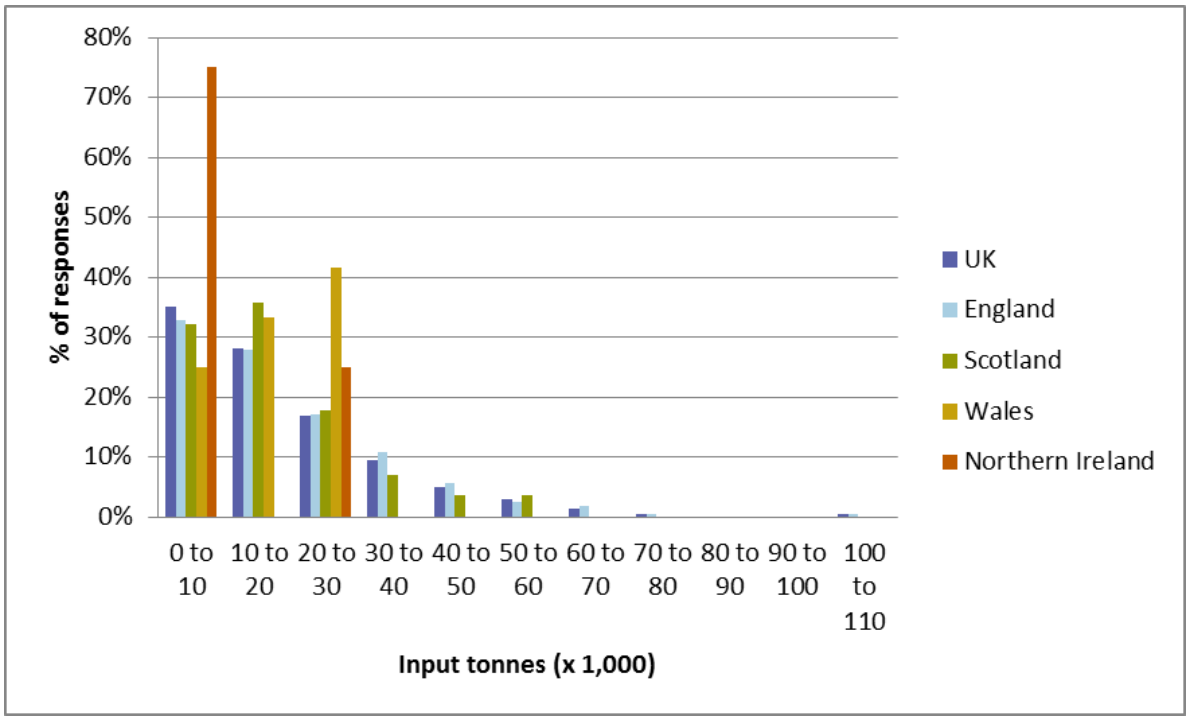
Composting technology types are explained in the Glossary – Appendix 1.

Of the sites that noted they were using more than one system, 50% said they were in parallel and 50% in series. Those that reported operating parallel processes are likely to be doing so because they are taking ABPR and non-ABPR waste streams and processing them through separate composting lines.

A single TAD site was surveyed but this process was carried out in parallel to windrow composting and data provided was at whole site level. TAD was therefore not able to be reported separately, so an estimate of 50% of the site total has been included under 'other' in the Sankey diagram and tables. The quantities reported as being processed by the TAD facility are used when producing the grossed figure for all composting.

Waste input data showed the majority of sites processed 30,000 tonnes or less of organic waste in 2010. The distribution of input tonnages per site is summarised in Figure 5 below.

Figure 5: Waste Input per composting site, as % of all responses (ranges in tonnes x 1,000)



Site Capacity

Sites were asked what their practical annual capacity was in 2010. This took into account the regulatory capacity i.e. permitted and planning, but is essentially a record of the amount of input material the site could physically handle in 2010. The answers have been subjected to the same grossing method as used for the input quantities. This results in an estimated annual capacity (as opposed to permitted capacity) of 7 million tonnes at composting sites in the UK in 2010. This suggests that there was spare capacity of 22% or ca. 1.6 million tonnes in 2010.

Much of this spare capacity can be explained by the fact that 46% of sites reported spare capacity in the summer months when sites would be expected to be at their busiest (45% in England, 56% in Scotland, 27% in Wales and 75% in Northern Ireland), although this is very dependent on prevailing weather conditions as this influences input volumes to sites.

Pre-processing

When waste is received at a composting site it is subjected to pre-processing to prepare the material for composting. This pre-processing can involve the removal of contaminants such as plastics but is mainly used to alter the state of the organic material to aid the composting process.

Only 4% of sites reported that they did not conduct any kind of pre-processing, with most sites involved in more than a single type of pre-processing. Table 4 below illustrates pre-processing activity.

Table 4: Proportion of sites involved in pre-processing activities

Type of pre-processing	Proportion of sites involved %
Shredding	90
Hand picking	54
Blending/Mixing	27
Screening	25
Other	4
De-packaging	1
Pulping	0

Where the answer was 'other', sites reported performing visual inspections and using machinery to remove contaminants. Some sites also reported receiving pre-shredded material. This could indicate that material is being brokered, i.e. it is being collected by a third party then shredded before being passed to a composter, or simply that material is shredded to facilitate getting more material on a vehicle and thus reducing transport costs.

Biodegradable (starch) bags

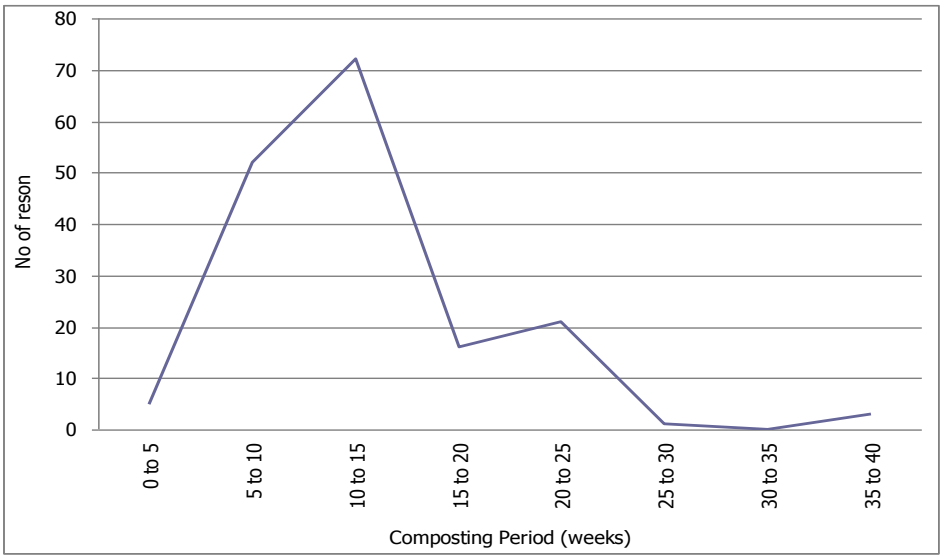
Of the sites surveyed, 28% responded that they received material in biodegradable bags compared with 24% in 2009. Around 6% by weight of the material received at composting sites was in biodegradable bags. Of this 82% is received at sites using IVC and the remainder at open windrow sites.

Survey respondents were asked if the use of biodegradable bags was a significant issue for them and only 23% of composting sites reported that they were. The recurrent reason for this was the length of time they took to degrade. Some sites noted that they do not degrade at all.

Composting period

Based upon the survey responses, the average composting period was 12 weeks. This is a typical minimum composting period for a PAS 100 compliant process. It should be noted that the range of this data set is 1 to 40 weeks. Figure 6 shows that most surveyed sites had a composting period of between 10 and 15 weeks, with only a small proportion over 20 to 25 weeks. This of course can vary depending upon the time of year, and the free capacity available.

Figure 6: Composting Period - distribution of responses per surveyed site



Animal by Products (ABP)

The number of sites authorised to receive ABP wastes in 2010 was 26. The majority of these (16) could take all Category 3 waste with the remaining 10 only allowed to take catering wastes. Four of the sites registered to take Category 3 waste were OAW with IVC with the remainder of ABP registered sites IVC alone[5].

Of the composting sites for which we have input data, 24 had ABP approval, with 10 approved for catering waste and 14 for category 3 waste. These sites had a combined input of 649,000 tonnes or 17% of total input data of which 286,000 tonnes (7.5% of total) was received at Category 3 registered sites and 363,000 tonnes (9.5% of total) at those that can receive catering waste. As a proportion of the grossed input figure for composting sites, 916,000 tonnes is handled overall in the UK at ABP approved sites, with 404,000 tonnes at sites registered to receive category 3 waste and 512,000 tonnes at sites registered to receive catering waste.

Compost Outputs and grades

The material produced at compost sites comes in various grades and is put to several end uses. This section assesses the outputs of the sites. The total estimated output from composting sites in the UK is 2.8 million tonnes in 2010.

The proportion of the different grades of compost produced in 2010 is presented in the Sankey diagram (Figure 3), this also shows which composting processes produce these grades. The estimated grossed quantities of each grade produced by each type of composting process are shown in Table 5.

[5] *"Catering Waste" means all waste food originating in restaurants, catering facilities and kitchens including central kitchens and household kitchens.*

Category 3 animal by product is generally material that has been classed fit for human consumption, but is no longer intended for human consumption, and includes waste from the food processing industry.

Table 5: Estimated quantity of each grade of compost produced by process type, UK 2010

		Grade of Compost and Quantity (tonnes/annum)					
System Type	**Total Estimated Outputs**	**0-10mm**	**0-20mm**	**0- 40mm**	**Mulch**	**Over-size**	**Other**
Open windrow	1,777,973	345,242	220,890	647,763	13,292	23,783	527,003
IVC - with some activities in open	704,253	138,292	208,197	153,978	7,648	9,178	186,960
IVC - totally enclosed	254,399	67,676	1,582	185,140	0	0	0
Aerated static pile	30,097	12,074	0	18,023	0	0	0
Continuous block composting	4,747	0	949	-	3,798	0	0
Other	46,048	1,582	0	44,465	0	0	0
Total	**2,817,517**	**564,866**	**431,619**	**1,049,370**	**24,738**	**32,961**	**713,963**
Proportion		20%	15%	37%	1%	1%	25%

Compost End Markets

Agriculture has always been the largest market for compost products as farmland has the capacity to utilise high volumes of coarsely screened material. This is supported by the 2010 survey results where over 67% of all compost produced is reported as being supplied to agricultural markets. This compares with 60% reported in the 2009 survey.

Most compost is supplied to agriculture as a coarse grade of 0-20mm to 0-40mm but some operators supply to agriculture at a fine grade ie. 0-10mm (30% of the material produced to this grade was supplied to agriculture in 2010). A reason for operators to send 0-10mm to agriculture may be the need to screen to this grade in order to remove contaminants such as plastic.

- the majority of compost produced in 2010 was applied to agriculture (1,203,755 tonnes recorded from those sites surveyed); and
- horticulture (professional), landscaping and land restoration also saw an increase in the application of compost.

Table 6 provides grossed output tonnages, compared to those recorded in 2009. There were no questions included in this survey which could offer any insight into the apparent differences in end uses between 2009 and 2010.

Table 6: Compost Markets, grossed tonnages, 2010 v 2009

	2010 (tonnes)	**2009** (1) **(tonnes)**
Agriculture	1,886,678	1,622,676
Horticulture - Professional	147,929	71,408
Horticulture - Amateur	134,697	387,276
Landscaping	273,187	211,694
Sports Turf	14,226	22,505
Landfill Restoration	232,110	182,444
Fuel for energy	10,329	16,657
Other	118,361	241,606
Total	**2,817,517**	**2,756,265**

(1) 2009 figures grossed using 2010 methodology

What grade or grades were applied?

Table 7 provides grade usage per application market, as % of total applied.

Table 7: Compost grade application per key end-use market (as % of end-use)

	0-10mm	**0-20mm**	**0-40mm**	**Mulch**	**Over-size**	**Other**
Agriculture (%)	9	18	44	0.3	0.5	28
Horticulture - professional (%)	65	15	0	0	0	21
Horticulture - amateur (%)	66	6	3	0	2	23
Landscaping (%)	65	15	8	2	0	11
Sports turf (%)	47	0	53	0	0	0
Land restoration (%)	7	7	69	6	1	10
Energy recovery (%)	0	16	0	0	84	0
Other (%)	13	7	12	0	10	58

This shows, as could be anticipated, the greater use of coarser grades for applications such as agriculture and land restoration, although some 0-10mm is used in both applications. Higher value applications such as sports turf, horticulture and landscaping, show a more significant usage of the finer grades. The key use of oversize is energy recovery.

Sales prices

The surveying of sales prices produced some useful data and brought up some interesting points. Although the highest sales prices have gone up since 2009 for all markets except for sports turf, the lowest prices paid for compost have actually decreased to below 2009 sales amounts except for sports turf. The figures listed are ex-works prices i.e. the financial transaction is an 'at the gate' exchange which excludes costs for transport and any spreading of material. The negative prices represent the site paying to have the material taken away.

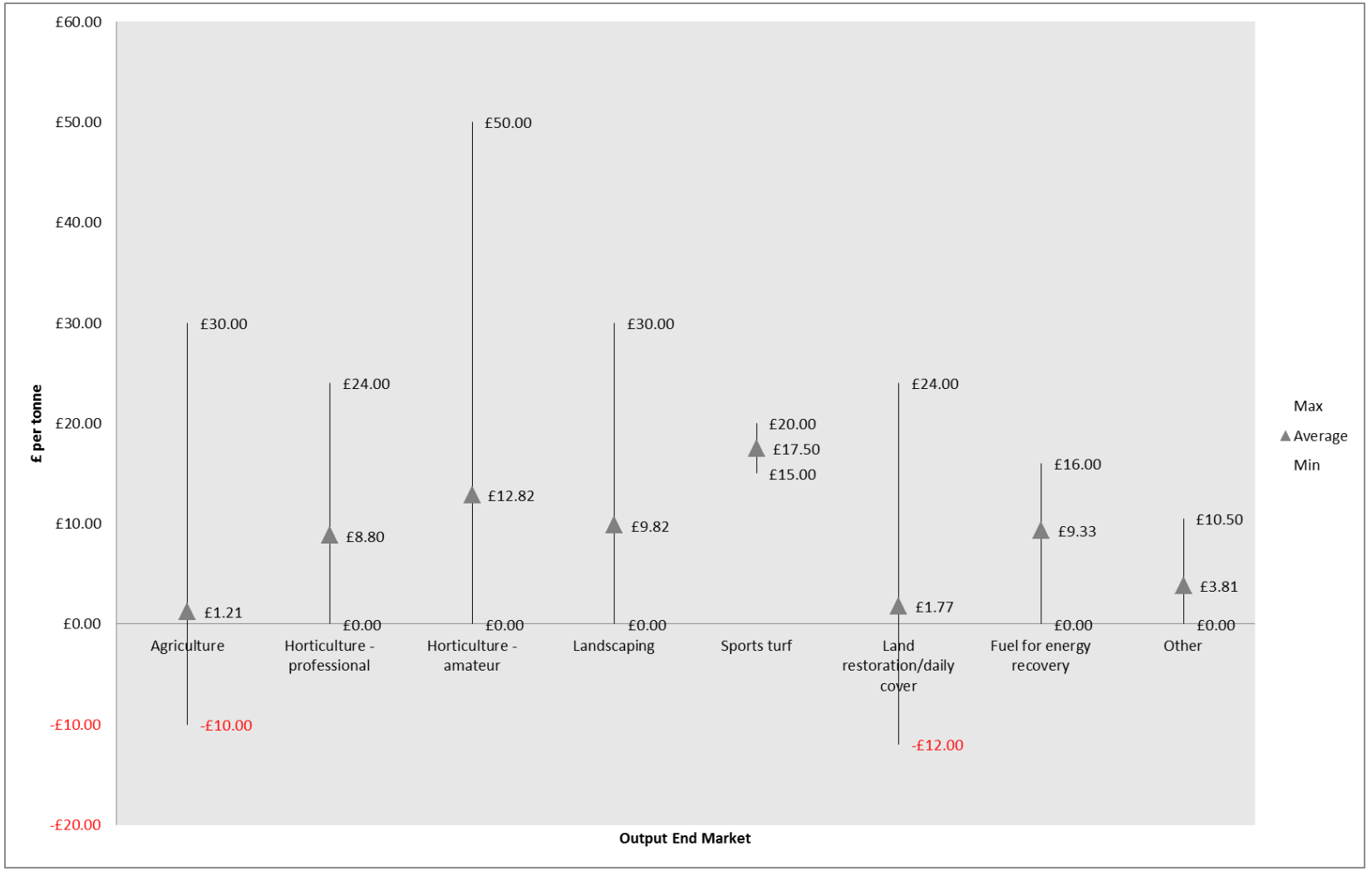
Reported prices varied considerably, particularly for agricultural uses. The distribution of reported prices per tonne, per end use market is summarised in Table 8 and illustrated in Figure 7. The comparison of 2010 to 2009 in Table 8 shows some strengthening of prices in 2010.

Table 8: Min and Max Ex Works Sale Price, by end-use market, 2010 v 2009

Ex Works Prices in £/t	Max Price	Min Price (1)	Mean Price	Mode (2)	Base	2009 Max/Min	2009 Mean/Mode
Agriculture	£30	-£10	£1.21	£0	108	£15/£0	£3.18/£0
Horticulture - professional	£24	£0	£8.80	£0	15	£15/£5	£9.38/£9
Horticulture - amateur (3)	£50	£0	£12.82	£0	14	£40/£1	£9.69/£4
Landscaping	£30	£0	£9.82	£0	39	£27/£0	£12.15/£12.5
Sports turf	£20	£15	£17.50	No mode	2	£25/£1	£10.86/£9
Land restoration/ daily cover	£24	-£12	£1.77	£0	11	£15/£0	£6.08/none
Fuel for energy recovery	£16	£0	£9.33	No mode	3	£10/£0	£6.00/£5
Other	£10.50	£0	£3.81	£0	8	£15/£0	(4)/£17.5

(1) Negative prices indicate fee charged by end user
(2) The mode is the data point (or points) that occur most frequently in a dataset. In this instance the most common sales prices for composts in all categories was £0.
(3) For small volumes in the amateur horticulture market (e.g. for retail), prices of £15-30 per 50 litres and £2 for a "small bag" were reported. These are not included in the above prices based upon £ per tonne.
(4) There was a single entry for £450 in the 2009 data which would result in a mean of £35. If this is removed mean is £9.06

Figure 7: Maximum, Minimum and Mean Compost Sales prices (in £/t) by end use application



The value of the end markets has also been calculated as Table 9 below shows.

Table 9: Compost market values 2010

Market	Mean Price £/t (P)	Tonnes (T)	Value
Agriculture	£1.21	1,886,678	£2.3m
Horticulture - professional	£8.80	147,929	£1.3m
Horticulture - amateur	£12.82	134,697	£1.7m
Landscaping	£9.82	273,187	£2.7m
Sports turf	£17.50	14,226	£0.2m
Land restoration/daily cover	£1.77	232,110	£0.4m
Fuel for energy recovery	£9.33	10,329	£0.1m
Other	£3.81	118,361	£0.5m
Totals		1,886,678	£9.2m
Notes		Data taken from table 6	P x T

The overall total calculated in this way, at £9.2m compares to £9.3m reported in 2009, a slight decrease which reflects the lower tonnages going to the more lucrative markets (amateur horticulture and sports turf) in this year's survey.

Impact of PAS 100 and Compost Quality Protocol (CQP) Certification on pricing

Data provided by the certification body shows that in 2010 there were (including exempt sites):

- 96 sites with PAS 100 and CQP[6], accounting for 1,917,208 tonnes of input material; 19 sites with PAS 100[7] accreditation alone, accounting for 330,764 tonnes of input material; and
- 21 sites (333,999 tonnes input) were applying for the first time for PAS 100 & CQP, and 3 sites (28,600 tonnes input) for PAS 100 certification alone.

For permitted sites, this translated to 50 sites with PAS 100 and CQP, and 16 sites with PAS 100 alone.

Of the surveyed composting sites in 2010, 26 had PAS 100 and CQP (mostly in England), while 10 sites had PAS 100 accreditation alone (mostly in Scotland). Of the surveyed input tonnages, PAS 100 & CQP accounted for around 508,000 tonnes, while PAS 100 sites

[6] Launched on 15th March 2007, by BREW, WRAP and the EA this protocol is a formalised procedure for the production and use of Quality Compost from source-segregated biodegradable wastes. Importantly, it clarifies the point at which waste regulatory controls on composted source-segregated biodegradable waste are no longer required. Any compost producer who supplies compost for use in England and Wales as 'product' must demonstrate compliance with this protocol, its criteria including a requirement that the compost conforms with an approved standard (currently PAS 100).

[7] The Composting Association has adopted BSI PAS 100 as the specification that composted materials must meet in order to achieve the independently verified Composting Association accreditation and use of TCA logo. The specification covers the entire process; from raw materials and production methods, through quality control and lab testing ensuring certified composts are quality assured traceable safe and reliable.

accounted for around 204,000 tonnes. Price data for the surveyed PAS 100 and CQP certificated sites was filtered from the rest of the dataset, producing the following averaged results shown in Table 10.

Table 10: Impact of certification on Average Compost Prices

	PAS 100 certified (2)	Not certified
Agriculture	£1.74	£1.00
Horticulture - professional	£10.33	£9.05
Horticulture – amateur	£19.13	£9.86
Landscaping	£12.45	£8.93
Sports turf (1)	£15.00	£20.00
Land restoration/daily cover	-	£1.77
Fuel for energy recovery	£12.00	£8.00
Other	£6.00	£1.60

(1) Note only 2 sites reported prices for sports turf
(2) Due to small sample sizes this column combines those certified to PAS 100 only and those certified to both PAS 100 and CQP.

Although it is recognised that certification applies to a specific output - compost quality which may only be a proportion of the production of a specific site, results do suggest that where sample size is reasonable (e.g. agriculture, landscaping) that certification does produce a premium in selling price. For agriculture average price for PAS 100 material is £1.69 (8 records), PAS 100 & CQP £1.76 (17 records) (combined £1.74) compared to £1.00 for non certificated sites (88 records).

Although this premium does not appear to be present in all cases, the small sample sizes (e.g. 4 records for amateur horticulture, 1 for sports turf) mean that the comparative averages must be treated with caution.

Compost products are screened to meet the requirements of the destined end market. The decision by the site operators regarding which grade(s) to produce will be influenced by numerous factors:

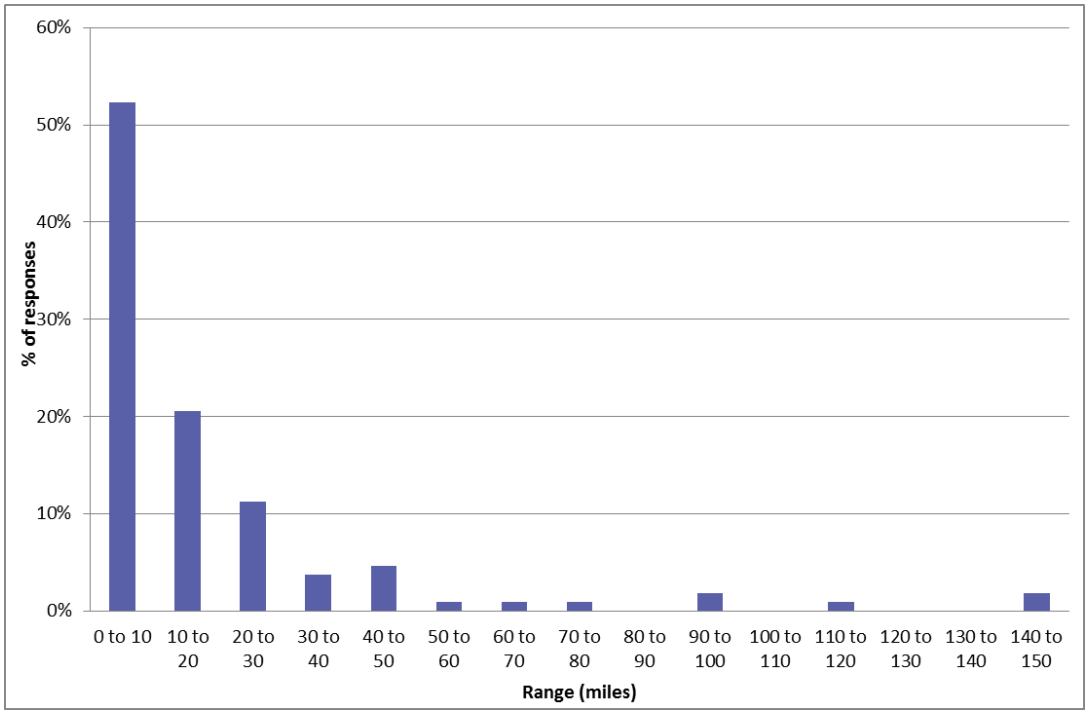
- **Price** – The survey shows that some permitted sites were achieving a selling price of between £15 and £30 for compost outputs. Normally the finer a compost product is screened the higher the price it commands in the market place but the results suggest that this is not always the case.
- **Site capacity** – Every site will have its capacity defined by physical, regulatory and operational constraints. Inevitably this means that compost needs to leave the site to accommodate the arrival of fresh waste. If gate fees are high then an operator might decide to maximise inputs by moving compost off site in high volumes quickly at a low price. Moving compost quickly generally means screening to a larger grade such as 0-40mm and selling to a high volume market such as agriculture. Conversely, screening compost to finer grades might result in a higher price per unit but is more time consuming and results in greater amounts of oversize material for which a market also needs to be found.
- **Logistics** – Compost is a bulky material and is costly to transport. Compost market opportunities, therefore, will always be dictated by the location of a site.

- **Contamination** – It is an unfortunate reality that organic waste is often delivered to recycling facilities containing varying levels of contamination. The amount of contamination that is present in the compost before it is screened will dictate the grade at which it needs to be screened in order to make an acceptable product.

End Product Haulage

Survey respondents were also asked what the typical haulage distance was for compost supplied for use off site. Among the 82% of respondents reporting that they supplied compost off site, the average distance has been calculated at 22 miles with a range of 1 to 150 miles. Those sites that reported hauling compost long distances were not selling into a single particular market, the long distances were spread across many different end markets. Figure 8 shows that the majority of reported haulage distances were less than 30 miles:

Figure 8: Distribution of haulage distances as % of those who supplied information



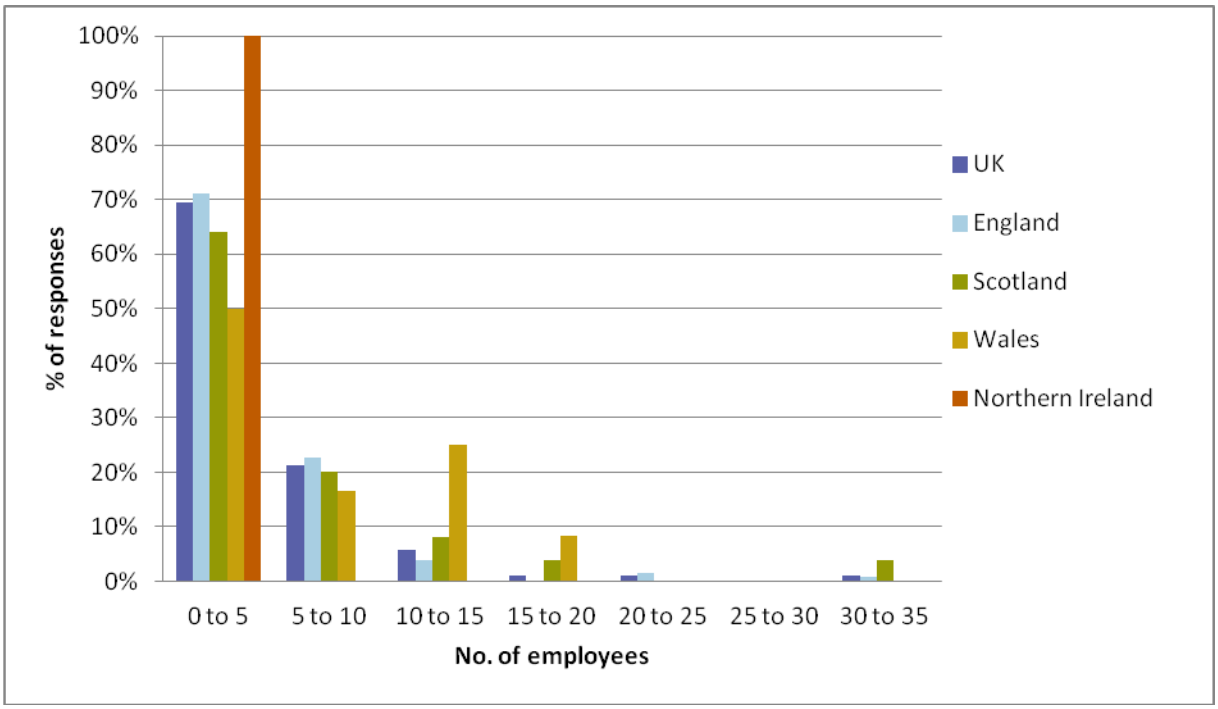
Site employees

Sites contacted were asked for the total number of employees involved in the composting operation, as full time equivalents (FTE).

The collected survey data identified 763 staff employed at the sites surveyed. Grossing these figures for the UK market as a whole (i.e. compensating for those sites where employee data was not collected) gave a UK total employment figure of 1,255. This compares to 1,184 in the 2009 survey.

Analysing individual site data (as summarised in Figure 9) showed that most composting sites employed between 1 and 5 FTE employees (around 70% of the sites surveyed) with a small number employing up to 35.

Figure 9: Employment bands for UK composting sites, as % of all responses (as full time equivalents)



Other Questions

Knowledge of and attitude to PAS 100 and the CQP were also covered by the survey.

In 2010, there were 50 sites with PAS 100 and CQP, and 16 permitted sites with PAS 100 alone. Questions were asked in this survey about operators' current thinking on PAS 100 and the CQP. The majority of sites reported that they are planning to pursue or maintain PAS 100 (133 sites of total 171 responses i.e. 78%). All those responding that they did not intend to maintain or pursue PAS 100 (37 sites) also said they will not be pursuing CQP (CQP does not apply in Scotland).

The responses from the surveyed sites are presented for each country in the table below. The figures are presented as percentages, to enable comparison between the countries, although the sample bases are very small in some cases. Respondents were able to select more than one answer, so columns add to more than 100% in each case.

Table 11 Surveyed Attitudes to PAS 100 and CQP

	England %	Scotland %	Wales %	Northern Ireland %	All UK %
Will maintain, currently pursuing or planning to pursue certification to PAS 100	75	80	92	75	78
Will maintain, currently pursuing or planning to pursue certification to CQP	54	8	58	75	49
Not planning to maintain/pursue certification to PAS 100	23	20	0	25	21
Not planning to maintain/pursue certification to CQP	25	32	8	25	25
Base (Number of respondents)	132	25	12	4	173

The sites not planning to maintain or pursue certification cited a number of different reasons.

The main ones can be summarised as follows:

- too expensive to introduce;
- the compost is used on the site where it is produced;
- waste streams processed at the site are not included in the allowable inputs for the CQP;
- the quantity of green waste handled is too small; and
- the operator felt that achieving PAS 100 and CQP compliance is a too long and laborious a process.

Sites were also asked for their opinions on the current threats and opportunities to their businesses. The opportunities mainly centre on markets, whereas threats focus on increased competition and regulation/legislation reducing the potential expansion of businesses. A complete listing of the responses given is shown in Appendix 5 and the summary below reflects the range of answers given. It was noticeable that more people offered threats than suggested opportunities.

Threats:

- Competition and gate fees were felt to be the biggest threats, farmers feel they are unable to compete with larger companies that are lowering gate fees.
- Regulation/legislation make compliance more expensive and difficult particularly with regard to the management and monitoring of bioaerosols and restriction of markets to those allowed under the current regulatory framework.
- AD was also linked with lowering gate fees and increasing competition, thus taking food waste away from composters.
- Issues with external bodies such as planners and local authorities who "put increasing pressure on composters to certify to PAS 100".
- Public perceptions and 'NIMBYism' from bad press are also perceived to be a problem.

Opportunities:

- Composters have the opportunity to increase the quality of the compost to gain more income from the sale of compost.
- Quality products were also leading to market expansion and diversification of composts, again meaning higher value composts being produced.
- Exporting to overseas biomass markets meant another revenue stream for products that did not meet specifications, thus diversion from landfill and another source of income.
- Food waste diversion from landfill will benefit composters that can take food waste.

3.1.5 Conclusions

Regulatory and other data identified 308 composting sites in the UK for 2010 (a 9.6% increase on the survey of 2009). The 2010 survey of permitted composting sites collected data from 173 sites - 28 more sites than 2009 (+19.3%). Regulatory returns data was used to estimate waste inputs to permitted sites and this was provided by DOENI, EA and SEPA. Sites were asked to confirm this regulatory data during interview, and where it was incorrect changes were made.

The regulatory data on inputs from 202 sites amounted to 3.86 million tonnes. When grossed to represent the input tonnage of the composting sector in the UK as a whole, this came to 5.4 million tonnes. Comparing to the reported composting sector inputs in 2009 (based solely on input data) this suggests an increase of 20.5%. However, when the same grossing methodology is used as employed for the 2010 survey i.e. grossed up for the sector as a whole, this 2009 total comes to 5,265,711 tonnes i.e, an increase of 3.9% between 2009 and 2010.

In this year's survey sites were asked for their practical capacity and grossing these figures gave an overall UK capacity of 7.0 million tonnes, suggesting a capacity utilisation of 78%. This 22% spare capacity was also reflected in 46% of respondents saying that they have free capacity in the summer months, the busiest period for composting sites. Of course, under-utilisation of composting facilities in the winter months will always mean that full utilisation will not be achieved.

Examining input wastes showed that in 2010, 88% came from municipal sources, 12% from commercial and industrial sources. Comparing tonnages showed that despite the similar overall throughput to 2009, inputs from non-municipal sources were reduced. As most organic waste from commercial sources is food waste, this reduction could well be a reflection of the increase in AD tonnages in 2010 (see below).

Open windrow remains by far the most common processing technique accounting for 65% of the input tonnage, with IVC representing 33%, aerated static pile 1% and continuous block composting 0.1%.

The survey also showed that compost output was similar in 2010 to 2009, at 2.81 million tonnes (grossed tonnage; surveyed tonnage was 1.8 million tonnes) compared to 2.76 million tonnes in 2009. The majority of compost output is a coarse 0-40mm grade, most of which is used in agriculture. Significant volumes of finer grade materials are also produced,

although again agriculture is the main market for these materials. Landscaping (at 10% of total tonnage) and land restoration (at 8%) are also important and growing markets.

Pricing varies significantly, although some added value benefit is seen from specialist markets such as horticulture and sports turf. Overall, prices seem to have firmed between 2009 and 2010, although there is still considerable material being supplied to agriculture and landscaping at zero or negative (where a negative price represents the site paying for the removal of material). Total market value is estimated at £9.2 million in 2010.

In 2010, data supplied by the certification body showed that 115 sites were certified to PAS 100. Of the composting sites interviewed for this survey, 36 (21%) had PAS 100 certification and they processed around 712,000 tonnes (18.5% of the total input surveyed). More than twice as much input was processed by sites with both PAS 100 and CQP certification (508,000 tonnes) as by sites with PAS 100 only (204,000 tonnes). Although it is recognised that certification applies to a specific quality of compost which may only be a proportion of the production of a specific site, results do suggest that where sample size is reasonable (e.g. agriculture, landscaping) that certification does produce a premium in selling price. For instance, for agriculture average price per tonne for PAS 100 certified sites is £1.69 (8 records), PAS 100 & CQP £1.76 (17 records) compared to £1.00 for non-certificated sites (88 records).

The majority of sites surveyed in the UK planned to pursue or maintain PAS 100 (78% of sites that responded) with 49% of these saying they will pursue or maintain CQP too. In Scotland where CQP does not operate, those intending to pursue or maintain PAS 100 certification accounted for 80% of responses. Those who were not intending to do so cited cost and complexity amongst their reasons.

3.2 Anaerobic Digestion (AD)

The following section describes the results of the AD part of the survey. This involved interviews with operators of industrial and farm based AD plants processing at least a proportion of organic wastes but excluding sites that use solely non-wastes or purpose grown crops and sites used for water treatment. Comparisons with the 2009 data have been made where possible but there are areas where these cannot be made. The figures in the 2009 survey were not grossed because it was considered the sample size was too small for grossing to be robust. Furthermore, it was noted that making generalisations from the results was difficult because of the 'highly individualized nature of each of the operations'. These points, along with the fact that 2009 was the first year for which AD data was collected separately, mean that trends have been difficult to explore.

However, given the continued development and growth of AD and the lessons learned from conducting surveys of the technology for 2009 and 2010, it is felt that the data that has been gathered thus far forms a firm foundation for future surveys.

3.2.1 Survey Performance and Participation

The telephone survey of UK AD sites successfully contacted 31 out of a UK population of 48 sites. It delivered 19 completed surveys, compared to 8 surveys in 2009 (i.e. 137% increase in responses). The population of sites was produced based on sites known to be operating in 2010, so, when grossing, there was no need to adjust for non-operational sites. Of those 31 sites contacted 12 chose not to take part. Considerable attempts were made to contact the remaining sites, but for a number of reasons surveys were not collected from these sites (such as key contact not available, telephone not answered etc.).

Introducing input data from EA, SEPA, NIEA and from WRAP's records for the Biogas Map[8] and PAS 110 consultancy to account for some of the sites not surveyed, means that 2010 input figures for 37 UK sites were collected. The breakdown of participation rates per country is summarised in Table 12.

Table 12: UK Anaerobic digestion site survey – 2010 participation rates

	England	Northern Ireland	Scotland (1)	Wales	UK	UK in 2009
Population	35	1	11	1	48	17(2)
Refused	11	0	1	0	12	-
No response	9	0	7	1	17	-
Surveyed	15	1	3	0	19	8
Proportion surveyed %	40	100	27	0	40	47
Input data	26	1	9	1	37	5
Proportion with input data %	74	100	82	100	77	29

(1) The population of sites in Scotland includes three AD plants at distilleries. These sites process high quantities each year and contribute significantly to the throughput figures reported in Table 13.
(2) WRAP's 2011 baseline study of AD infrastructure suggests this figure was an underestimate.

[8] *http://biogas-info.co.uk/maps/index2.htm*

To estimate the size of the total UK and individual national inputs, the data from these 37 sites was applied to the whole of the 48 site UK population, using the methodology summarised in Appendix 3. For site outputs, data from the 19 surveyed sites was used in the same way.

Table 13 shows the market size estimates from grossing inputs and outputs. Since data was only available from a single site for each of Wales and Northern Ireland, no data are presented individually for these nations to maintain confidentiality. However, their figures are included in the UK total.

Table 13: Size of the UK and National AD sector 2010

	England	Scotland	UK Total (1)	UK in 2009 (2)
Input - Surveyed (tonnes)	491,026	506,942	1,007,648	105,110
Input - Grossed (tonnes)	629,036	514,151	1,152,867	
Capacity - Surveyed (tonnes) (3)	188,499	-	195,499	
Capacity - Grossed (tonnes) (4)	938,719	767,276	1,716,994	
Digestate - Surveyed (tonnes)	110,012	17,600	127,612	123,533
Digestate - Grossed (tonnes)	551,036	450,396	1,009,912	161,007
Biogas - Surveyed (Km^3)	21,118	1,500	26,632	10,367
Biogas - Grossed (Km^3)	114,799	93,833	210,399	
Electricity - Surveyed (MWh)	50,655	7,150	57,805	32,800
Electricity - Grossed (MWh) (5)	89,335	15,765	110,355	
Heat - Surveyed (MWh)	12,840	-	12,840	
Heat - Grossed (MWh) (4)	180,533	147,561	330,872	
Employees - Surveyed (FTE)	59	22	84	
Employees - Grossed (FTE)	159	81	245	48

(1) The 2010 UK figure includes data for Wales and Northern Ireland which is not shown in the table.
(2) With the exception of digestate, the AD figures were not grossed in the 2009 survey – the figures are totals for the 8 sites surveyed.
(3) Plant operators were asked for the practical capacity of their site. Fewer sites supplied this information than supplied input/output figures.
(4) Where no survey responses were available for an individual nation, grossed figures have been estimated using averages from rest of UK data
(5) Grossed electricity production (including parasitic load and other on-site use) based upon number of generating facilities in 2010 reported by Ofgem

Grossing 2010 data for the UK AD market as a whole suggests a considerable increase in the amount of organic waste treated at AD sites. Although it is not possible to directly compare the results from 2009 with 2010, it is reasonable to assume that the significant increase in the number of sites led to an increase in total inputs, i.e. that 1.15 million tonnes represents an increase in throughput at AD sites in the UK for 2010. Similarly, the increase in the number of sites undoubtedly means that the production of biogas, electricity and heat has increased.

Digestate production was grossed for 2009 and therefore direct comparison can be made. This suggests an 849,000 tonnes increase in digestate production between the two years.

Grossing up the operators' estimates of the practical capacity of the surveyed sites leads to an estimate for UK available capacity of 1.72 million tonnes, implying a 67% utilisation in 2010. An estimated 245 full time equivalent employees worked at AD sites in the UK in 2010.

The significant increase in AD throughput can be explained by a number of factors:

- the total number of permitted sites identified from regulatory and other data, was higher in 2010;
- increased recycling of food waste; and
- data was obtained from 19 sites this time compared to 5 in 2009, giving more confidence in the collected data.

It should be noted that the grossing process implicitly assumes uniform sampling and so is liable to over emphasise the significance of activities where a higher than average proportion of the total has been surveyed. For example, the sample of thermophilic systems surveyed seems to have been a higher proportion of the potential total than was the case for mesophilic.

3.2.2 Survey Response Analysis and Commentary

The responses for each individual survey question asked are summarised in Appendix 5. The interpretation of this extensive dataset follows.

Supply Chain Flow

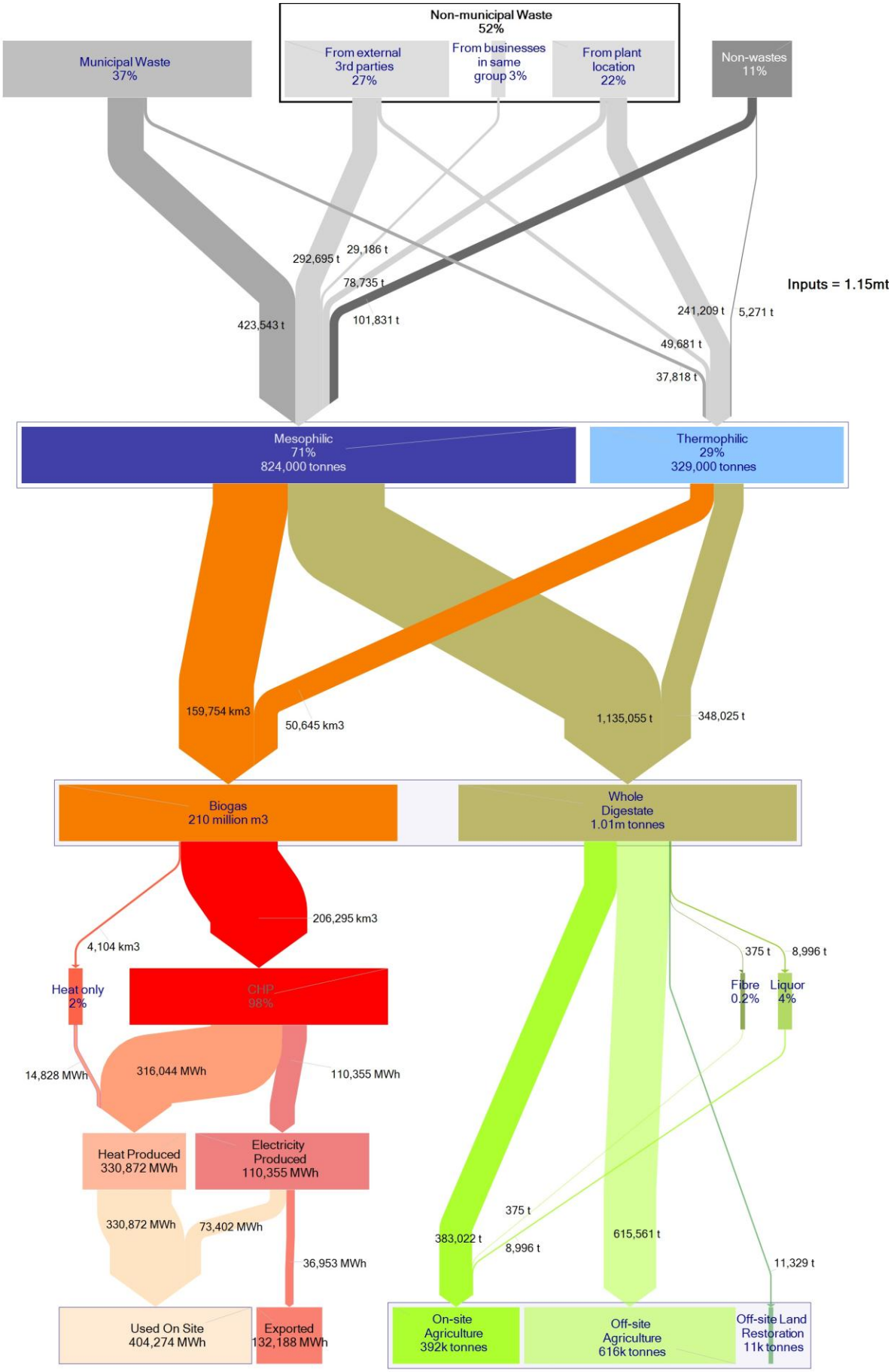
The diagram below (Figure 10) offers a fairly simple representation of the flow of organic waste through AD sites in the UK and warrants the attention of the reader.

As explained earlier, the horizontal width of both directional flow arrows and destinations is proportional to the amount of material the flow represents. Tonnage figures quoted for each flow are the **grossed** figures and represent the estimated totals for the UK. The proportions quoted for the destinations are proportions of the total material flow at that stage in the chain.

N.B. some of the rows do not add to 100% due to rounding.

One point to note is that there are no outputs shown on the diagram as going to landfill or to sewers even though two respondents noted that their fibre and liquor were disposed of using these routes. Unfortunately, these sites were unable to provide figures for the amount of fibre and liquor produced, therefore, it was not possible to calculate the proportion of these materials to which this fate is applicable.

Figure 10: UK Anaerobic Digestion 2010 supply chain flow



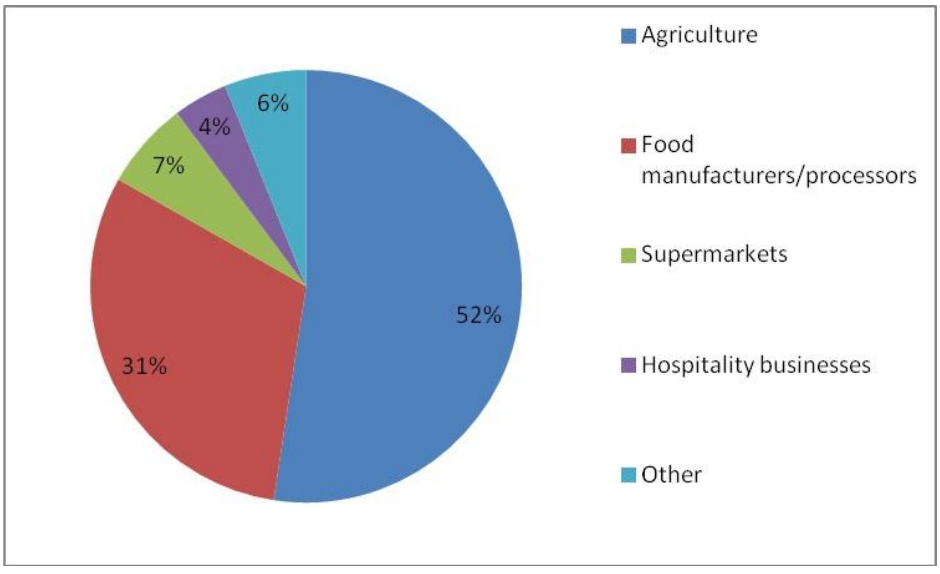
Feedstock

The proportion of municipal, non-municipal and non-waste entering AD facilities in the UK, is 37%, 52% and 11% respectively. If we discount the non-waste feedstocks, 58% are from non-municipal sources and 42% from municipal sources. This compares with 2009 when the results showed that 56% of feedstocks came from municipal sources and 44% from non-municipal sources. This reverse could be partially explained by the decrease in feedstock from non-municipal sources shown for composting sites in 2010 (it is possible that some of this non-municipal waste now goes to AD) and also by the small sample size in 2009 – the results for this particular statistic in the 2009 survey are based on input data for just five sites.

The proportion of inputs that are non-wastes (including energy crops) was calculated using the survey responses and is based on the amount of non-wastes being handled at the sites surveyed. This figure does not represent the total non-waste inputs to all AD facilities in the UK because the survey only covers those sites that have waste inputs and not sites that use solely non-wastes or purpose grown crops. Only five of the sites surveyed stated they had non-waste as well as waste inputs in 2010, although one of these did not provide detail on the quantity.

43% of all of the non-municipal waste input to AD plants comes from the same site where the plant is located and a further 5% from other sources in the same business group. Sites were asked to report where non-municipal food waste[9] was sourced (Figure 11). Of the non-municipal food waste processed by sites, agriculture provided the majority of this (52%), followed by food manufacturers and supermarkets (31% and 7% respectively).

Figure 11: Sources of non-municipal food waste by weight, 2010



Of the total population of AD sites, 14 were approved to take ABPs in 2010. Three of these sites were approved to take Category 2 & 3 wastes with the remainder Category 3 only.

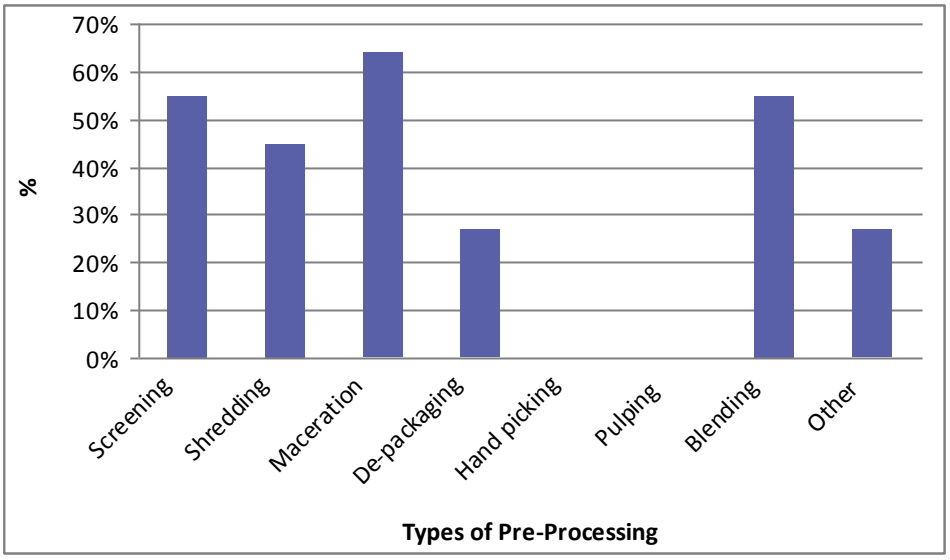
[9] *Food waste was not defined in the question and so may be from any stage of the food production, retail and consumption process including crop residues, out of date stock as well as preparation waste and leftovers from catering.*

Pre-processing

When waste is received at an AD facility it is subjected to pre-processing to prepare the material before it is added to the digester. This pre-processing can involve the removal of contraries such as plastics but is mainly used to alter the physical condition of the organic material to aid the digestion process.

- maceration was the most common pre-processing of feedstocks (64% of sites);
- blending/mixing and screening were each carried out at 55% of sites. The 2009 survey found that blending/mixing was undertaken at 62.5% of sites and screening at 50%;
- the proportion of sites using de-packaging is noted as being surprisingly low (27%), given the importance of this in AD, although this may have been reported as maceration or screening; and
- none of the sites surveyed said that they undertook hand picking, whereas the 2009 survey reported that 37.5% of sites undertook hand picking.

Figure 12: Pre-processing - % of respondents (multiple responses possible)



Sites were asked what their operational capacity was in 2010, taking into consideration planning, regulatory and physical constraints. This is the maximum amount of material that could be handled in 2010.

- The average working capacity of the surveyed sites was 17,772 tonnes, the total across all the sites surveyed being 195,499 tonnes in 2010, which grosses to an estimated 1.7 million tonnes capacity in the UK.
- Of the 11 sites that responded to this question, 4 sites had a capacity of between 30,000 and 50,000 tonnes and the remaining 7 sites were below 16,000 tonnes per annum.

When asked about the utilisation of their capacity, 70% of sites had spare capacity – a higher proportion than for composting sites.

It is likely that the high proportion of sites with spare capacity reflects the fact that in 2010 a considerable number of sites were new, and, therefore, possibly commissioning for part of the year and/or still in the process of securing contracts to source their input materials to reach the full capacity.

In terms of non-waste feedstocks, those sites surveyed reported relatively small quantities: 13,000 tonnes of manures and 320 tonnes of purpose grown crops. One site surveyed dominated this figure, reporting 12,000 tonnes of manures which was 40% of total inputs to the site in 2010; the other sites reported negligible amounts.

The amount reported here is likely to be a relatively small proportion of the total non-waste feedstocks used in AD in the UK in 2010, but this survey covered only those sites that received waste materials and not those that have solely non-waste inputs.

Technology

Process type

Of the sites surveyed, 71% reported using mesophilic (100% in 2009) with the remainder using thermophilic systems (0% in 2009).

Of the systems used by surveyed sites, 94% reported using wet systems and 6% using dry. The 6% dry equates to 1 of the 18 sites that responded to this question. It is understood that there was only 1 dry site in operation in 2010 and therefore the grossing up has inflated the significance of the use of this type of system. 100% of systems were wet in 2009

94% of surveyed sites utilised continuous processing (100% in 2009), and the remainder used batch processing. (Continuous processing is a system where waste can be continually added and removed without stopping the system; with a batch system, the process has to be stopped to allow more waste to be introduced.)

In terms of the number of processing stages, one third of sites surveyed used two stages and two thirds used a single stage (where a single stage system utilises just one sealed reactor and a two stage system utilises two). The advantage of two-stage processes is that they aid the control of bacterial communities forming in the digesters whereas a single-stage process can lead to competition of bacterial communities.

Pasteurisation

Sites that take Category 3 ABPR wastes are legally obliged to use pasteurisation as part of the process. 50% of all sites surveyed used pasteurisation.

For those sites surveyed that were operating pasteurisation:

- 62% of sites operated a post-digestion pasteurisation process; and
- 38% operated a pre-digestion pasteurisation process.

With pre-pasteurisation, the material has to be heated and then cooled (using energy recovery via heat exchangers) before it is introduced into the digester. Sites do not cool

material if post-digestion pasteurisation is used because the material goes into a holding tank and cools naturally.

Biodegradable (starch) bags

Of the surveyed sites, 29% reported receiving some material in biodegradable bags compared to 37.5% in 2009. By volume, material in biodegradable bags amounted to only 7% of the total waste received at these sites which equates to an estimated 160,000 tonnes per annum. As noted earlier, 28% of composting sites receive material in biodegradable bags and this equates to 6% of the volume of inputs to these sites. The proportion of sites receiving waste in biodegradable bags has decreased for AD sites but increased for composting sites.

Of the AD sites that received material in biodegradable bags, 80% said that they were an issue. The main reason for this is that the bags either break down poorly or do not break down at all during AD. Some sites remove these bags prior to the introduction of material into the digester. This is a similar situation to that reported in 2009, where the same issues were noted.

Outputs

The outputs of AD plants are biogas and digestate, the former can be converted into heat and power and the latter can be used as a fertiliser. Sites were asked to report on their production of biogas and digestate and how these are utilised.

Biogas

The estimated output of biogas was 210 million m^3 in 2010, this is based on a surveyed amount of 26 million m^3 from 13 sites at an average of 2 million m^3 per site and 182.5m^3 per tonne of waste input[10]. The 2009 survey did not provide a grossed total biogas figure based on the surveyed output of 10.4 million m^3, however it is possible to compare the average site yield for 2009, 1.3 million m^3, some 0.7 million m^3 less than 2010.

The vast majority (98%) of biogas was used for combined heat & power (CHP) with the small remainder used for heat only (on-site boiler). This compares with 2009 when 72% was utilised by CHP and none for heat only. The remaining 28% of biogas identified as being produced in 2009 was stated to have been used by a single plant that only generated electricity.

None of the respondents reported using the biogas as vehicle fuel or directly injecting the gas into the national grid, which is similar to 2009, where no biogas was used as vehicle fuel but 1,000m^3 was directly injected into the national grid. Both of these uses could generate an income for the site.

Electricity

The survey identified 57,805 MWh of electricity generation from 11 sites which provided data, at an average of 5,255 MWh per site. Applying this average to 21 sites identified by Ofgem as generating electricity in 2010, gives a total of ca 110,000 MWh as total generation including parasitic load (90% confidence interval of 74,800-145,200 MWh). This compares with a surveyed amount of 32,800 MWh in 2009 – it is not possible to calculate an average

[10] *The Wales Centre of Excellence for Anaerobic Digestion quotes a typical range of 70-170 m3 per tonne of waste input.*

per site for 2009 because it is not known how many sites provided figures for electricity generation.

For the electricity generated in 2010, of the 13 sites reporting electricity figures, 8 sites (62%) also reported exporting quantities of this. Of those reporting export and total generation figures, an average export of 70% of total electricity generated was noted.

The survey estimate is comparable to the 98,000 MWh of Renewables Obligation Certificates (ROCs) and Feed in Tariffs (FiTs) issued for 2010, reported on the Ofgem E-Serve ROC register. ROCs issued relate to the total energy produced, whether exported to the grid or for onsite use, minus the parasitic load from electricity generating equipment (CHP engine peripherals).

Heat

Only four of the sites surveyed were able to quantify heat generation in 2010. These sites generated 12,840 MWh of heat, with one of the sites responsible for generating almost all of this. When grossed the estimated heat production is 330,872 MWh. None of the four sites reported exporting heat off site. Where sites did not report the generation of heat they either did not record this information or were unwilling to disclose it. None of the sites surveyed in 2009 reported generating heat.

Digestate

The output of digestate from the surveyed sites varied depending upon the scale of the facility; 12 sites provided data on whole digestate production:

- the average wet weight of whole digestate produced per site was 11,226 tonnes, ranging from 1,000 tonnes to 31,000 tonnes per site, with a total output from the surveyed sites of 1235,000 tonnes;
- the production of digestate as a proportion of waste inputs is 84% at the sites surveyed; and
- the grossed figure for whole digestate production is just over 1 million tonnes.

Only 4 (21%) of the surveyed sites reported how they post-processed the digestate in 2010 compared with 3 sites (40%) in 2009. In 2010 two of the sites were using screening to remove contaminants, 1 site de-watered the whole digestate and one used pasteurisation. Post-processing in 2009 was limited to screening and the use of a press to separate the fibre and liquor.

Fibre and liquor

Of the sites surveyed, only 1 reported separating the digestate and did so using a press. No further (tertiary) treatments were reported at this site suggesting the use of the press achieved the desired outcome for the digestate.

- the total quantity of separated fibre reported by the surveyed site was just 50 tonnes in wet weight, compared with 80 tonnes from the single site in 2009;
- the quantity of separated liquor at the surveyed site came to 1,200 tonnes in 2010 compared with 1,440 tonnes from the single site in 2009; and
- de-nitrification of the liquor was not undertaken by the site.

End markets

As Figure 10 illustrates, agriculture was the dominant end market for digestate, fibre and liquor with all recorded outputs being used in agriculture except a small fraction of the whole digestate that went to land restoration. This is similar to that reported in 2009, when all digestate, fibre and liquor was used in agriculture. Around 38% of the agricultural use was reported as being on the same site as the AD facility, with 62% going for off-site use – a very similar split to 2009.

There were two questions in the survey relating to the financial arrangements for the use of site outputs. The first asked, for each output and destination (i.e. off-site, on-site, landfill, sewers and 'other'), whether the site charged, provided the material free of charge or were charged for its removal. The second question asked about the value of the transaction per tonne in monetary terms. The former produced the greater response rate with 14 sites providing data, with the latter receiving answers from 11 sites.

- 38% of whole digestate produced in 2010 was used on-site (37% in 2009); 22% was sold (12% in 2009); 22% was supplied to the end user free of charge (39% in 2009); and 10% was paid to be taken away (12% in 2009). The destination of the remaining 8% of digestate was not provided.
- All the liquor produced was used on the operator's own site which is the same result as 2009. However, one site that did not report quantities of liquor did report that they paid a fee for discharging liquor to the sewer, so a quantity is disposed of by this means.
- All fibre was used on the operator's own land (although data is limited to a single site here). This is the same as for 2009.

Of those sites that responded to the question regarding the monetary value of their outputs, all except one stated that the charge was £0 per tonne for all outputs. The remaining site paid both for whole digestate to go to the agricultural market and to discharge liquor to the sewers. As only a single site reported any transactions with a value other than £0, the total value of the market for outputs from AD sites has not been estimated.

For outputs supplied for use off site by a third party, the average typical haulage distance was 19 miles with distances ranging from 2 to 90 miles. The site that reported transporting the material 90 miles provided whole digestate free of charge for use in land restoration. There is no data on whether or not the transport was paid for by the end user in this case.

Other survey questions

In 2010 no sites had been certified to PAS 110. Sites were asked what their current (i.e. 2012) intention is with regards to PAS 110 and the ADQP with the result that:

- 56% of sites were planning to maintain or pursue certification to PAS 110 and the ADQP whereas 44% were not;
- there was no clear trend as to why sites were not certifying to PAS 110, but some examples of reasons were:
  - cost;
  - outputs used on site, so certification not required; and
  - not able to conform at this time.

Sites were also asked to state the threats and opportunities that currently impact on their business. A complete listing of the responses given is shown in Appendix 5.

Some of the more commonly noted opportunities were:

- the drive to divert food waste from landfill; and
- improved technologies to improve efficiencies.

Some of the more commonly noted threats were:

- gate fees;
- legislation and government policy – uncertainty, excess regulation; and
- competition for feedstocks.

The latter point is particularly interesting because composters expressed concern with the competition posed by AD sites. It would appear that AD sites are also having to compete with each other.

3.2.3 Conclusions

The number of AD sites in the UK increased significantly between 2009 and 2010 rising to 48 sites. The 2010 survey captured data from 19 sites with input data available from 37 sites altogether compared with 8 sites in 2009.

When grossed, the input to the sites in 2010 is estimated to be 1.15m tonnes, which is a considerable increase on 2009. Despite it not being possible to directly compare the results from 2009 with 2010, it is safe to assume that the increase in the number of sites led to an increase in total inputs. Therefore, 1.15 million tonnes represents an increase in throughput at AD sites in the UK for 2010. Similar comment can be made regarding biogas, electricity and heat production, the increase in the number of sites undoubtedly means that the production of biogas, electricity and heat has also increased. Digestate production was grossed for 2009 and therefore direct comparison can be made, showing an 850,000 tonnes increase in digestate production between the two years.

The significant increase in AD throughput can be explained by a number of factors:

- the increase in the total number of permitted sites;
- increased recycling of food waste; and
- increased recycling of food waste.

It can also be noted that the grossed estimate for UK available capacity is 1.7 million tonnes, suggesting a 67% utilisation in 2010 – 73% of sites reported having spare capacity. This high proportion of sites with spare capacity could be due to many of the sites being new in 2010 and therefore commissioning and/or looking to secure contracts to take them to maximum utilisation.

The proportions and quantity of municipal, non-municipal and non-waste entering AD facilities in the UK are 37%, 52% and 11% respectively. If we discount the non-waste

feedstocks, 58% are from non-municipal sources and 42% from municipal sources. This compares with 2009 when the results showed that 56% of feedstocks came from municipal sources and 44% from non-municipal sources. This reverse could be partially explained by the decrease in feedstock from non-municipal sources shown for composting sites in 2010 (it is possible that some of this non-municipal waste now goes to AD) and also by the small sample size in 2009. The results for this particular statistic in the 2009 survey are based on input data for just five sites.

Maceration was the most common method of pre-processing used; it was utilised at 64% of sites with blending/mixing used at 55% of sites and screening also at 55%. The proportion of sites using depackaging is noted as being surprisingly low (27%), given the importance of this in AD. No hand picking was undertaken at any of the sites.

Of the sites surveyed, 71% reported using mesophilic (100% in 2009) with the remainder using thermophilic systems (0% in 2009) 94% of systems were reported as wet and 6% as dry (the dry system surveyed is the only dry facility in the UK) and 94% of sites used continuous processing with 6% using batch. For those sites that reported using pasteurisation 62% did so post-digestion and 38% pre-digestion.

Biodegradable bags were received at 29% of sites which represents 7% of total inputs. The majority of these sites (80%) stated that these bags were an issue to them and this was usually because the bags break down poorly or do not break down at all.

The estimated output of biogas was 210 million m^3 in 2010, this was based on a surveyed amount of 26 million m^3 from 13 sites at a average of 2 million m^3 per site. The vast majority (98%) of biogas was used for combined heat & power (CHP) with the remainder used for heat only (on-site boiler). This compares with 2009 when 72% was utilised by CHP and 0% for heat only. This biogas was used to generate an estimated 110,000 MWh of electricity and 331,000 MWh of heat.

The whole digestate produced at the sites surveyed was 128,000 tonnes, which, when grossed, amounts to a UK wide estimate of just over 1 million tonnes. Only one site reported separating the digestate into fibre and liquor and did so using a press. The surveyed amount of fibre was just 50 tonnes and liquor 1,200 tonnes.

Agriculture was the dominant end market for digestate, fibre and liquor with all recorded outputs being used in agriculture except a small fraction of the whole digestate that went to land restoration. This is similar to the end uses reported in 2009, when all digestate, fibre and liquor was used in agriculture. Around 38% of the agricultural use was reported as being on the same site as the AD facility, with 62% going for off-site use – a very similar split to 2009.

38% of whole digestate produced in 2010 was used on-site (37% in 2009); 22% was sold (12% in 2009); 22% was supplied to the end user free of charge (39% in 2009); and 10% was paid to be taken away (12% in 2009). The destination of the remaining 7% of digestate was not provided.

All the liquor noted as being produced was used on the operator's own site which is the same result as 2009. However, one site that did not report quantities of liquor did report that they paid a fee for discharging liquor to the sewer, so a quantity is disposed of by this means.

The majority of fibre was sold to users off site with the remainder being used on the operator's own land (although data is limited to two sites here). 100% of the fibre was used on the operator's own land in 2009.

Of those sites that responded to the question regarding the monetary value of their outputs, only a single site reported that any money changed hands, the rest stated that the charge was £0 per tonne for all outputs. As only a single site reported any transactions with a value other than £0, the total value of the market for outputs from AD sites has not been estimated. If the data was grossed it would give a large negative value to the market, which could be misleading.

During 2010 no AD sites were certified to PAS 110. Comments on current intentions towards certification gathered in this survey indicate that over half of sites are interested in attaining PAS 110 and the ADQP.

It is clear from the results of this survey that the UK AD industry expanded between 2009 and 2010 with a 182% increase in sites between the two years. This increase is reflected in the volume of materials being received at sites and in the volume of outputs.

3.3 Mechanical Biological Treatment (MBT)

3.3.1 Survey Performance and Participation

The telephone survey of UK MBT sites surveyed 10 out of a UK population of 23 (17 of these were operational in 2010). For the purposes of this report an MBT plant is one that processes waste using mechanical sorting and biological treatment and produces an organic material. This could be a compost, digestate or a biomass rich refuse derived fuel (RDF). A number of sites have been omitted from the data because they perform the function of an MBT plant but do not produce an organic output, for instance as a pre-treatment for landfilling. MBT does not include autoclave processes where these operate on their own.

Including input data from EA, SEPA, NIEA for some of the sites not surveyed, input data for 14 UK sites was available for 2010. The breakdown of participation rates per country is summarised in Table 14.

Table 14: MBT site survey - participation rates (number of sites)

	England	Northern Ireland	Scotland	Wales	UK
Population	22	0	1	0	23
Not operational in 2010	7	0	0	0	7
Refused	0	0	0	0	0
No response	13	0	0	0	13
Surveyed	9	0	1	0	10
Proportion surveyed %	45	0	100	0	43
Input data	13	0	1	0	14
Proportion with input data %	55	0	100	0	57

Only two MBT sites were surveyed in 2009.

To estimate the size of the total UK inputs and outputs, the data from these 10 sites was applied to the whole of the UK MBT population, using the methodology summarised in Appendix 3. It is worth noting, as it was for AD, that the grossing process implicitly assumes uniform sampling and so is liable to over emphasise the significance of activities where a higher than average proportion of the total has been surveyed.

Grossing inputs and outputs produced the following market size estimates for the UK. MBT sites only operate in England and Scotland and since only one site was surveyed in Scotland, those data are not presented separately, to maintain confidentiality.

Table 15: Size of the UK MBT organics sector 2010 (tonnes)

	UK Market
Total surveyed input capacity (tonnes)	966,816
Grossed input capacity (tonnes)	1,282,060
Total surveyed organic fraction output (tonnes)	99,800
Grossed organic fraction output (tonnes)	273,400
Total surveyed employees	356
Grossed employees	685

With MBT sites operating only in England and Scotland:

- total UK capacity in 2010 was estimated as 1.28 million tonnes;
- total UK organic fraction output was estimated as 273,400 tonnes; and
- total UK employment in MBT operation was estimated as 685 full time equivalents.

As this is the first time the organics survey has surveyed a significant proportion of MBT sites, there are no 2009 results for comparison.

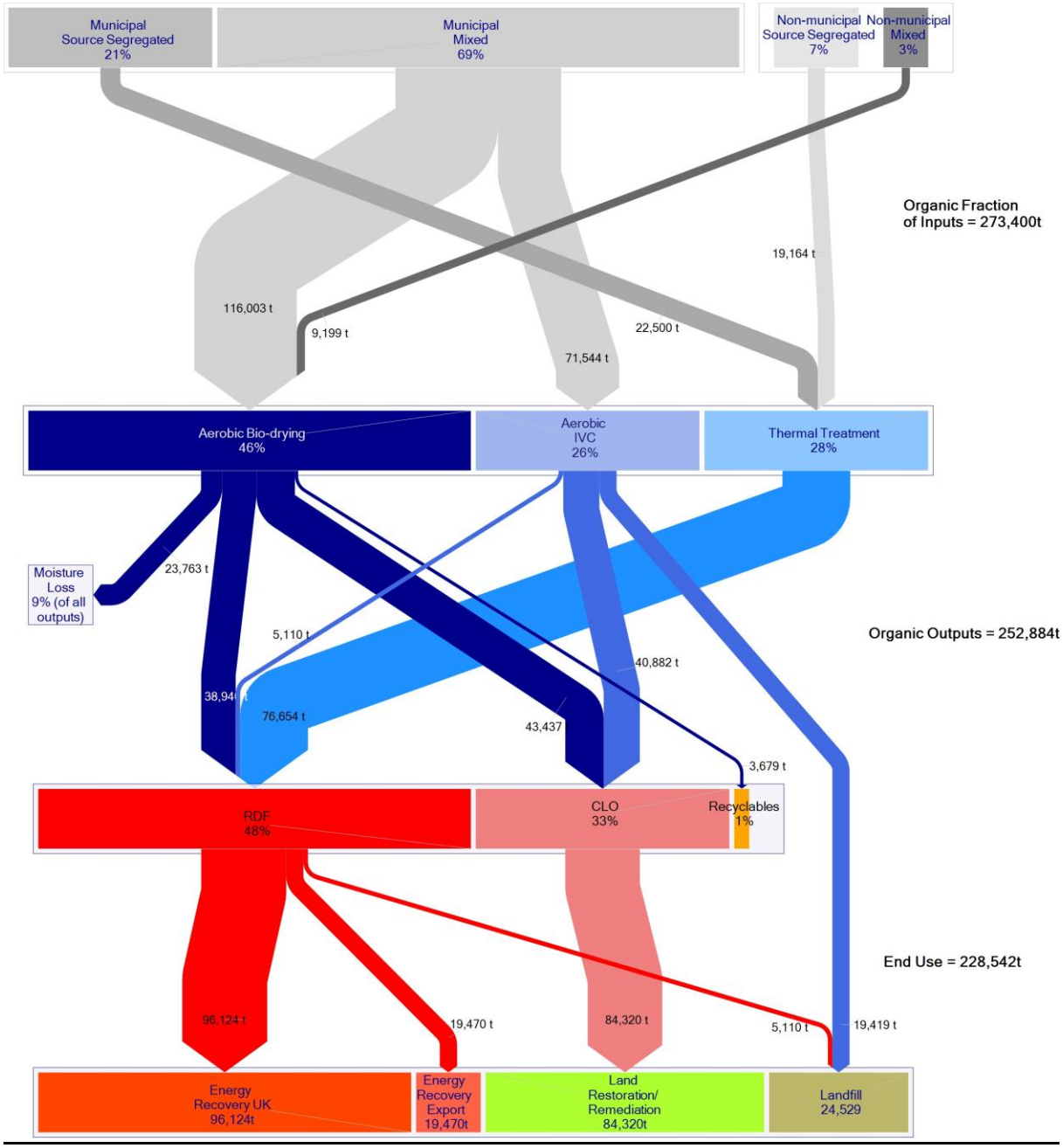
3.3.2 Survey Response Analysis and Commentary

The analysed responses for each individual survey question asked are summarised in Appendix 5. The interpretation of this dataset follows.

Supply Chain Flow

Figure 13 shows the flow of organic waste through MBT sites in the UK. It is important to note that two of the sites surveyed reported utilising AD in the process but did not provide data to enable the estimation of inputs to these systems. As this is the case, AD is not represented in Figure 13.

Figure 13: UK MBT 2010 supply chain flow



Feedstock

In terms of source of input material for the surveyed MBT facilities:

- the organic fraction was extracted from municipal mixed waste at 72% of the MBT sites surveyed, this source provided 69% of the organic fraction by weight (as noted in Figure 13);
- the second most common waste input was non-municipal source segregated at 17% of sites;
- one site reported receiving only source segregated material (municipal and non-municipal).

Technology

The Sankey diagram shows the quantity of material processed through each technology type. By analysing how often technologies are used by sites we are able to note that of the MBT sites surveyed, aerobic IVC was the most common organic treatment system in use in 2010, at 44% of sites. The next most common was aerobic bio drying (33%) followed by AD (22%) and thermal treatment (11%). Since two of the sites surveyed used both aerobic IVC and AD, these figures do not add to 100%.

Aerobic IVC composts and stabilises the organic fraction which has the potential to reduce the quantity sent to landfilI. Aerobic bio-drying reduces the overall weight of the material in the organic fraction but does not stabilise the material and is used in the process of making RDF. However the Sankey diagram illustrates that in 2010 proportions of material from aerobic bio-drying were also sent to landfill as well as becoming compost like output (CLO). AD is also used alongside aerobic IVC in a dual process so that some of the waste can be composted.

Capacity

Taking into consideration planning, regulatory and physical constraints, the reported maximum working capacity of the surveyed sites in 2010 (in terms of the total amount of *all* materials the sites can take each year) was 961,000 tonnes. The average capacity per site was 74,000 tonnes, with a range of 5,000 to 180,000 tonnes.

Outputs

In terms of the organic fraction produced by MBT facilities:

- the total organic fraction produced by all the surveyed sites was 107,000 tonnes in 2010; and
- of the ten sites surveyed, four reported organic fraction figures and two of these specified 100% of the output was landfilled (this was, in fact, organic material that was being turned into CLO but did not reach the required quality, so these sites remain in the survey data because of this intention).

As shown in Figure 13, 48% of the outputs were reported as being RDF, 33% CLO, 1% recyclables, 9% moisture loss (all from aerobic bio-drying) and 9% landfill. Although the qualities and composition of these materials can be similar, RDF is burned as a fuel in energy recovery plants, while CLO can be used for soil improvement in non-agricultural applications. The landfill figures are reasonably significant given that MBT plants that purely pre-treat

waste for landfill were excluded from this survey. It is apparent that some of the RDF produced is sent to landfill. In terms of end use markets for the CLO outputs, 100% was used in land restoration. All the sites that sent CLO to land restoration utilised aerobic bio-drying and aerobic IVC.

In general, operators have been paying to have their output taken away rather than generating revenue, even though some of the output is being used by companies restoring or remediating land. This suggests there was a limited market for RDF and CLO materials and this is further corroborated by the fact that haulage distances to third party users were high (up to 80-100 miles).

In terms of end use as RDF:

- 48% of the output was turned into RDF of which 80% or an estimated 100,000 tonnes was utilised in the UK, 16% or 19,000 tonnes was exported and 4% or 5,000 tonnes was landfilled;
- three of the sites surveyed sent 50% of the RDF they produce into the UK market and 50% into overseas markets;
- two sites sent all of the RDF they produce to landfill; and
- all sites paid for third parties to take the RDF.

Other survey questions

The main threat to their businesses reported by MBT sites was finding a viable output for CLO and the understanding needed to be able to put CLO to land. In addition, it was noted that the organic fraction of waste inputs is declining because of increased diversion of organic waste by local authorities.

Opportunities included the on-site use of the RDF and creating better quality outputs. Both of these offer little prospect of expansion for MBT until advances have been made in the technology and until legislation is in place on definitions of CLO. CLO is a term often used to describe composted materials derived from mixed waste feed stocks. Companies operating MBT facilities in the UK find it very difficult to effectively market CLO as current regulations are highly restrictive on how and where it can be used. There is a lot of work being undertaken at the moment to produce a standard for CLO so that it can be used in a wider spectrum of applications but it is not clear how successful this will be given the potentially varied nature of input materials.

3.3.3 Conclusions

Of a UK population of 23 MBT facilities, input data was available for 10 surveyed sites.

As the input to MBT plants is most commonly mixed waste it is not possible to obtain estimates from operators of the quantity of organic waste entering sites, only the organic fraction produced. Grossing capacity data showed that in 2010 total UK capacity at MBT sites for all wastes was 1.28 million tonnes producing an organic output fraction of 273,400 tonnes.

The most prevalent process used was aerobic bio-drying, which processed 46% of the waste throughput. The two main products were RDF (48% of outputs), mostly used for energy

recovery, and CLO (33% of outputs), all used for land restoration. All sites reported that they paid to have all organic outputs removed.

3.4 Exempt Sites

This section reports the headline results of the exempt sites survey, which was conducted at the same time as the permitted sites survey. The main difference between this survey and the permitted survey is that the exempt sites survey was postal, with a limited level of telephone follow up. Further differences are discussed in the methodology.

The tables below provide information regarding the sites involved in the exempt composting and exempt AD surveys.

Table 16: Exempt composting sites survey details

	England	Northern Ireland	Scotland	Wales	UK in 2010	UK in 2009
Population	2,755	9	108	269	**3,141**	2,733
Postal survey Sample	557	9	108	101	**775**	574
Surveyed	76	1	3	6	**86**	49
Not operational in 2010*	92	2	2	44	**140**	ca. 8
Refused	10	1	1	2	**14**	NR
No response	379	5	102	49	**535**	NR
Proportion of sample % surveyed*	13.6%	11.1%	2.8%	5.9%	**11.1%**	13.6%
Proportion of all sites surveyed %	2.8%	11.1%	2.8%	2.2%	**2.7%**	2.8%

* The figures for England & Wales exclude 47 sites for one particular organisation that had speculatively applied for exemptions and not used them. These sites were removed when grossing the data because it was thought the figures would be skewed by their inclusion.
NR = not reported

Table 17: Exempt AD sites survey details

	England	Northern Ireland	Scotland	Wales	UK	UK in 2009
Population	84*	0	3**	14*	**101**	Not known
Surveyed	2	0	1	1	**4**	0
Not Operational in 2010	12	0	0	1	**13**	Not known
Refused	0	0	0	0	**0**	0
No Response	70	0	2	12	**84**	0
Proportion of operating sites surveyed	2.8%	0.0%	33%	7.7%	4.0%	0%

*The actual number of English & Welsh AD sites is unknown because all sites were previously listed together under the Para 12 exemption where no distinction is made between site types. The sites included here are just those that have made the transition to the new T24 or T25 exemption.
** SEPA data for Para 12 exemptions does not distinguish between process types so AD sites were not identifiable from this list. Instead, the ratio of composting sites to AD sites in England and Wales has been applied to the Scottish data, giving a total of 3 exempt AD sites in Scotland.

The response rate to the exempt sites survey was low, as can be observed from the tables above; this was also apparent in the 2009 survey. There are inherent difficulties with surveying such a large universe of diverse sites, particularly where individual contact details are not known. In addition, many of the sites are premises where organics recycling is not the primary activity (e.g. schools and allotments) so getting the survey to the correct person is a challenge in itself. Furthermore, the proportion of sites with exemptions but not undertaking organics recycling – or undertaking it at such a small and informal scale as to render them unable to complete the survey – only adds to this challenge. More than one in four of the sample contacted fell into this category. Finally, the lack of regulatory requirement means that many of the sites do not keep a record of the data required for this survey, so even when willing to take part in the survey they are often unable to provide comprehensive information. This said, the data collected from the exempt composting sites has been analysed and grossed as discussed earlier to enable results to be reported here.

3.4.1 Exempt Composting Results

The headline result is that in the UK, exempt composting sites are estimated to have recycled 636,560 tonnes of organic waste, this compares with 902,277 tonnes reported in the 2009 survey. The fact that the 2010 figure is much lower than the 2009 figure is perhaps surprising given the increase in throughput of the permitted sites. However, there are two reasons that might explain the difference in the two figures.

Principally, the sample sizes of both surveys are relatively small meaning that the confidence in both results is not high and the confidence interval is broad. For the 2010 survey the confidence interval is $\pm$41.8% at 90% compared to $\pm$49.7% at 90% for the 2009 survey.

Converting these confidence limits into tonnage ranges gives the results in Table 18, showing considerable overlap of the ranges so that the two results cannot be regarded as statistically significantly different:

Table 18: Tonnage ranges for Exempt Site Inputs, based upon 90% confidence level

Year	Reported tonnage	Confidence Interval	Min Tonnage	Max Tonnage
2010	636,560	41.8%	370,478	902,642
2009	902,277	49.7%	453,845	1,350,709

Secondly, because of the limitations of a postal survey and the lack of data on which a stratified sampling strategy could be based, we cannot argue that the sites that have responded are particularly statistically valid, and representative of the sector as a whole.

However, a smaller throughput in 2010 could be explained by some of the larger sites having become permitted between the two periods, either just by natural progression or in anticipation of the new permitting regime. Those remaining operating under an exemption would then have a generally lower throughput.

The grossed inputs calculated from the 2010 exempt site survey represent 10.5% of the estimated total amount of inputs into permitted and exempt composting sites in the UK. This compares with 16.6% in 2009.

Further discussion of the results

The majority of sites surveyed used either open air windrow (43%) or aerated static pile (23%) composting systems. The remainder of respondents noted that they used 'other' types of systems, including: household composting bins, middens and wormeries.

There was a vast range of average composting periods observed by the sites, with the average of these averages being 12 weeks. Those reporting longer periods of time noted that they only start using the compost once they have filled a container, hence the range of answers. This also suggests that many sites do not have a formal monitoring system in place for assessing the compost and simply leave it until they can be sure it is ready to use.

The organic waste treated at the sites is mainly municipal, with 94% of inputs being from municipal sources, the remainder being from non-municipal. Of the total inputs, 95% was sourced from external third party sources, with 3% from on-site sources and 2% from other businesses within the same group.

The breakdown of the grades of compost produced is shown in Table 19 below.

Table 19: Proportion of the different grades of compost produced by exempt composting sites (by no. of sites)

Grade	0-10mm	0-20mm	0- 40mm	Mulch	Oversize	Other	Not answered
Proportion	12%	4%	49%	17%	1%	5%	12%

Where the response was 'other' the main reason is that sites do not grade the compost they produce. In the 2009 survey 47% of compost produced fell into the 0-10mm and 0-20mm grades with 39% in the 0-40mm grade and 14% of other. Comparing this with the 2010 results from those sites surveyed show they generally produce a coarser grade of compost than those surveyed in 2009.

Table 20: Proportion of the different applications for compost produced by exempt composting sites (by quantity)

Application of Compost	Proportion
Agriculture	72.3%
Land restoration/ daily cover	21.3%
Landscaping	4.1%
Horticulture - amateur	2.0%
Horticulture - professional	0.1%
Sports turf	0.0%
Fuel for energy recovery	0.0%

NB does not total 100% due to rounding

The vast majority of compost produced at exempt sites is used in agriculture or as land restoration or daily landfill cover, very little is used in other applications. The grades of compost produced do not lend themselves to the higher end-uses, although the results suggest that some of the 0-10mm grade being produced is used in agriculture and land restoration/daily cover. The 2009 report did not provide data that could be compared here.

There was a dearth of responses regarding the price obtained for the compost produced. However, the majority of those that did respond stated that the price was £0 (6 responses), with 4 sites receiving an income (ranging from £3.50/tonne in agriculture to £50/tonne in horticulture). Again there are no 2009 results with which to compare this information.

While only a single survey respondent was certified to PAS 100 in 2010 and none at all to the CQP, the PAS 100 records show that five exempt sites overall were certified to PAS 100 and the CQP in 2010. When asked, 70% of sites stated that they had heard of PAS and 63% had heard of CQP, whereas 26% had heard of neither. Furthermore, 36% of sites were planning to pursue certification to both, although 26% of sites were not going to pursue certification to either. Amongst the reasons for sites not pursuing certification were:

- not a commercial undertaking;
- quantities too small;
- all compost is used on own site; or
- too complex a procedure.

Looking to the future, 30% of respondents stated that they planned to apply for a permit while 55% said they would continue to operate under an exemption; 15% of respondents noted that the site in question had closed since 2010.

In terms of the current opportunities and threats experienced by exempt composters, many (22 respondents) saw opportunities in expanding into new composting markets, obtaining PAS 100 certification (1 respondent) and introducing new machinery to make the process more efficient (1 respondent), whereas others saw fewer commercial opportunities, particularly in involving a wider part of the community in the composting activity (3 respondents).

The threats noted by respondents mainly centred on legislative red tape and issues of managing and monitoring bioaerosols, especially with regard to the proximity of sites to other activities and either current or planned developments. One respondent stated that construction activity nearby would threaten their ability to continue to operate because it would make the site risk assessment unworkable.

3.4.2 Exempt AD sites

No attempt has been made to analyse the data from the four exempt AD sites that responded to the survey. Only three reported inputs and these totalled just 76t/annum. Similarly, only three sites noted biogas outputs and these amounted to 845m^3/annum.

3.4.3 Conclusions

A postal and telephone survey of exempt sites yielded data from 90 facilities out of around 3,000 in the UK. Grossing the data provided a UK recycling input of 636,560 tonnes, lower than calculated for 2009.

The majority of sites surveyed processed municipal waste (94%), with 95% of all site inputs coming from external third party sources. The surveyed sites supplied the compost they produced for agricultural application (72%) and land restoration/daily cover (21%).

Although there may be a number of reasons why throughput through exempt sites may have reduced in 2010, both this survey and that conducted in 2009 only sampled a small number

of potential sites, and not in a manner which could be described as statistically valid, due to the lack of basic data available on individual sites. For this survey the confidence in the grossed input data is ±41.8% at 90% ie. we are 90% certain that the total input tonnage was in the range 370,478 to 902,642 tonnes.

The exempt sites survey was particularly challenging to undertake because of the reasons noted earlier in this section. However, those that responded showed a willingness to provide the required information and generally had good knowledge of the industry and how their site would develop going forward. Despite this the difference in the sizes of sites and the motivation behind the composting operation on each mean that is difficult to draw meaningful conclusions that are applicable to exempt composting sites as a whole.

That so many sites were reported as being non-operational in 2010, and with others having closed since, is indicative of the transitional nature of sites holding exemptions. It is hoped the introduction of the new exemption system will help to eradicate non-operational sites from the lists that form the basis of the survey population and allow for a more focussed and more fruitful surveying process in the future.

The exempt composting sector remains of interest because it covers 91% of all composting sites in the UK (although the survey results suggest 1 in 4 of sites with exemptions were not operational in 2010). Yet in 2010 it is estimated to receive just over 10% of the inputs of organic material to all composting sites. Surveying such an industry is a sizeable task and the lack of responses over the most recent two years of the annual organics survey suggests that a different approach is needed.

It is clear from discussions with the project steering group for this survey that the exempt sites are of interest and there is a consensus that it would be worthwhile continuing to capture this data. Therefore, it is recommended that either the exempt sites survey is conducted entirely separately, say, by combining with an annual survey conducted by the Community Composting Network, with greater resources made available to ensure that significant data is captured, or the project manager and delivery team for future surveys place the same emphasis on the exempt sites survey as the permitted sites survey. This latter approach would likely also require the input of greater resources. One other action that would help with capturing data on this sector is to have regulatory authorities collect a small data set from each exempt site as SEPA does.

Appendices

Appendix 1 - Glossary

ADBA	Anaerobic Digestion and Biogas Association
Aerated static pile composting	Organic waste is mixed together in one large pile instead of rows. To aerate the pile, layers of loosely piled bulking agents (e.g., wood chips, shredded newspaper) are added so that air can pass from the bottom to the top of the pile. The piles also can be placed over a network of pipes that deliver air into or draw air out of the pile.
AfOR	Association for Organics Recycling
Anaerobic digestion (AD)	Process of controlled decomposition of biodegradable materials under managed conditions where free oxygen is absent, at temperatures suitable for naturally occurring mesophilic or thermophilic anaerobic and facultative bacteria species that convert the inputs to biogas and whole digestate.
Anaerobic Digestate Quality Protocol (ADQP)	Published in September 2009, this sets end-of-waste criteria for the production and use of quality outputs from AD of source-segregated biodegradable waste. It was effective in England and Wales in 2010. Compliance with the criteria in the ADQP is considered sufficient to ensure that the product may be used without risk to human health or the environment and therefore without the need for waste regulatory control.
Animal By-Products Regulations (ABPR)	The Animal By-Products Regulations 2005 (SI 2347/2005) provide for the application of EU Regulation in England. This controls the collection, transport, storage, handling, processing and use or disposal of animal by-products in EU member states, including catering wastes. Similar legislation applies in Scotland and Wales. The England Regulations were amended with effect from 2 May 2009 by the Animal By-Products (Amendment) Regulations 2009 (SI 2011/1774).
Compost Quality Protocol (CQP)	Published in March 2007, this sets criteria for the production of quality compost from source-segregated biodegradable waste (biowaste). Compliance with the criteria in the CQP is considered sufficient to ensure that the product may be used without risk to human health or the environment and therefore without the need for waste regulatory control.
Confidence interval (CI)	Defines the error bands around a statistic. A 90% CI around a sample average indicates that in 9 cases out of 10 the band includes the average for the whole population from which the sample was drawn (assuming the statistical model used to construct the CI is valid).

Continuous block	Continuous block composting is an approach used to compost large volumes of material, employing minimal process management: large piles are formed, with new material added at one end and compost harvested at the other. Composting relies largely on passive aeration with turning often achieved through the use of a side turner, or use of a 360 degree excavator which sits on the top of the block and moves the material, which slowly moves the table a windrow's width down the pad at a time, starting from one end. Continuous block composting is commonly used for non-putrescible materials, such as woody green wastes, and may take a number of months to produce a composted product.
Controlled waste	Controlled wastes are household, commercial and industrial wastes as defined in The Controlled Waste Regulations 1992 (as amended).
EA	Environment Agency
EWC Code	European Waste Catalogue Code
In-vessel composting (IVC)	A term used to describe a wide range of composting systems where the composting feedstock is contained in a purpose-built structure for the sanitisation phase of composting, allowing a higher degree of process control and environmental protection than OAW. Many IVC sites incorporate an element of windrow composting for maturation of the material following the sanitisation phase. At present, IVC is primarily used for feedstocks that fall under the provision of the ABPR.
Mechanical biological treatment (MBT)	A generic term for an integration of several processes treating mixed wastes, such as Materials Recovery Facilities, sorting and composting or AD.
NIEA	Northern Ireland Environment Agency
Ofgem	Office of the Gas and Electricity Markets
On-farm composting	A composting activity that is carried out on a farm. It may be an ancillary process to complement existing agricultural activities, or a stand-alone business that is simply located on designated agricultural land.
Open air windrow (OAW)	Mechanically turned windrow located outdoors (in the open air), as opposed to under a cover or in a building.
Organic waste	Waste of animal or plant origin which, for recovery purposes, can be decomposed by micro-organisms, other larger soil-borne organisms or enzymes.
PAS 100	Publicly Available Specification 100, which is the British Standards Institution specification for composted material published in 2005 (the relevant edition in effect in 2009) and updated in 2011.
PAS 110	Publicly Available Specification 110, which is the British Standards Institution specification for whole digestate, separated liquor and

	separated fibre derived from the AD of source-segregated biodegradable materials, published in February 2010.
REA	Renewable Energy Association
SEPA	Scottish Environment Protection Agency
Source-segregated feedstock	Feedstock kept separate from other waste types so as to reduce contamination and facilitate treatment. It is referred to as 'separate collection' in the Waste Framework Directive (2008/98/EC).
Static pile with aeration	Form of composting where the materials are turned infrequently and the fresh air is introduced into the pile through a forced aeration system. This may be either through channels in the ground or through a perforated pipe laid within the compost. Aeration may be either positive (pushed through the composting mass) or negative (sucked through the mass).
Thermophilic aerobic digestion (TAD)	Method of treating slurries or liquid suspensions of organic wastes where the materials are pumped into a tank and air is forced through, encouraging the growth of thermophilic bacteria that then digest the waste. The process is typically shorter than composting or AD.
Unit of mass	Expressed in metric tonnes (t) = 1,000kg 1kt = 1000 tonnes 1 Mt = 1 million tonnes = 1,000,000 or 10^6 tonnes
Unit of volume	Expressed in metres cubed (m^3), which is equivalent to 1,000 litres.
Unit prefixes	SI units and prefixes have been used: k (kilo) = 1,000 M (mega) = 1,000,000

Appendix 2 – Survey Methodology

This research focuses on the calendar year 2010 and follows on from the 2009 survey, which was delivered in 2011. The survey takes such a retrospective look at the industry principally because of the timing of data availability. The regulatory returns data on which the survey is based becomes available around 11 months after the year in question. Therefore, 2010 data was not available until the end of 2011.

Review of previous survey and impact on employed methodology

The last survey was undertaken with a significantly changed methodology from that used previously, to reflect developments in the industry and the need to increase data capture rate. To this end, separate questionnaires for each process type were introduced for the first time to produce more detail, in particular on AD, and also to introduce greater subtlety to enable a wider breadth of more focussed questions on each process. This approach also served to attempt to improve the industry perception of the value of the survey. In addition, an increased number of third party data sources were used to reduce the need to request data from the industry that they had already provided under a different process.

Of a total of 308 permitted sites, the survey achieved a 50.3% participation rate, plus 1.7% of the estimated 3,041 exempt facilities UK wide.

Following a thorough review of the 2009 survey, the 2010 survey sought to improve on the data robustness achieved by increasing the participation rate. It sought to do this principally in two ways, through:

1. comprehensively reviewing and re-focussing the questionnaires to make them shorter and more efficient; and
2. changing the method used for recruiting sites to complete the survey.

The questionnaires had previously tried to capture a considerable amount of data and were very lengthy and overly time-consuming for participants as a result[11]. Reducing the length of the questionnaires, without losing any of the essential data capture, was set as a priority. The method for recruiting sites to the survey was also changed. Firstly, permitted sites were approached to participate through a call from a telephone recruiter where appointments were made with contacts for undertaking the survey. This allowed the interviewee to prepare and gather key information in preparation as well as enabling the interviewer to reference the relevant site details. Secondly, the interview was conducted by interviewers with good knowledge of the organics recycling sector. Both the revision to the questionnaires and the approach to the interviews are discussed in more detail in the relevant sections below.

Deliverables

The key deliverable of this work is the presentation and discussion of the results in this report. In addition, an "organics recycling sites register" (ORSR) has been developed. The ORSR will form the basis of the contacts database for future industry surveys and be a useful reference point for those interested in this sector. The ORSR also lists relevant data (e.g. site

[11] *The 2009 survey tested the viability of using regulatory data as a substitute for input data with a view to removing questions about inputs from future surveys. As this was the case the 2009 survey collected some data twice.*

inputs, technology type, number of employees) that will help in the reporting of trends going forward.

The methodology for producing these deliverables is outlined below. It is split into sub-sections that describe each stage of the process as follows:

- development of contacts database;
- survey approach – permitted and exempt sites;
- questionnaire development;
- other data sources; and
- data analysis and quality check.

Development of contacts database

Details of all organics recycling sites in the UK that held permits or exemptions in 2010 were provided by the relevant government agencies for each nation.

- England and Wales - Environment Agency (EA);
- Scotland - Scottish Environmental Protection Agency (SEPA); and
- Northern Ireland -Northern Ireland Environment Agency.

The information provided varied in its extent. Essentially, each data set gave the operator's name, site address, site process type (e.g. AD, composting), permit/exemption number and, in most instances, telephone number. For Scotland and Northern Ireland, site input data for 2010 was also included.

These data sets were combined to produce a single contact database, to which were then added contact names. These were provided by members of the delivery partnership and through desk research. The number of permitted sites in the original dataset was 367 (282 composting sites, 58 AD and 26 MBT). The number of registered exempt sites was 3,242 the vast majority of these, over 2,700, being in England.

Further data sets were then scrutinised to ensure that the central database was as comprehensive as possible. These further sets included those detailing PAS 100 and PAS 110 certification and a record of AD plants established by WRAP. Sites were also added as they were identified during the survey, resulting in a final database of 429 permitted sites comprising 308 composters, 99 AD (including water treatment sites) and 23 MBT (the number of MBT sites was reduced as details on the database were corrected). The exempt sites list was updated during the course of the survey as further information became known.

During the survey delivery, a number of sites were identified as not operating in 2010. The main reason for this was that the lists supplied included sites that had applied for and been granted a permit in 2010 but had not become operational until a later date. The proportion of non-operational sites contacted was applied to the population of sites so that non-operational sites were accounted for in the final results, apart from AD sites where a firm population of 48 was agreed with the Steering Group, with all non-operational sites and water treatment sites removed before grossing.

This single database contained the population of sites that were to be contacted to take part in the survey and now forms the basis of the ORSR. The ORSR compiled during the 2009 survey could not be used to develop the current database because the necessary data protection permissions had not been sought from the sites during the survey. This

permission was sought when sites were contacted through this survey allowing data to be used in subsequent surveys where permission was granted.

Survey approach

Marketing

The survey was widely marketed through steering group members. In particular ADBA, AfOR, ESA and REA publicised the work with their members. In addition, news releases were prepared and these were distributed by WRAP. The aim of marketing the work was to heighten awareness of the survey in the industry so that when approached to take part individuals already had some knowledge of the research. A page was also established on the WRAP website with information on the survey; this provided details of the work and also served to validate the research for any contacts that required it.

Each of the questionnaires was set up online to enable easy access for surveyors and interviewees (in the case of the exempt sites survey) and to allow data to be captured at a single point.

Permitted sites

The 2009 survey had reported that permitted sites accounted for 83.4% of the material received by organics recyclers. Therefore, capturing data from permitted sites was deemed as the most important task of the research. As this was the case, the survey methodology for permitted sites differed from that used for registered exempt sites and had a multi-layered approach as follows:

1. Sites contacted by telemarketing company and recruited for the survey;
2. Appointment made;
3. Email sent to contact detailing date and time of appointment and outlining preparation required;
4. Surveyor called at allotted time and undertook survey; and
5. Data quality check performed and site re-contacted if necessary to check any outlying data.

This approach enabled the interviewee time to prepare for the survey by gathering relevant data and allowed them to set aside the required amount of time for speaking with the surveyor. A web-based appointment system was developed for managing the telemarketing approach. This allowed calls to be recorded and prioritised, progress against targets to be monitored, and surveyors access to a diary that presented them with all the site details required to conduct the survey.

Telemarketers and surveyors were given training prior to their involvement in the survey. This provided background on why the survey was undertaken as well as the more technical aspects of data entry and record keeping.

All of the sites on the database were targeted for the survey with an estimated 1,400 calls being made to secure the required appointments. Particular focus was given to securing appointments with:

i. the major waste management companies (these were approached using a central contact point);
ii. companies operating multiple sites;
iii. Welsh sites; and
iv. Scottish sites.

In addition, the data capture rate for the less common technologies was monitored closely to ensure a significant proportion of AD and MBT sites were surveyed.

The surveyors all had extensive experience of the organics recycling sector and were selected because they would be able to have an informed discussion with the surveyee. In addition, the use of knowledgeable surveyors meant that data sense checks could be carried out as the survey was being conducted.

Surveyors contacted the surveyee at the pre-arranged time to conduct the survey, with up to 14 half-hour survey slots being available per surveyor each day. Answers were entered into the online system as the survey was being conducted.

Exempt sites

The sheer volume and varied nature of exempt sites meant that a targeted method was required to reduce the number of sites approached to take part in the survey and try and capture high quality data.

The EA provided two lists of exempt sites: those with a Paragraph 12 exemption and those with either a T23, T24 or T25 exemption[12] (which are in the process of replacing Paragraph 12). It was considered that sites with the new exemption types were more likely to be currently active than those that remained on the old type, and, as a result, might be more responsive to the survey. In addition, the new exemptions allow the process type to be identified, whereas the old Paragraph 12 does not, enabling the correct questionnaire to be sent to the site. Therefore, it was agreed with the Steering Group that the 658 sites on the second list should be targeted for this part of the research.

The distinction between process types was not possible for sites in Northern Ireland and Scotland, therefore all sites were targeted in these countries. This meant that 9 and 111 sites respectively were sent questionnaires.

The lists of exempt sites that were provided contained addresses for all sites but the number of records that contained telephone numbers or email addresses was very small. Therefore, it was deemed that a postal survey was the most practical way of targeting these companies for participation. Contacts were sent a covering letter outlining the research and a copy of the relevant questionnaire (or both questionnaires for Northern Ireland and Scotland). The covering letter gave the option of completing the survey online by providing the web address(es) for the questionnaire. Alternatively, sites could complete the hard copy of the questionnaire and return it using the pre-paid envelope provided.

[12] These exemptions are as follows: T23 - Aerobic composting and associated prior treatment; T24 - Anaerobic digestion at premises used for agriculture and burning of resultant biogas; T25 - Anaerobic digestion at premises not used for agriculture and burning of resultant biogas

In order to maximise the return rate, follow up calls were made to exempt sites not returning questionnaires. As with the permitted sites, these calls focussed on companies with multiple exemptions as well as those in the nations where return rates had been low. If successful, these calls either prompted the completion of the postal survey, or took the participant through the survey over the phone. In addition, they highlighted sites not operating organics recycling, or where the exemption covered an activity not deemed to be organics recycling e.g. for a pile of manure that was proximate to an area used by the public.

Questionnaire development

The questionnaire design was based upon the following requirements:

- to provide the data required for the survey and to resist adding additional "nice to have" requests for data;
- to minimise the impact on the interviewee, particularly in terms of the time taken to deliver the survey; and
- to provide some commonality with the questionnaire used for the last survey, so that key data could be compared.

Because of the differences between the key processes being surveyed, (i.e. composting, AD and MBT) separate questionnaires were developed for each treatment method.

The cutting back of the length of the questionnaires required the involvement of all members of the steering group. It was initially agreed that reducing the length of the questionnaires was required to improve participation rates. In order to do this, consensus was required on which subject areas of the previous questionnaires should remain and which areas should be removed. A list of all subject areas was therefore circulated to the steering group and each member was asked to indicate what they viewed as 'essential' and 'desirable'. The results were such that only those subjects viewed as essential were included.

Once initial drafts of each questionnaire were formulated they were circulated to WRAP and the steering group and feedback and comments incorporated. Each questionnaire was also field-trialled with a small number of operators so that both surveyor and interviewee could feedback on the questionnaire and its effectiveness in use.

Data was recorded electronically during the interview itself, using a web-based application.

Other data sources

As part of the drive to reduce the length of the questionnaires, a number of data sources other than the site contact were used. These data sources were:

- Animal by Products Register (ABPR) of approved sites;
- EA Waste Interrogator (England & Wales); and
- Publicly Available Specification (PAS) 100 & 110 certification registers.

The EA waste interrogator provides information on waste returns made by permitted sites in England and Wales. Data pertaining to the input of waste materials to organic recycling sites in 2010 was obtained from this source (for Scotland and Northern Ireland this data was supplied with site contact details).

Details of PAS 100 & 110 certification were obtained from the relevant datasets provided by WRAP and the ABPR approval status of sites was also made available. In each case commencement dates were available allowing 2010 data to be extracted.

Data confidentiality, analysis & quality checking

Data confidentiality

In order to ensure the confidentiality of the data provided by respondents, site details were stored separately to survey answers. A unique site identification code links the two datasets. This unique code dataset was only available to those members of the survey team who needed access for data checking and other purposes.

Quality checking

As noted above, the use of surveyors with good knowledge of organics recycling enabled the data in the permitted survey to be checked at the time of collection, limiting the number of anomalies that would occur. In addition, the surveyor was provided with an area within the survey questionnaire where notes could be made explaining any entries that might look out of place.

During data analysis, any items that appeared anomalous were highlighted (these were sense checked against other data collected and against the 2009 survey and other data sources) and then checked, if required, directly with the site by phone, they were then corrected where necessary.

The high participation rates achieved and the extensive quality checking imposed on the collected data, means the project team has a high level of confidence in the data collected and in the results generated from this data.

Data analysis

After quality checks, the collected data was analysed by waste management method and UK nation, using the following methods:

- Grossing of the collected quantitative data was carried out to take account of those companies which did not take part in the interview, either through choice (for permitted sites) or because they were not contacted (exempt survey). The stratified grossing methodology used is an accepted method used in many past surveys of this type (e.g. commercial & industrial waste surveys delivered by Defra and the Environment Agency) and is explained in detail in Appendix 3.
- Qualitative data, where collected, is provided in Appendix 5 and summarised in the report.
- Distribution plots were produced to represent the spread of responses to questions such as selling prices of outputs, to indicate precision.

The question by question analysis of the survey results is given in Appendix 5. Key data is further analysed, extrapolated and presented in the body of this report.

Reporting Tonnages

The survey undertaken in 2009 reported industry totals as the sum of the survey and Environment Agency returns input data. However, it is clear that the sector is larger than

this, and that there are facilities which do not file returns, either in error or because they are not obliged to do so. For the 2010 survey therefore, figures were grossed to fill the data gap generated by these non-reporting facilities. So that figures could be compared between 2010 and 2009 in this report, 2009 data was grossed in the same manner. This is explained in more detail in Appendix 3.

Appendix 3 - Grossing Methodology

This survey has adopted different grossing methodologies from the previous 2009 survey for both site inputs and outputs of permitted sites and for exempt sites.

The 2009 survey based the sector site input estimates on the data obtained from regulators plus that obtained from the survey questionnaires. Although the survey did not collect data from all the sites identified, the totals reported were simply survey data + regulatory data rather than trying to estimate the impact of those facilities not surveyed to produce a sector wide total input figure.

For exempt sites, the previous survey applied three different methods, i.e. SEPA site averages, UK site band extrapolation using SEPA data and WasteDataFlow (WDF) balance, of which the best estimate from the three methods was taken. The (WDF) balance method was selected, in which the exempt sites inputs were estimated by deducting the reported permitted sites total from the WDF totals, for no other reason than it provided mid-level results compared to the other two methods i.e. a pragmatic rather than technical approach.

Table 21: 2009 survey, results from using a variety of grossing methodologies for exempt sites

Methodology Tested	Estimated Tonnage
SEPA average site extrapolation	990,984t
UK size band extrapolation	810,302t
WDF balance	902,277t

This method however assumed that all exempt composting being carried out was of municipal waste – the responses to this survey however, show that this is not the case.

For this survey, a widely accepted stratified grossing methodology was employed to estimate the total employment, capacity, inputs and outputs for permitted composting, AD and MBT sites in England, Scotland, Wales and Northern Ireland based on survey data and data from secondary sources. Details of the grossing methodologies employed are as follows.

Grossing for permitted sites

The grossing methodology employed in this survey involves extrapolating survey data to provide an estimate of the total inputs, outputs, capacity and employment for each technology (i.e. composting, AD and MBT) at a national level. The grossing up methodology was also executed on a category/band basis to reduce the variation within the data since there was significant variation in the data collected. This assumes that the bands are sufficiently narrow and that the sample average per site is representative of the population of that category.

To estimate the total employment, capacity, inputs and outputs for permitted sites, categories/bands were created and established how many sites were in each band based on survey data. Table 23 to Table 30 show the bands that were created (in this case for grossing inputs) and the number of sites in each band based on the survey data. Equivalent band distributions were used for grossing capacities, outputs and employment.

The total inputs, outputs and employment were determined for each of the categories by summing up the data of the sites surveyed in each category. The average per site in each category was determined using the total number of sites surveyed and totals in each band.

Before grossing up, the number of sites recorded as not operational in 2010 during the survey had to be taken into account first. Therefore, using the number of sites recorded as not operational in 2010 and the total number of sites contacted during the survey for each nation, the proportion of non-operational sites was determined and applied to the total/overall number of sites for each nation to provide an estimate of the total number of sites that were operation in 2010. These were then used for grossing up purposes.

To determine how many sites were in each band of the sites that were not surveyed or did not have input, output, capacity or employment data, the proportion of sites with data in each category was established using the total number of sites with data and the number of sites in each band for each nation. This proportion was then applied to the total number of sites without data (i.e. not surveyed) for each nation. The overall number of sites in each band (i.e. total sites with and without data) was then determined. This was then used with the averages per site to estimate the total inputs, outputs and employment for each band and overall/grossed up tonnage for each nation.

Grossing for AD Outputs

The grossing methodology was changed when considering the outputs from AD facilities. Respondents for these sites tended to answer some questions and not others, or would not have key data available. This meant that the number of responses per question could be low, and would not represent a statistically valid proportion of the sites surveyed.

For instance, although input tonnage data was available for 37 sites, only 11 sites responded with digestate tonnages. On grossing using the methods described above, it was noted that the digestate responses tended to cover small to medium sites, and grossing produced considerable underestimate of the likely tonnages produced, on a simple mass balance basis.

Further analysis of the digestate results obtained, however, did show the digestate volumes recorded were generally directly proportional to inputs as shown in Figure 14 below. Similarly, comparing inputs to biogas yields produced a reasonably direct relation as shown in Figure 15. Although it might be expected that outputs would be in proportion to inputs, technology or process difference may have impacted on this, and only through the use of the data from the survey could this relationship be demonstrated.

Figure 14: 2010 survey data, AD inputs v digestate output

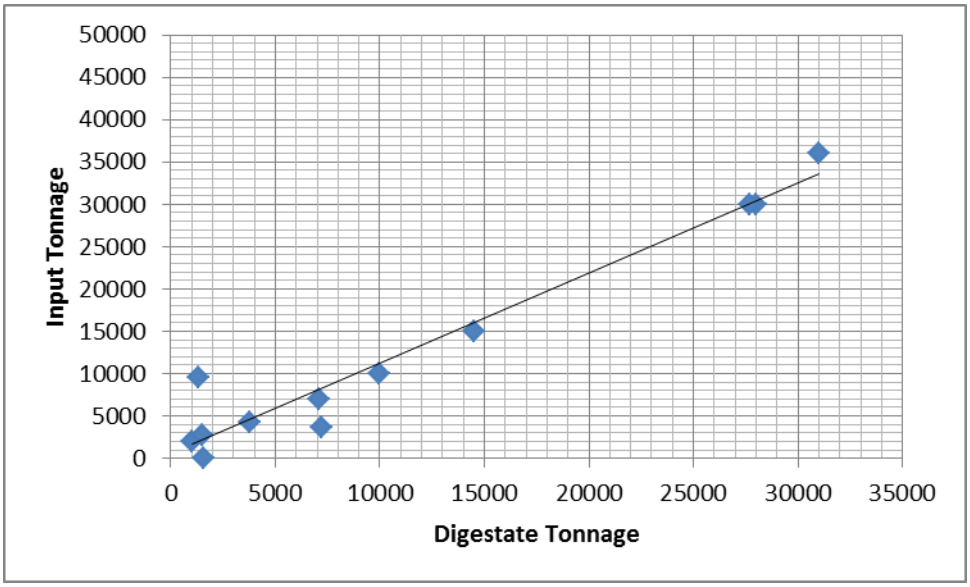
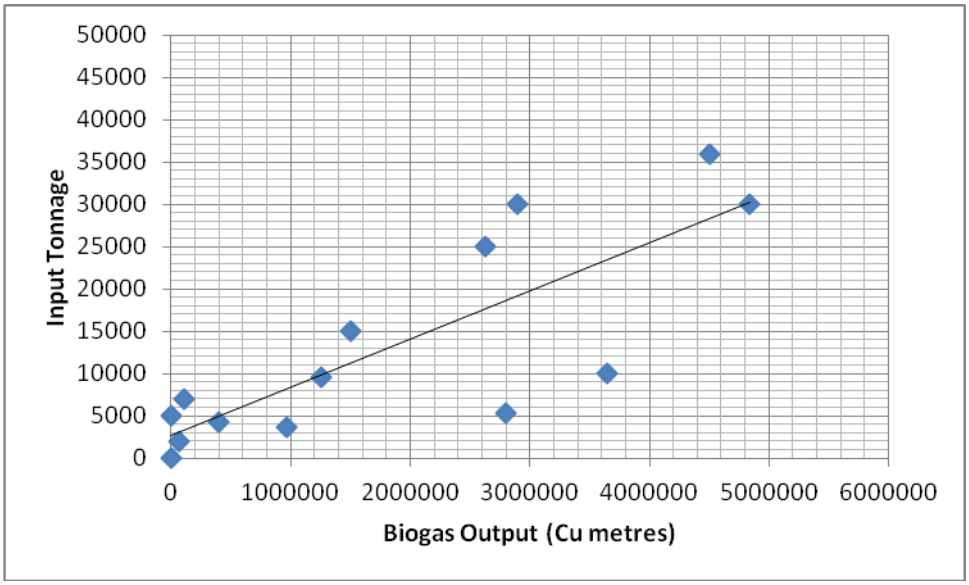


Figure 15: 2010 survey data, AD inputs v biogas output



Therefore, the averaged conversion factors (listed in Table 22) were used to calculate digestate and biogas as well as other outputs from the grossed input tonnages calculated. These compared to directly grossed figures as in the following table, and gave a much closer mass balance. These figures have therefore been applied in this report. For electrical output, for the same reason, figures were calculated based upon applying the averaged KWh output per site from the survey to the 21 AD sites identified by Ofgem as producing electricity in 2010 (from RO records). Both calculated biogas and electrical output estimates were compared with other independent data sources to ensure they were realistic.

Table 22: Comparison of proportioned to grossed estimates, AD outputs

	Digestate/Input (tonnes)	Biogas/Input (m3/tonne)
Average from survey data	0.876	182.501
Applied to grossed AD tonnage	1,009,912	210,399,000
cf Grossed figures by stratified method	663,138	119,339,029

Grossing for exempt sites

The methodology employed for exempt sites involved using tonnage size bands used in the previous survey for the "UK size band method" and applied the Scottish input data (Paragraph 12 Exempt sites for Scotland) proportion of sites within the each of the bands for 2010. These proportions were then applied to total number of exempt sites for England and Wales after taking into account the proportion of sites that were recorded as not operational during 2010. The England and Wales survey input data for exempt sites was then distributed in the various bands and the average tonnage per site in each band was estimated. This method most closely reproduces the "UK site band extrapolation" method, and the same size bands were used in this case so that the results obtained could be compared.

This was then applied to the total number of sites in each band to provide an estimate of input tonnage of exempt sites in England and Wales.

Composting

Table 23: Composting Inputs – banding employed using actual survey and EA data for 2010

Input categories (tonnes)	Number of sites (with input data)				Totals (tonnes)				Average per site (tonnes)			
	England	Scotland	Wales	N.Ireland	England	Scotland	Wales	N.Ireland	England	Scotland	Wales	N.Ireland
<5,000	17	6	5	3	38,730	13,419	14,429	4,647	2,278	2,237	2,886	1,549
5,000 - 10,000	36	3	3	0	282,811	23,493	27,168	0	7,856	7,831	9,056	0
10,001 - 15,000	17	7	1	0	219,074	83,719	13,314	0	12,887	11,960	13,314	0
15,001 - 20,000	27	3	1	0	463,613	51,630	17,000	0	17,171	17,210	17,000	0
20,001 - 25,000	14	4	1	1	311,682	90,142	23,166	24,282	22,263	22,536	23,166	24,282
25,001 - 35,000	16	2	0	0	454,534	57,068	0	0	28,408	28,534	0	0
35,001 - 50,000	22	2	0	0	866,721	79,942	0	0	39,396	39,971	0	0
>50,000	9	1	0	1	589,537	55,721	0	55,477	65,504	55,721	0	55,477
Total	**158**	**28**	**11**	**5**	**3,226,702**	**455,134**	**95,077**	**84,406**				

Table 24: Composting Inputs – grossing tonnages based upon calculated totals for all operational sites in 2010

Input categories (tonnes)	Proportion of sites in each category (%)				Total Number of operational sites in each category				Grossed up input data (tonnes)			
	England	Scotland	Wales	N.Ireland	England	Scotland	Wales	N.Ireland	England	Scotland	Wales	N.Ireland
<5,000	10.8	21.4	45.5	60.0	25	7	6	4	56,098	16,637	18,640	5,809
5,000 - 10,000	22.8	10.7	27.3	0.0	52	4	4	0	409,638	29,127	35,097	0
10,001 - 15,000	10.8	25.0	9.1	0.0	25	9	2	0	317,318	103,794	26,628	0
15,001 - 20,000	17.1	10.7	9.1	0.0	39	4	1	0	671,520	64,011	17,000	0
20,001 - 25,000	8.9	14.3	9.1	20.0	20	5	1	1	451,456	111,758	23,166	24,282
25,001 - 35,000	10.1	7.1	0.0	0.0	23	2	0	0	658,370	70,753	0	0
35,001 - 50,000	13.9	7.1	0.0	0.0	32	2	0	0	1,255,403	99,112	0	0
>50,000	5.7	3.6	0.0	20.0	13	1	0	1	853,915	69,083	0	55,477
Total	**100**	**100**	**100**	**100**	**229**	**35**	**14**	**6**	**4,673,719**	**564,273**	**120,532**	**85,568**
Cf 2009									**3,715,044**	**496,560**	**52,123**	**NR**

NR= NOT REPORTED

Anaerobic Digestion

Table 25: AD Inputs – banding employed using actual survey and EA data for 2010

Input categories (tonnes)	Number of sites (with input data)				Totals (tonnes)				Average (tonnes)			
	England	Scotland	Wales	N.Ireland	England	Scotland	Wales	N.Ireland	England	Scotland	Wales	N.Ireland
<5,000	9	6	1	0	22,211	7,265	2,680	0	2,468	1,211	2,680	0
5,000 - 10,000	5	0	0	1	40,267	0	0	7,000	8,053	0	0	7,000
10,001 - 15,000	1	2	0	0	15,000	25,177	0	0	15,000	12,589	0	0
15,001 - 20,000	2	0	0	0	40,000	0	0	0	20,000	0	0	0
20,001 - 25,000	2	0	0	0	50,000	0	0	0	25,000	0	0	0
25,001 - 35,000	2	0	0	0	60,000	0	0	0	30,000	0	0	0
35,001 - 50,000	3	0	0	0	117,547	0	0	0	39,182	0	0	0
>50,000	1	1	0	0	0	0	0	0	0	0	0	0
Total	25	9	1	1	345,026	32,442	2,680	7,000				

Table 26: AD Inputs – grossing tonnages based upon calculated totals for all operational sites in 2010

Input categories (tonnes)	Proportion of sites in each category				Number of sites in each category (from those without input data)				Total Number of operational sites in each category				Grossed up input data (tonnes)			
	England	Scotland	Wales	N.Ireland	England	Scotland	Wales	N.Ireland	England	Scotland	Wales	N.Ireland	England	Scotland	Wales	N.Ireland
<5,000	36.0%	66.67%	100.0%	0.00%	4	1	0	0	13	7	1	0	31,095	8,879	2,680	0
5,000 - 10,000	20.0%	0.0%	0.0%	100.0%	2	0	0	0	7	0	0	1	56,374	0	0	7,000
10,001 - 15,000	4.0%	22.2%	0.0%	0.0%	0	0	0	0	1	2	0	0	21,000	30,772	0	0
15,001 - 20,000	8.0%	0.0%	0.0%	0.0%	1	0	0	0	3	0	0	0	56,000	0	0	0
20,001 - 25,000	8.0%	0.0%	0.0%	0.0%	1	0	0	0	3	0	0	0	70,000	0	0	0
25,001 - 35,000	8.0%	0.0%	0.0%	0.0%	1	0	0	0	3	0	0	0	84,000	0	0	0
35,001 - 50,000	12.0%	0.0%	0.0%	0.0%	1	0	0	0	4	0	0	0	164,566	0	0	0
>50,000	4.0%	11.1%	0.0%	0.0%	0	0	0	0	1	1	0	0	146,000	474,500	0	0
Total	**1**	**1**	**1**	**1**	**10**	**2**	**0**	**0**	**35**	**11**	**1**	**1**	**629,036**	**514,151**	**2,680**	**7,000**

MBT

Table 27: MBT Capacity – banding employed using actual survey data for 2010

Input categories (tonnes)	Number of sites (with input data)			Totals (tonnes)			Average (tonnes)		
	England	Scotland	Wales	England	Scotland	Wales	England	Scotland	Wales
<5,000	2	0	0	5,635	0	0	2,817	0	0
5,000 - 10,000	0	0	0	0	0	0	0	0	0
10,001 - 15,000	0	0	0	0	0	0	0	0	0
15,001 - 20,000	1	0	0	20,000	0	0	20,000	0	0
20,001 - 25,000	0	0	0	0	0	0	0	0	0
25,001 - 35,000	0	0	0	0	0	0	0	0	0
35,001 - 50,000	1	0	0	43,043	0	0	43,043	0	0
>50,000	8	1	0	833,138	65,000	0	104,142	65,000	0
Total	12	1	0	901,816	65,000	0			

Note no sites operating in 2010 in Wales or Northern Ireland; inputs not recorded to MBT facilities

Table 28: MBT Capacity – grossing tonnages based upon calculated totals for all operational sites in 2010

Input categories (tonnes)	Proportion of sites in each category (%)			Number of sites in each category (from those without capacity data)			Total Number of operational sites in each category			Grossed up capacity data (tonnes)		
	England	Scotland	Wales	England	Scotland	Wales	England	Scotland	Wales	England	Scotland	Wales
<5,000	16.7	0.0	0.0	1	0	0	3	0	0	8,452	0	0
5,000 - 10,000	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0
10,001 - 15,000	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0
15,001 - 20,000	8.3	0.0	0.0	1	0	0	1	0	0	20,000	0	0
20,001 - 25,000	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0
25,001 - 35,000	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0
35,001 - 50,000	8.3	0.0	0.0	1	0	0	1	0	0	43,043	0	0
>50,000	66.7	100.0	0.0	4	0	0	11	1	0	1,145,564	65,000	0
Total	**100**	**100**	**0**	**6**	**0**	**0**	**16**	**1**	**0**	**1,217,060**	**65,000**	**0**

Exempt Sites

Table 29: Exempt Inputs – banding employed using actual survey data for 2010

Input categories (tonnes)	Number of sites (with input data)				Totals (tonnes)				Average (tonnes)			
	England	Scotland	Wales	NI	England	Scotland	Wales	NI	England	Scotland	Wales	NI
<10	16	0	2	0	47	0	5	0	3	0	3	3
10 - <25	1	1	1	0	20	11	20	0	20	11	20	20
25 - <50	0	0	1	0	0	0	30	0	43	0	30	36
50 - <100	1	0	0	0	65	0	0	0	65	0	0	65
100 - <500	5	0	0	0	1,724	0	0	0	345	0	0	345
500 - <1,600	18	0	0	0	16,325	0	0	0	907	0	0	907
≥1,600	5	0	0	1	21,083	0	0	2,000	4,217	0	0	2,000
Total	46	1	4		39,264	11	55	2,000				

Table 30: Exempt Inputs – grossing tonnages based upon calculated totals for all operational sites in 2010

Input categories (tonnes)	Number of sites in each category (%)			Grossed up input data (tonnes)			SEPA data Scotland
	England	NI	Wales	England	Wales	NI	
<10	369	1	7	1,096	18	3	62
10 - <25	141	0	3	2,814	55	7	136
25 - <50	211	1	4	8,969	124	19	445
50 - <100	457	1	9	29,721	583	73	1,944
100 - <500	475	0	9	163,722	3,211	0	7,031
500 - <1,600	106	0	2	95,699	1,877	235	5,302
≥1,600	70	1	1	296,618	5,817	2,000	8,096
Total	**1,829**	**4**	**36**	**598,638**	**11,684**	**2,337**	**23,016**

Data grossed for England, Wales & Northern Ireland; Scotland data from SEPA returns

Estimation of precision

The sampling error and confidence levels determine how accurate the survey results are. The margin of error gives an idea of the measure of precision of the statistical estimate while the confidence level is an indication of how confident or certain we are about the level of error in the results of the survey. The margin of error was estimated as follows:

Estimation of the overall sample means using:

$$\overline{x} = \left(\sum x_i\right) / n \qquad (1)$$

Where:
$\overline{X}$ is the overall sample mean
x_i is the sample observation (derived from the survey data)
n is the sample size

Determination of the sample standard deviation using the survey data:

$$Sd = \frac{\sqrt{\sum \left(x_i - \overline{x}\right)^2}}{\left(n-1\right)} \qquad (2)$$

Where:

Sd is the standard deviation derived from the survey data

Determination of the sample standard error using the survey data:

$$SE = \frac{Sd}{\sqrt{n}} \qquad (3)$$

Using the above equations and the critical value (α)[13], also known as the z score (derived from the normal distribution tables), the sampling error (or margin of error) of the survey results was computed at three different confidence levels.

[13] *It is a factor used to compute the margin of error/sampling error.*

Appendix 4 - Lessons Learned

In delivering this survey, the following lessons have been learned which we suggest be applied to repeat surveys in the future.

Permitted sites survey

The quality and breadth of the contact data provided by the respective agencies varied tremendously. This was due to a combination of the brief provided to the respective agencies and the different levels of willingness/ability to provide the requested data. The development of a usable ORSR will help to counter this in future surveys. However, the agencies will still need to provide details of all operational sites for the year in question and a more consistent brief should be developed at the very outset of the research to ensure the most useful data is received.

Moreover, there were different levels of confidentiality imposed by the different agencies, some of which could be overcome if given clearance. This clearance was sometimes protracted and not in place in time to be of use for this survey.

Agencies were asked for details of all sites holding a permit in 2010 in order to develop the contact database. However, a site holding a permit does not necessarily mean that it is operational. Permits are often applied for during site development and as a result pre-date site operation, this is particularly prevalent with the more complex technologies and larger sites for AD and MBT. As a result there were many cases of permitted sites being contacted that did not operate in 2010 but held a permit at that time.

Input data is generally available from central sources for permitted sites but it is by no means comprehensive. A representative of the EA estimated that around 10% of permitted sites within England and Wales do not submit annual input data returns either because their permit does not require them to or because they neglect to do so. Furthermore, it is suspected that it has not been possible in a number of instances to match sites between all data sets, i.e. the permitted sites register, the record of site inputs, PAS 100 & PAS 110 registers and the register of ABPR approved sites. This is because the only common denominator across all data sets is the name of the site operator, so this has been used extensively to cross reference between data sets (to then identify different sites a combination of site name or post code or town or elimination is used). However, it is apparent that the same site is referred to using different names across the data sets so this method does not capture all the relevant information. Postcodes can be used for some data sets but not all, as can site name. However, not all records have associated site names or post codes and even where they do, differences in naming and formatting restrict the effectiveness of this cross referencing.

As this is the case, relying on a central source for input data means that not all data will be captured. To counter this it is recommended that input data is requested from all the regulatory bodies in the same data set as contact details are provided (this is already the case with Northern Ireland and Scotland). In addition, that all sites are asked for input data during the survey – this will help to fill any gaps in the regulatory data.

Exempt sites survey

The cases of sites not being operational in 2010 or, in a number of instances, never being operational, were more prevalent in the exempt sites survey than for permitted sites. It appears that there are a lot of speculative applications for exemptions for activities that never occur. In addition, many exempt sites contacted could not complete the survey ether because the process being undertaken was too small scale and informal or because the activity was not organics recycling. For example, one exemption was held for a small block of apartments that had a communal compost bin, and another was held for compost delivered to a site where it was stored prior to spreading on land.

Logistically the exempt sites survey is also difficult to undertake. The central datasets provided by the regulatory bodies contain only site addresses with no contact name or number, forcing the use of a postal survey. Furthermore, many exempt composting or anaerobic digestion processes occur at sites where they are not the main activity e.g. in the grounds of a hotel, so directing the survey to the correct job title is also extremely challenging.

Conducting the exempt sites survey is therefore very difficult as can be seen by the data capture rate in this survey and in 2009. To undertake a more effective exempt sites survey i.e. one that records a statistically valid sample of data, greater resources are required. Combining the exempt sites survey with the permitted sites survey is logical, but because permitted sites account for the vast majority of organic waste recycling it is these sites that dominate the survey and to which resources and attention are focussed.

It is clear from discussions with the project steering group for this survey that the exempt sites are of interest and there is a consensus that it would be worthwhile continuing to capture this data. Therefore, it is recommended that either the exempt sites survey is conducted entirely separately, say, by combining with an annual survey conducted by the Community Composting Network, with greater resources made available to ensure that significant data is captured, or the project manager and delivery team for future surveys place the same emphasis on the exempt sites survey as the permitted sites survey. This latter approach would likely also require the input of greater resources. One other action that would help with capturing data on this sector is to have other UK regulatory authorities collect a small data set from each exempt site as SEPA does.

Appendix 5 - Responses to Survey Questions by Site Type and Country

The following tables present the summarised raw data from all the questions asked per organic recycling technology questionnaire. Note that where tonnages are quoted, these are tonnages reported by respondents (ie surveyed tonnages) rather than grossed tonnages.

Permitted Composting Data

1. Numbers of sites

	England	Scotland	Wales	Northern Ireland	All UK	UK 2009
Surveys completed	132	25	12	4	173	145

2. How many full time equivalent employees are involved in composting at the site?

	England	Scotland	Wales	Northern Ireland	All UK
Average	4	6	7	2	5
Range	Max: 35 Min: 0	Max: 30 Min: 1	Max: 17 Min: 2	Max: 3 Min: 2	Max: 35 Min: 0

3. What type(s) of system was the site operating in 2010? (Please tick all the options that apply) This question includes data from sites not surveyed (from EA/SEPA licensing data).

	England	Scotland	Wales	Northern Ireland	All UK
IVC - totally enclosed					
Number	12	5	1	0	18
% of responses	7%	16%	8%	0%	8%
% by input weight	5%	15%	5%	0%	6%
IVC - with some activities in open					
Number	36	7	8	1	52
% of responses	19%	22%	62%	20%	21%
% by input weight	28%	16%	51%	28%	26%
Windrow open					
Number	135	23	6	4	168
% of responses	74%	72%	54%	75%	70%
% by input weight	78%	74%	47%	16%	65%
Windrow under cover					
Number	0	0	0	0	0
% of responses	0%	0%	0%	0%	0%
% by input weight	0%	0%	0%	0%	0%
Aerated static pile					
Number	3	0	0	0	3
% of responses	2%	0%	0%	0%	1%
% by input weight	1%	0%	0%	0%	1%
Continuous block composting (Table composting)	2 1% 0%	0 0% 0%	0 0% 0%	0 0% 0%	1 0.4% 0%

Other systems mentioned:
Rocket Composter
Agbag
Shredding only
TAD
hotrot aerobic composting process

4. IF MORE THAN ONE TYPE: Were they used in series (sequential treatment of the same material) or in parallel (separate treatment of different material)?

	England	Scotland	Wales	Northern Ireland	All UK	2009
In Series	5 45%	2 50%	3 75%	0 0%	10 50%	67%
In Parallel	6 55%	2 50%	1 25%	1 100%	10 50%	25%

5. What was the typical composting period in terms weeks?

	England	Scotland	Wales	Northern Ireland	All UK
Average term (weeks)	12	12	11	9.5	12
Range	Max: 40 Min: 1	Max: 24 Min: 6	Max: 18 Min: 4.5	Max:12 Min: 2	Max: 40 Min: 1

6. What types of pre-processing of feedstocks did you carry out in 2010 (Please select all the options that apply)

	England	Scotland	Wales	Northern Ireland	All UK
No pre-processing	3%	4%	8%	25%	4%
Screening	27%	24%	17%	0%	25%
Pulping (e.g. screw or hydropulper)	0%	0%	0%	0%	0%
Shredding	94%	88%	83%	50%	90%
Blending / mixing	28%	32%	25%	0%	27%
De-packaging	0%	4%	0%	0%	1%
Hand picking	53%	64%	58%	50%	54%
Other	4%	4%	8%	0%	4%

Other types of pre-processing mentioned:
contamination tests
used digger to pull stuff out
comes on site pre-shredded
Comes in shredded
visual inspection
Screen only in winter, shred in summer
some already shredded

7. Taking into consideration planning, regulatory and physical constraints; what was the maximum working capacity of this site in 2010?

	England	Scotland	Wales	Northern Ireland	All UK
No of Responses	131	24	11	4	170
Average Site Capacity (tonnes)	20,422	16,239	8,643	7,232	19,113
Range	Max:110,000 Min:32	Max:55,271 Min:6	Max:23,166 Min:1,078	Max:24,282 Min:940	Max:110,000 Min: 6

8. Did you have spare capacity in the summer months?

	England	Scotland	Wales	Northern Ireland	All UK
No of Responses	132	25	11	4	172
Yes	45%	56%	27%	75%	46%
No	55%	44%	73%	25%	54%

9. In 2010, approximately what percentage of your waste feedstock was sourced…?

	England	Scotland	Wales	Northern Ireland	All UK
From the site at which the plant is located					
Sites	20	3	0	1	24
Tonnes	211,929	13,093		215	225,237
% by input weight	(9%)	(4%)		(1%)	(8%)
From other sites within the same business (or group)					
Sites	26	9	0	1	36
Tonnes	127,170	87,107		430	214,708
% by input weight	(5%)	(26%)		(1%)	(8%)
From external third party sources					
Sites	128	21	11	4	164
Tonnes	1,988,985	242,013	81,116	28,284	2,350,399
% by input weight	(85%)	(73%)	(100%)	(98%)	(85%)

10. Of the waste that you processed in 2010, approximately what proportion came from?

	England	Scotland	Wales	Northern Ireland	All UK
Municipal waste sources					
Sites	109	22	11	3	145
Tonnes	1,705,732	257541	78386	25,561	2,076,2
% by input weight	(88%)	(77%)	(96%)	(88%)	(88%)
Non-municipal waste sources					
Sites	76	16	6	2	100
Tonnes	210,560	75473	2730	3,368	293,13
% by input weight	(12%)	(23%)	(4%)	(12%)	(12%)

11. Of the NON-MUNICIPAL FOOD WASTE that you processed in 2010, approximately what proportion came from…? (proportion of total)

	England (%)	Scotland (%)	Wales (%)	Northern Ireland (%)	All UK (%)
Agriculture					
Average	100	75	-	25	69
Min / Max	100 / 100	50 / 100	-	25 / 25	25 / 100
Food manufacturers/ processors					
Average	65	65	75	25	61
Min / Max	5 / 100	5 / 100	75 / 75	25 / 25	5 / 100
Supermarkets		-	-		
Average	100	-	-	25	75
Min / Max	100 / 100	-	-	25 / 25	25 / 100
Hospitality businesses (restaurants etc)					
Average	55	47	63	25	51
Min / Max	5 / 100	20 / 100	25 / 100	25 / 25	5 / 100

12. During 2010 was any feedstock delivered in biodegradable (starch) bags?

	England	Scotland	Wales	Northern Ireland	All UK
No of Responses	132	25	11	4	172
Yes	23%	28%	73%	25%	28%
No	77%	72%	27%	75%	72%

13. Roughly, what proportion of the feedstock you processed in 2010 was delivered in biodegradable bags?

	England	Scotland	Wales	Northern Ireland	All UK
No of Responses	32	7	7	1	47
Tonnes	88,537	50,700	67,027	24,000	234,144
Average % of feedstock	11%	26%	53%	100%	21%

14. Were these bags a significant issue for you?

	England	Scotland	Wales	Northern Ireland	All UK
No of Responses	31	7	7	1	46
Yes	29%	14%	0%	0%	23%
No	71%	86%	100%	100%	77%

Reported Issues:

Didn't break down in the composting process no matter how many times they were put through the system. This has now been addressed.
very variable in compostability (only all food waste in the bags)
extra hassle
Not breaking down quickly enough
Failed to break down quickly enough and made front end sorting challenging
Didn't break down in time and made front end sorting confusing
They didn't break down quickly enough and make front end picking confusing.
confusion as to which were really compostable training with with CC some small fractions of non-starch bags crept in
Don't degrade quick enough.
Longer to degrade.
Took a long time to degrade

15. What was the quantity of compost produced in 2010?

	England	Scotland	Wales	Northern Ireland	All UK
No of Responses	**127**	**24**	**11**	**4**	166
Average Tonnage	11,407	8826	6482	8,725	10,627
Total Tonnage	1,448,681	211,812	71,301	34,900	1,774,694

16. Please state the proportion of the compost you produced in each grade, in 2010.

	England	Scotland	Wales	Northern Ireland	All UK	2009
0-10mm						
Tonnes	342,409	9,480	5,000	0	356,889	
%	(24%)	(4%)	(7%)	(0%)	(20%)	25.9%
Number of sites	(47)	(4)	(2)	(0)	(53)	
0-20mm						
Tonnes	166,270	59,672	46,821	0	272,763	
%	(11%)	(28%)	(66%)	(0%)	(15%)	17.1%
Number of sites	(27)	(8)	(8)	(0)	(43)	
0- 40mm						
Tonnes	529,071	122,377	4,205	9,500	665,153	
%	(37%)	(53%)	(6%)	(77%)	(37%)	46.8%
Number of sites	(61)	(10)	(2)	(2)	(75)	
Mulch						
Tonnes	5,100	8,133	2,400	0	15,663	
%	(0.4%)	(4%)	(3%)	(0%)	(1%)	
Number of sites	(3)	(2)	(1)	(0)	(6)	
Oversize						
Tonnes	17,955	1,350	1,125	400	20,830	
%	(11%)	(1%)	(2%)	(3%)	(1%)	
Number of sites	(1)	(2)	(2)	(1)	(6)	
Other						
Tonnes	388,476	20,800	11,750	25,000	446,026	
%	(27%)	(10%)	(16%)	20%	(25%)	10.1%
Number of sites	(34)	(6)	(3)	(1)	(44)	

17. Where was the compost that you produced in 2010 applied?

	England	Scotland	Wales	Northern Ireland	All UK	2009
Agriculture	1,013,604 (70%) (107)	105,140 (50%) (14)	49,791 (70%) (8)	31,150 (89%) (4)	1,199,685 (67%) (133)	58.9%
Horticulture Professional	122,865 (8%) (35)	3,200 (2%) (3)	664 (1%) (1)	0 (0%) (0)	126,729 (7%) (39)	2.6%
Horticulture Amateur	50,558 (3%) (12)	460 (0%) (2)	4,996 (7%) (5)	0 (0%) (0)	56,014 (3%) (19)	14.1%
Landscaping	137,589 (9%) (34)	11,917 (6%) (6)	8,675 (12%) (3)	3,750 (11%) (1)	161,931 (9%) (44)	7.7%
Sports Turf	6,500 (0%) (2)	2,400 (1%) (1)	0 (0%) (0)	0 (0%) (0)	8,900 (0%) (3)	0.8%

	England	Scotland	Wales	Northern Ireland	All UK	2009
Land restoration/ daily cover	58,922 (4%) (25)	88,500 (42%) (10)	2,375 (3%) (1)	0 (0%) (0)	149,797 (8%) (36)	6.6%
Fuel for Energy Recovery	5,800 (0%) (2)	195 (0%) (1)	0 (0%) (0)	0 (0%) (0)	5,955 (0%) (3)	0.6%
Other	59,643 (4%) (11)	0 (0%) (0)	4,800 (7%) (1)	0 (0%) (0)	64,443 (4%) (12)	

18. Where the outputs produced in 2010 were applied, what grade(s) was applied for each type of use? (Please select as many grades as apply for each end use)

Agriculture	England	Scotland	Wales	Northern Ireland	All UK
Responses	114	14	11	3	142
0-10mm	7%	0%	0%	0%	6%
0-20mm	18%	29%	55%	0%	22%
0-40mm	47%	50%	18%	66%	46%
Mulch	0%	0%	0%	0%	0%
Oversize	4%	7%	9%	33%	5%
Other	24%	14%	18%	0%	22%

Horticulture - Professional	England	Scotland	Wales	Northern Ireland	All UK
Responses	34	3	1	0	38
0-10mm	35%	33%	0%	0%	34%
0-20mm	15%	33%	100%	0%	18%
0-40mm	0%	0%	0%	0%	0%
Mulch	0%	0%	0%	0%	0%
Oversize	0%	0%	0%	0%	0%
Other	50%	33%	0%	0%	47%

Horticulture - Amateur	England	Scotland	Wales	Northern Ireland	All UK
Responses	16	3	4	0	23
0-10mm	38%	33%	25%	0%	35%
0-20mm	13%	33%	75%	0%	26%
0-40mm	13%	0%	0%	0%	9%
Mulch	0%	0%	0%	0%	0%
Oversize	6%	0%	0%	0%	4%
Other	31%	33%	0%	0%	26%

Landscaping	England	Scotland	Wales	Northern Ireland	All UK
Responses	41	7	2	1	51
0-10mm	63%	43%	50%	0%	58%
0-20mm	12%	43%	50%	0%	17%
0-40mm	10%	0%	0%	0%	10%
Mulch	2%	0%	0%	0%	2%
Oversize	0%	0%	0%	0%	0%
Other	12%	14%	0%	100%	13%

Sports Turf	England	Scotland	Wales	Northern Ireland	All UK
Responses	1	1	0	0	2
0-10mm	100%	100%	0%	0%	100%
0-20mm	0%	0%	0%	0%	0%
0-40mm	0%	0%	0%	0%	0%
Mulch	0%	0%	0%	0%	0%
Oversize	0%	0%	0%	0%	0%
Other	0%	0%	0%	0%	0%

Land Restoration/ Daily Cover	England	Scotland	Wales	Northern Ireland	All UK
Responses	26	10	2	0	38
0-10mm	4%	0%	0%	0%	3%
0-20mm	4%	10%	50%	0%	8%
0-40mm	19%	60%	0%	0%	29%
Mulch	0%	10%	0%	0%	3%
Oversize	4%	0%	0%	0%	3%
Other	69%	20%	50%	0%	55%

Fuel for Energy Recovery	England	Scotland	Wales	Northern Ireland	All UK
Responses	2	1	0	0	3
0-10mm	0%	0%	0%	0%	0%
0-20mm	50%	0%	0%	0%	33%
0-40mm	0%	0%	0%	0%	0%
Mulch	0%	0%	0%	0%	0%
Oversize	50%	100%	0%	0%	67%
Other	0%	0%	0%	0%	0%

Other	England	Scotland	Wales	Northern Ireland	All UK
Responses	10	0	1	0	11
0-10mm	30%	0%	0%	0%	27%
0-20mm	0%	0%	100%	0%	9%
0-40mm	10%	0%	0%	0%	9%
Mulch	0%	0%	0%	0%	0%
Oversize	20%	0%	0%	0%	18%
Other	40%	0%	0%	0%	36%

19. Where the outputs produced in 2010 were applied, what was the AVERAGE EX-WORKS sale price? (£/t)

Average Ex Works Sale Price	England	Scotland	Wales	Northern Ireland	All UK	2009
Responses	174	59	28	4	265	
Agriculture						
Highest £pt	£30.00	£5.00	£15.00	£0	£30.00	£15.00
Lowest £pt	-£10.00	-£3.00	-£7.00	-£5.00	-£10.00	£0
Average £pt	£1.15	£1.41	£1.00	-£2.50	£1.21	
Horticulture – Professional						
Highest £pt	£24.00	£20.00	£22.00	£0	£24.00	£15.00
Lowest £pt	£0.00	£0.00	£22.00	£0	£0.00	£0
Average £pt	£7.46	£10.00	£0.00	£0	£8.80	
Horticulture – Amateur						
Highest £pt	£50.00	£10.00	£5.50	£0	£50.00	£40.00
Lowest £pt	£0.00	£10.00	£0.00	£0	£0.00	£0
Average £pt	£15.14	£10.00	£1.88	£0	£12.82	
Landscaping						
Highest £pt	£30.00	£20.00	£0.00	£0	£30.00	£27.00
Lowest £pt	£0.00	£2.00	£0.00	£0	£0.00	£0
Average £pt	£10.81	£8.90	£0.00	£0	£9.82	
Sports Turf						
Highest £pt	£20.00	£15.00	£0.00	£0	£20.00	£25
Lowest £pt	£20.00	£15.00	£0.00	£0	£15.00	£1
Average £pt	£20.00	£15.00	£0.00	£0	£17.50	
Land Restoration/ Daily Cover						
Highest £pt	£24.00	£4.50	£0.00	£0	£24.00	£15
Lowest £pt	-£12.00	£0.00	£0.00	£0	-£12.00	£0
Average £pt	£1.88	£1.50	£0.00	£0	£1.77	
Fuel for Energy Recovery						
Highest £pt	£16.00	£0.00	£0.00	£0	£16.00	£10
Lowest £pt	£12.00	£0.00	£0.00	£0	£0.00	£0
Average £pt	£14.00	£0.00	£0.00	£0	£9.33	
Other	'£6-15 if collected' 'it's sold at £8/m3' 'unknown' 'discarded waste £2 tonne' 'Cost not specified'	'£6-15 if collected' 'it's sold at £8/m3' 'unknown' 'discarded waste £2 tonne' 'Cost not specified	'£6-15 if collected' 'it's sold at £8/m3' 'unknown' 'discarded waste £2 tonne' 'Cost not specified	'£6-15 if collected' 'it's sold at £8/m3' 'unknown' 'discarded waste £2 tonne' 'Cost not specified	'£6-15 if collected' 'it's sold at £8/m3' 'unknown' 'discarded waste £2 tonne' 'Cost not specified	£0-15

20. Was compost supplied for use off site by third parties?

	England	Scotland	Wales	Northern Ireland	All UK
Responses	128	25	11	4	168
Yes	70%	44%	0%	50%	66%
No	30%	56%	0%	50%	34%

21. If 'Yes', what was the typical haulage distance in miles?

	England	Scotland	Wales	Northern Ireland	All UK
Responses	85	11	9	2	107
Average (miles)	23	25	14	5	22

By mileage range:

	England	Scotland	Wales	NI	UK
0 to 10	54%	36%	33%	100%	52%
10 to 20	16%	36%	56%		21%
20 to 30	13%	0%	11%		11%
30 to 40	5%	0%			4%
40 to 50	4%	18%			5%
50 to 60	1%	0%			1%
60 to 70	0%	9%			1%
70 to 80	1%				1%
80 to 90	0%				0%
90 to 100	2%				2%
100 to 110	0%				0%
110 to 120	1%				1%
120 to 130	0%				0%
130 to 140	0%				0%
140 to 150	2%				2%

22. What is your current intention with regard to certification of your outputs to PAS 100 or the CQP?

	England	Scotland	Wales	Northern Ireland	All UK
Will maintain, currently pursuing or planning to pursue certification to PAS 100	75% (99)	80% (20)	92% (11)	75% (3)	78% (133)
Will maintain, currently pursuing or planning to pursue certification to CQP	54% (71)	8% (2)	58% (7)	75% (3)	49% (84)
Not planning to maintain/ pursue certification to PAS 100	23% (31)	20% (5)	0% (0)	25% (1)	21% (37)
Not planning to maintain/ pursue certification to CQP	25% (33)	32% (8)	8% (1)	25% (1)	25% (43)

23. Are you aware of the activities of WRAP (in Scotland, Zero Waste Scotland) to develop the market for compost?

	England	Scotland	Wales	Northern Ireland	All UK
Responses	131	25	11	4	171
Yes	83%	76%	91%	25%	81%
No	17%	24%	9%	75%	19%

24. Normal practice in survey research is to ensure anonymity of responses. However, WRAP is likely to be conducting this survey again in 2013. Would you be prepared to let us pass your information to them so that it can be used in planning for that survey and analysing year-on-year

	England	Scotland	Wales	Northern Ireland	All UK
Responses	130	25	11	4	170
Yes	97%	100%	91%	75%	96%
No	3%	0%	9%	25%	4%

25. ALOWANCE is an online tool aimed at operators who recycle organic materials to agricultural land. It shows how much land is available for spreading these materials in the vicinity of existing or planned production sites. We have been asked to provide the administrators of that site with information on the distances outputs are currently transported. Would you be prepared to have your information passed to them?

	England	Scotland	Wales	Northern Ireland	All UK
Responses	130	25	11	4	170
Yes	86%	64%	73%	50%	81%
No	14%	36%	27%	50%	19%

Anaerobic Digestion Sites

There is no survey data shown for NI or Wales because there was only a single site operational in NI in 2010 and confidentiality needs to be maintained. Where response rate for Scotland was from a single site, that data has also been suppressed. As a result rows in some of the tables do not total the UK figure.

1. Completed Survey?

	England	Scotland	Northern Ireland	Wales	UK
Responses	35	11	1	1	48
Yes	43%	27%	100%	0%	40%
No	57%	73%	0%	100%	60%

2. How many full time equivalent employees are involved in ad at the site?

	England	Scotland	UK
Responses	15	3	19
Average Employees	4	7	5

3. Did your site ONLY use energy crops and no other form of feedstock in 2010? If you select Yes here you will be directed to the final page because this survey is primarily about the treatment of waste.

	England	Scotland	UK
Responses	15	3	19
Yes	7%	0%	5%
No	93%	100%	95%

4. What was the temperature of the system used in 2010?

	England	Scotland	UK
Responses	13	3	17
Thermophilic	31%	33%	29%
Mesophilic	69%	67%	71%

5. Was the system type wet or dry in 2010?

	England	Scotland	UK
Responses	14	3	18
Dry	0%	33%	6%
Wet	100%	67%	94%

Note only single dry facility in Scotland so cannot be grossed to UK picture

6. Was the process continuous or batch in 2010?

	England	Scotland	UK
Continuous	92%	100%	94%
Batch	8%	0%	6%

7. Was the process single stage or two stages in 2010?

	England	Scotland	UK
Responses	13	3	17
Single Stage	54%	100%	65%
Two Stages	46%	0%	35%

8. Were you using pasteurisation?

	England	Scotland	UK
Responses	14	3	18
Yes	57%	33%	50%
No	43%	67%	50%

9. Was the pasteurisation pre or post pasteurisation?

	UK
Responses	8
Pre	38%
Post	62%

Data for only one site in Scotland, so not presented separately

10. Were you performing any type of pre-processing in 2010?

	England	Scotland	UK
Responses	14	3	18
Yes	71%	0%	61%
No	29%	100%	39%

11. What types of pre-processing of feedstocks were carried out on this site in 2010?

	UK
Responses	11
Screening	55%
Shredding	45%
Maceration	64%
De-packaging	27%
Hand-picking	0%
Pulping	0%
Blending	55%
Other	27%

Data for only one site in Scotland, so not presented separately

12. Taking into consideration planning, regulatory and physical constraints; what was the maximum working capacity of this site in 2010?

	UK
Responses	11
Total	195,499
Average	17,773

13. Did you have spare capacity in the summer months?

	UK
Responses	10
Yes	70%
No	30%

14. What was the quantity of NON-WASTE feedstocks processed in 2010? (Tonnes per annum)

	UK
Responses	9
Manures	13,100
Agricultural by-products	0
Energy crops	320
Other	0

15. In 2010, approximately what percentage of your waste feedstock was sourced... (Only approximate percentages are required - to nearest 10% or even 25% but please ensure the total adds to 100%)

	England	Scotland	UK
Responses	13	3	18
From the site at which the plant is located	51,600 (32%)	0 (0%)	51,600 (29%)
From other sites within the same business (or business group)	267 (0%)	4,500 (25%)	4,767 (3%)
From external third party sources	111,341 (68 %)	13,300 (75%)	124,641 (69%)

16. Of the waste that you processed in 2010, approximately what proportion came from.. .

	England	Scotland	UK
Responses	16	3	21
Municipal sources	68,224 (45%)	2,800 (16%)	72,024 (42%)
Non-municipal sources	85,384 (55%)	15,000 (84%)	100,384 (58%)

17. Of the NON MUNICIPAL FOOD WASTE that you processed in 2010, approximately what proportion came from: (Please ensure %'s total 100).

	UK
Responses	11
Agriculture (%)	Min 20 Max 100 Ave 57
Manufacturers/processors (%)	Min 20 Max 100 Ave 58
Supermarkets (%)	Min 33 Max 75 Ave 50
Hospitality Businesses (%)	Min 50 Max 33 Ave 42
Other (%)	Min 30 Max 30 Ave 30

Data for only one site in Scotland, so not presented separately

18. During 2010 was any feedstock delivered in biodegradable (starch) bags?

	England	Scotland	UK
Responses	13	3	17
Yes	38%	0%	29%
No	62%	100%	71%

19. Roughly, what proportion of the feedstock you processed in 2010 was delivered in compostable (starch) bags?

	UK
Responses	5
t/annum	51239
%	8%

20. Were these bags a significant issue for you?

	UK
Responses	5
Yes	80%
No	20%

21. What was the total biogas gas yield in 2010 in cubic metres?

	UK
Responses	13
Total Biogas Yield	25,631,765

22. What proportion of the biogas that you produced in 2010 was used for…? (Please give %'s ensuring they add to 100)

	UK
Responses	16
Heat (boiler only)	500,000 (2%)
Heat and Electricity	25,017,765 (98%)
Direct injection on gas into national grid	0 (0%)
Vehicle fuel – on site	0 (0%)
Vehicle fuel – off site	0 (0%)
Other	0 (0%)

23. What was the gross output of the site in 2010 (Biogas combustion on site)?

	UK
Responses	
Average Gross Combustion	1,028,058
Total	7,196,408

Data for only one site in Scotland, so not presented separately

24. How much electricity was generated in 2010? (in MWh)

	England	Scotland	UK
Responses	9	2	11
Average	5,628	3,575	5,255
Total	50,655	7,150	57,805

25. How much electricity was exported?

	England	Scotland	UK
Responses	6	2	8
Total	14,050	5,361	19,411
% Exported (1)	68%	75%	23%

(1) average of those reporting export

26. How much heat was generated in 2010? (in MWh)

	UK
Average Heat Generated	3,210
Total	12,840

How much heat was exported off site?

	England	Scotland	UK
Heat Exported as % total generated	0%	0%	0%

27. What was the quantity of whole digestate produced in 2010?

	England	Scotland	UK
Responses	8	2	12
Wet Weight (tonnes)	110,012	17,600	134,712
Dry Matter %	37%	0%	32%
Dry Matter (tonnes)	40,960	75	41,035

28. Was the whole digestate post-processed?

	England	Scotland	UK
Responses	13	3	16
Yes	23%	33%	31%
No	77%	67%	69%

29. How was the whole digestate post-processed? (Select all that apply)

	UK
Screened to remove contaminants	2 sites
Composted	No sites
Pelletised	No sites
Other (please specify)	3 sites
	de-watered off to sewage works pasteurised

Data for only one site in Scotland, so not presented separately

30. Was the whole digestate separated into fibre and liquor?

	UK
Responses	4
Yes	25%
No	75%

Data for only one site in Scotland, so not presented separately

31. How was the digestate separated into fibre and liquor?

	UK
Centrifuged	No sites
Press	1 site
Other (please specify)	No sites

32. Was there any further (tertiary) treatment of either fibre or liquor following separation?

	England	Scotland	UK
Responses	2	0	2
Yes	50%	0%	50%
No	50%	0%	50%

33. What was the quantity of separated fibre produced in 2010?

	UK
Responses	1
Wet Weight (tonnes)	50
Dry Matter Content %	0%
Tonnes	0

34. What was the quantity of separated liquor produced in 2010?

	England	Scotland	UK
Tonnes	1,200	0	1,200
De-nitrified Yes	0%	0%	0%
De-Nitrified No	100%	0%	100%

35. What were the destinations of all the outputs you produced in 2010? Please complete proportions for each destination that applies - only approximate percentages are required, ensuring the total is 100% for each column.

Whole Digestate	England	Scotland	UK
Sold to users off –site	31000.0 25%	0 0%	31,000 22%
Provided Free of Charge to users off-site	28000.0 25%	1500.0 9%	29500.0 22%
Site operator paid user to remove	13800.0 13%	0.0 0%	13800.0 10%
Used by your own business	36212.0 33%	14500.0 82%	50712.0 38%
Disposal to landfill or sewers	0.0 0%	0.0 0%	0 0%
Other	0.0 0%	0.0 0%	0 0%

Fibre	England	Scotland	UK
Sold to users off –site	00 0%	0 0%	0 0%
Provided Free of Charge to users off-site	0.0 0%	0 0%	0.0 0%
Site operator paid user to remove	0.0 0%	0 0%	0.0 0%
Used by your own business	50.0 100%	0 0%	50.0 100%
Disposal to landfill or sewers	0.0 0%	0 0%	0 0%
Other	0.0 0%	0 0%	0 0%

Liquor	England	Scotland	UK
Sold to users off –site	0.0 0%	0 0%	0 0%
Provided Free of Charge to users off-site	0.0 0%	0 0%	0.0 0%
Site operator paid user to remove	0.0 0%	0 0%	0.0 0%
Used by your own business	1200.0 9%	0 0%	1200.0 9%
Disposal to landfill or sewers	0.0 0%	0 0%	0 0%
Other	0.0 0%	0 0%	0 0%

36. For outputs supplied for use off site by a third party, what was the typical haulage distance?

	England	Scotland	UK
Responses	3	2	6
Average Miles	6.3	47	19

Mileage ranges:

	England	Scotland	UK
0 to 10	100%	50%	85%
10 to 20	0%	0%	0%
20 to 30		0%	0%
30 to 40		0%	0%
40 to 50		0%	0%
50 to 60		0%	0%
60 to 70		0%	0%
70 to 80		0%	0%
80 to 90		50%	15%

37. Of the outputs that you produced in 2010 that were used (i.e. not disposed of to landfill or sewers), where were they applied? Please complete proportions for each application that applies - only approximate percentages are required, ensuring the total is 100% for each column.

Whole Digestate	England	Scotland	UK
Agriculture	109012.0 100%	16100.0 91%	125,112.0 99%
Forestry	0.0 0%	0.0 0%	0.0 0%
Soil/field grown horticulture	0.0 0%	0.0 0%	0.0 0%
Land restoration	0.0 0%	1500.0 9%	1500.0 1%
Fuel for energy recovery	0.0 0%	0.0 0%	0.0 0%
Other	0.0 0%	0.0 0%	0.0 0%

Fibre	England	Scotland	UK
Agriculture	50 100%	0.0 0%	50.0 100%
Forestry	0.0 0%	0.0 0%	0.0 0%
Soil/field grown horticulture	0.0 0%	0.0 0%	0.0 0%
Land restoration	0.0 0%	0.0 0%	0 0%
Fuel for energy recovery	0.0 0%	0.0 0%	0.0 0%
Other	0.0 0%	0.0 0%	0.0 0%

Liquor	England	Scotland	UK
Agriculture	1200.0 100%	0.0 0%	1200.0 100%
Forestry	0.0 0%	0.0 0%	0.0 0%
Soil/field grown horticulture	0.0 0%	0.0 0%	0.0 0%
Land restoration	0.0 0%	0.0 0%	0 0%
Fuel for energy recovery	0.0 0%	0.0 0%	0.0 0%
Other	0.0 0%	0.0 0%	0.0 0%

38. What is your current intention with regard to certification of your outputs to PAS 110 or the ADQP? Select all that apply.

	England	Scotland	UK
Responses	14	4	25
Will maintain, currently pursuing or planning to pursue certification to PAS 110	57%	67%	56%
Will maintain, currently pursuing or planning topursue certification to ADQP	21%	0%	17%
Not planning to maintain/pursue certification to PAS 110	36%	33%	39%
Not planning to maintain/pursue certification to ADQP	29%	33%	28%
Why?	Not able to conform at this time Kept onsite so don't need to have it No outputs Not relevant as it is a test facility.	Cost	Not able to conform at this time Kept onsite so don't need to have it No outputs Not relevant as it is a test facility Cost

39. Are you aware of the activities of WRAP (in Scotland, Zero Waste Scotland) to develop the market for digestate as a fertilizer?

	England	Scotland	UK
Responses	14	3	18
Yes	93%	100%	94%
No	7%	0%	6%

40. Normal practice in survey research is to ensure anonymity of responses. However, WRAP is likely to be conducting this survey again in 2013. Would you be prepared to let us pass your information to them?

	England	Scotland	UK
Responses	15	3	19
Yes	93%	100%	95%
No	7%	0%	5%

41. Allowance is an online tool aimed at operators who recycle organic materials to agricultural land. It shows how much land is available for spreading these materials in the vicinity of existing/planned production sites.

	England	Scotland	UK
Responses	15	3	19
Yes	67%	100%	74%
No	33%	0%	26%

MBT Sites

(England & Scotland responses only – results combined to protect confidentiality of responses from the single Scottish respondent)

1. Completed Survey

Yes	10
No	4

2. Full time equivalent employees

Average	35.6

3. What type(s) of system was the site using in 2010? (Please tick all the options that apply)

Aerobic bio-drying	Aerobic IVC	Anaerobic digestion	Thermal treatment	Other
33%	44%	22%	11%	22%

4. Please give an approximation of where the organic waste inputs came from in 2010.

	Tonnes pa	% of total
Municipal source segregated	45,000	6%
Municipal mixed	539,994	72%
Non-municipal source segregated	125,000	17%
Non-municipal mixed	36,000	5%

5. Taking into consideration planning, regulatory and physical constraints; what was the maximum working capacity of this site in 2010?

Average t/annum	82,888

6. What was the quantity of the separated organic fraction produced by this site in 2010?

Average t/annum	24,752

7. For the CLO that you produced in 2010 what were the end uses?

	Tonnes pa	% of total
Spread to land - restoration/remediation	33,000	100%
Spread to land – agricultural	0	0%
Disposal to landfill	0	0%
Fuel for energy recovery	0	0%
Other	0	0%

8. For CLO supplied for use off site to third parties what was a typical haulage distance?

Average Miles	47

By mileage range:

0 to 10	3%
10 to 20	93%
20 to 30	1%
30 to 40	1%
40 to 50	0%
50 to 60	0%
60 to 70	0%
70 to 80	1%
80 to 90	0%
90 to 100	2%

9. For the RDF that you produced in 2010 what were the end uses?

	Tonnage Surveyed	% of total
Fuel for energy recovery - UK market	37,620	80%
Fuel for energy recovery - exported	7,620	16%
Disposal to landfill	2,000	4%
Other – please specify	0	0%

10. Normal practice in survey research is to ensure anonymity of responses. However, WRAP is likely to be conducting this survey again in 2013. Would you be prepared to let us pass your information to them so that it can be used in planning for that survey?

Yes	89%
No	11%

11. **ALOWANCE is an online tool aimed at operators who recycle organic materials to agricultural land. It shows how much land is available for spreading these materials in the vicinity of existing or planned production sites. We have been asked to provide the administrators of that site with information on the distances outputs are currently transported. Would you be prepared to have your information passed to them?**

Yes	78%
No	22%

Exempt Composting Data

(Data not separated per country)

1. Completed Surveys

86 surveys were completed

2. How many full time equivalent employees are involved in composting at the site?

Average	1
Range	Max: 30 / Min: 0

3. What type(s) of system was the site operating in 2010?

	Number	% of respondents
IVC - totally enclosed	2	2
IVC - with some activities in open	0	0
Window open	37	37
Windrow under cover	2	2
Aerated static pile	20	20
Continuous block composting (Table composting)	1	1
Other	32	32
No answer	6	6

4. IF MORE THAN ONE TYPE: Were they used in series (sequential treatment of the same material) or in parallel (separate treatment of different material)?

In Series	7%
In Parallel	3%
N/A	90%

5. What was the typical composting period in terms weeks? Please break it down by different phases if need be.

Average term (weeks)	12
Range	Max: 140 / Min: 0

6. What types of pre-processing of feedstocks did you carry out in 2010 (Please select all the options that apply)

No pre-processing	6%
Screening	6%
Pulping (e.g. screw or hydropulper)	1%
Shredding	50%
Blending / mixing	12%
De-packaging	1%
Hand picking	47%

7. Taking into consideration planning, regulatory and physical constraints; what was the maximum working capacity of this site in 2010?

No of Responses	80
Average	3848
Range	Max:250,000 / Min:0

8. Did you have spare capacity in the summer months?

No of Responses	79
Yes	22%
No	77%
Don't Know	1%

9. In 2010, approximately what percentage of your waste feedstock was sourced…?

	Sites	**Tonnes**
From the site at which the plant is located	36	56,667 (3%)
From other sites within the same business (or business group)	7	35,420 (2%)
From external third party sources	18	1,841,060 (95%)

10. Of the waste that you processed in 2010, approximately what proportion came from?

	sites	**tonnes**
Municipal waste sources	50	1,841,403 (94%)
Non-municipal waste sources	70	113,224 (6%)

11. Of the NON-MUNICIPAL FOOD WASTE that you processed in 2010, approximately what proportion came from?

	Sites	**Responses (%)**
Agriculture	7	Min 0 Max 100 Ave 51
Food manufacturers/processors	4	Min 0 Max 10 Ave 3
Supermarkets	5	Min 0 Max 15 Ave 5
Hospitality businesses (restaurants etc)	4	Min 0 Max 100 Ave 28
Other	18	Min 0 Max 100 Ave 65

12. During 2010 was any feedstock delivered in biodegradable (starch) bags?

No of Responses	76
Yes	8%
No	92%

13. Roughly, what proportion of the feedstock you processed in 2010 was delivered in biodegradable bags?

No of Responses	5
Tonnes	100
Proportion of Feedstock (average)	0%

14. Were these bags a significant issue for you?

No of Responses	5
Yes	40%
No	60%

15. What was the quantity of compost produced in 2010?

No of Responses	75
Average Tonnage	470
Total Tonnage	35,265

16. Please state the proportion of the compost you produced in each grade, in 2010.

	sites	**tonnes**
0-10mm	9	3,060
0-20mm	3	31
0-40mm	38	19,221
Mulch	13	0
Oversize	1	17,955
Other	14	50

17. Where was the compost that you produced in 2010 applied?

	sites	**tonnes**
Agriculture	44	25,489
Horticulture – Professional	3	31
Horticulture – Amateur	22	722
Landscaping	3	1,454
Sports Turf	0	0
Land restoration/daily cover	6	7,511
Fuel for Energy Recovery	0	0
Other	3	50

18. Where the outputs produced in 2010 were applied, what grade(s) was applied for each type of use? (Please select as many grades as apply for each end use)

Tonnes	Agriculture	Horticulture Professional	Horticulture Amateur	Landscaping
Responses	33	2	9	0
0-10mm	1	0	2	0
0-20mm	0	0	751	0
0-40mm	11,490	0	1	0
Mulch	0	31	501	0
Oversize	0	0	0	0
Other	1250	0	1252	0

Tonnes	Sports Turf	Land Restoration/ Daily Cover	Fuel for Energy Recovery	Other
Responses	0	4	0	0
0-10mm	0	0	0	0
0-20mm	0	1	0	0
0-40mm	0	1	0	0
Mulch	0	1	0	0
Oversize	0	0	0	0
Other	0	7500	0	0

19. Where the outputs produced in 2010 were applied, what was the AVERAGE EX-WORKS sale price? (£/t)

	Agriculture	Horticulture Professional	Horticulture Amateur	Landscaping
Responses	4	2	7	2
Highest	£3.75	£50.00	£8.00	£3.00
Lowest	£0.00	£0.00	£0.00	£0.00
Average	£1.81	£25.00	£1.29	£1.50

	Sports Turf	Land Restoration /Daily	Fuel for Energy Recovery	Other
Responses	1	3	1	8
Highest	£0.00	£0.00	£0.00	Given away, not graded
Lowest	£0.00	£0.00	£0.00	Not sold. Spread on own farmland as soil improver.
Average	£0.00	£0.00	£0.00	Free. Leaves and grass mowings ex RAF base Not sold. Own use.

20. Was compost supplied for use off site by third parties?

Responses	125
Yes	44%
No	56%

If 'Yes', what was the typical haulage distance in miles?

Responses	11
Average	6

21. What is your current intention with regard to certification of your outputs to PAS 100 or the CQP?

	Number	%
Currently certified to PAS 100	1	2
Currently certified to CQP	0	0
Currently certified to both	1	2
Planning to pursue certification to PAS 100 only	0	0
Planning to pursue certification to CQP only	0	0
Planning to pursue certification to both	31	56
Not planning to pursue certification	22	40

22. Are you aware of the activities of WRAP (in Scotland, Zero Waste Scotland) to develop the market for compost?

Responses	73
Yes	67%
No	33%

23. Normal practice in survey research is to ensure anonymity of responses. However, WRAP is likely to be conducting this survey again in 2013. Would you be prepared to let us pass your information to them so that it can be used in planning for that survey and analysing year-on-year ?

Responses	75
Yes	84%
No	16%

24. ALOWANCE is an online tool aimed at operators who recycle organic materials to agricultural land. It shows how much land is available for spreading these materials in the vicinity of existing or planned production sites. We have been asked to provide the administrators of that site with information on the distances outputs are currently transported. Would you be prepared to have your information passed to them?

Responses	75
Yes	24%
No	76%

Exempt AD Sites

1. **Completed Survey?**

Responses	4
Yes	100%
No	0%

2. **How many full time equivalent employees are involved in ad at the site?**

Responses	4
Average Employees	2

3. **Did your site ONLY use energy crops and no other form of feedstock in 2010? If you select Yes here you will be directed to the final page because this survey is primarily about the treatment of waste.**

Responses	4
Yes	0%
No	100%

4. **What was the temperature of the system used in 2010?**

Responses	3
Thermophilic	0%
Mesophilic	100%

5. **Was the system type wet or dry in 2010?**

Responses	2
Dry	0%
Wet	100%

6. **Was the process continuous or batch in 2010?**

Continuous	67%
Batch	33%

7. **Was the process single stage or two stages in 2010**

Responses	3
Single Stage	33%
Two Stages	67%

8. **During 2010, what was the typical residence time in reactor in terms of DAYS?**

No of responses:	4
Average no of days:	7

9. Were you using pasteurisation?

Responses	4
Yes	25%
No	75%

10. Was the pasteurisation pre or post pasteurisation?

Responses	1
Pre	100%
Post	0%

11. Were you performing any types of pre-processing in 2010?

Responses	4
Yes	100%
No	0%

12. What types of pre-processing of feedstocks were carried out on this site in 2010?

Responses	11
Screening	13%
Shredding	0%
Maceration	25%
De-packaging	25%
Hand-picking	13%
Pulping	13%
Blending	0%
Other	13%

13. Taking into consideration planning, regulatory and physical constraints; what was the maximum working capacity of this site in 2010?

Responses	4
Total	8,761
Average	2,190

14. Did you have spare capacity in the summer months?

Responses	4
Yes	0%
No	100%

15. What was the quantity of NON-WASTE feedstocks processed in 2010? (Tonnes per annum)

Responses	2
Manures	675
Agricultural by-products	10
Energy crops	0
Other	18

16. In 2010, approximately what percentage of your waste feedstock was sourced... (Only approximate percentages are required - to nearest 10% or even 25% but please ensure the total adds to 100%)

	Responses	Tonnes (% of total quantity)
From the site at which the plant is located	4	33 (43%)
From other sites within the same business (or business group)	2	27 (36%)
From external third party sources	1	16 (21%)

17. Of the waste that you processed in 2010, approximately what proportion came from...

Responses	Responses	Tonnes (% of total quantity)
Municipal resources	2	55 tonnes (72%)
Non-municipal resources	3	21 tonnes (28%)

18. Of the NON MUNICIPAL FOOD WASTE that you processed in 2010, approximately what proportion came from: (Please ensure %'s total 100).
There was only a single response to this question so *actual* answers given.

Responses	Proportion from that source (%)
Agriculture	70
Manufacturers/processors	30
Supermarkets	-
Hospitality Businesses	-
Other	-

19. During 2010 was any feedstock delivered in biodegradable (starch) bags?

Responses	4
Yes	25%
No	75%

20. Roughly, what proportion of the feedstock you processed in 2010 was delivered in compostable (starch) bags?

Responses	1
t/annum	1
%	1%

21. Were these bags a significant issue for you?

Responses	1
Yes	0%
No	100%

22. What was the total biogas gas yield in 2010 in cubic metres?

Responses	3
Total Biogas Yield	845

23. What proportion of the biogas that you produced in 2010 was used for...? (Please give %'s ensuring they add to 100)

Responses	Responses	Cubic Metres (% of total quantity)
Heat (boiler only)	3	841 (99.5%)
Heat and Electricity	0	-
Direct injection on gas into national grid	0	-
Vehicle fuel – on site	0	-
Vehicle fuel – off site	1	4.5 (0.5%)
Other	0	-

24. What was the gross output of the site in 2010 (Biogas combustion on site)?

Responses	1
Average Gross Combustion	5
Total	5

25. How much electricity was generated in 2010? (MWh)

Responses	1
Average	2
Total	2

26. How much electricity was exported?

Responses	1
Total	2
% Exported	100%

27. How much heat was generated in 2010? (MWh)

Average Heat Generated	4
Total	4

28. How much heat was exported off site?

4 Mwh

29. What was the quantity of whole digestate produced in 2010?

Responses	2
Wet Weight (tonnes)	60
Dry Matter %	12%
Dry Matter (tonnes)	5

30.Was the whole digestate post-processed?

Responses	2
Yes	50%
No	50%

31. How was the whole digestate post-processed? (Select all that apply)

Screened to remove contaminants	0
Composted	1
Pelletised	0
Other (please specify)	0

32. What were the destinations of all the outputs you produced in 2010? Please complete proportions for each destination that applies - only approximate percentages are required, ensuring the total is 100% for each column.

	Whole Digestate Tonnes/(proportion of total whole digestate)	**Fibre Tonnes/(proportion of total fibre)**	**Liquor Tonnes/(proportion of total liquor)**
Sold to users off – site	0 0%	16 35%	0 0%
Provided Free of Charge to users off-site	0 0%	0 0%	0 0%
Site operator paid user to remove	0 0%	0.0 0%	0 0%
Used by your own business	11 100%	36 80%	0 0%
Disposal to landfill or sewers	0.0 0%	0.0 0%	0 0%
Other	0.0 0%	0.0 0%	0 0%

***Respondents figures added up to more than 100%**

33. Of the outputs that you produced in 2010 that were used (i.e. not disposed of to landfill or sewers), where were they applied? Please complete proportions for each application that applies - only approximate percentages are required, ensuring the total is 100% for each column.

	Whole Digestate	Fibre	Liquor
Agriculture	0 0%	0 0%	0 0%
Forestry	0.0 0%	0.0 0%	0 0%
Soil/field grown horticulture	7 60%	29 65%	0 0%
Land restoration	18 40%	0 0%	0 0%
Fuel for energy recovery	38 85%	1 5%	11 25%
Other	0.0 0%	0.0 0%	0 0%

***Respondents figures added up to more than 100%**

34. What is your current intention with regard to certification of your outputs to PAS 110 or the ADQP? Select all that apply.

Responses	**3**
Will maintain, currently pursuing or planning to pursue certification to PAS 110	50%
Will maintain, currently pursuing or planning to pursue certification to ADQP	0%
Not planning to maintain/pursue certification to PAS 110	17%
Not planning to maintain/pursue certification to ADQP	17%
Why?	Exemption form

35. Are you aware of the activities of WRAP (in Scotland, Zero Waste Scotland) to develop the market for digestate as a fertilizer?

Responses	3
Yes	67%
No	33%

36. Normal practice in survey research is to ensure anonymity of responses. However, WRAP is likely to be conducting this survey again in 2013. Would you be prepared to let us pass your information to them?

Responses	4
Yes	75%
No	25%

37. Allowance is an online tool aimed at operators who recycle organic materials to agricultural land. It shows how much land is available for spreading these materials in the vicinity of existing/planned production sites. We **have been asked to provide the administrators of that site with information on the distances outputs are currently transported. Would you be prepared to have your information passed to them?**

Responses	4
Yes	75%
No	25%

Responses to the question: In relation to the effective operation of your business what do you see as the most significant threats or opportunities?

COMPOSTING - Threats

Competition for feedstock (leading to lower gate fees)
Market competition for feedstock
More competition; compete for green waste
Competition starting
Competition *(3 mentions)*
Competition for feedstock *(3 mentions)*
Third party competition
Competitor sites
Other composters and the increasing amount of capacity available
Capacity
Big waste management companies
Competition from large waste management companies
Competition, different waste streams, wood prices, competition for land areas, increased competition for material to spread
Competition particularly on price.
Competition driving gate fees down
Decreasing gate fee - competition
Decreasing gate fees *(7 mentions)*
Falling gate fees due to sham recovery
Gate fees for green waste getting lower
Lowering gate fee increased competition
Reduction in gate fees, competition from water board

AD
AD *(2 mentions)*
Proliferation of AD
Saturation of AD - competition for feedstocks
AD from plants and water sludges, spread compost on particular fields at particular times of the year
AD plant proposed in local area, limits investment
AD technology
Development of AD capacity in Scotland
FITS for AD screwing gate fees

Unfair competition
Alternative technologies and relaxation of procedures to enable other people to compost without stricter monitoring
Being undercut by very cheap compost i.e. B&Q, and people don't understand difference between food waste compost and green waste compost
Can't compete, farmers composting at lower cost per tonne, may not be adhering to PAS 100. We do
Increased regulation and cost from the EA - on farm composting is cheaper
New developments being made where people will do the work for nearly nothing
Operators coming in with low gate fees and shred and spread operators
Scottish Water - too low gate fees/uneconomical
Not a level playing field! AD and others affecting market
Small operator prides themselves on quality - fed up with large operators charging low gate fees.

The proposed Wales AD hub system for treating food waste could really affect business because subsidised
Waste majors have an unfair advantage with Local Authority Contracts due to their financial clout where smaller Operators offer better value for money
Large government PFI contracts

Feedstock supplies
Budgets on ground maintenance will reduce feedstock they get or cause some irregularity of supply
Supply of feedstock not meeting demand, but if love food hate waste campaign is successful then feedstock will be lowered
Feedstock security
Feedstocks; hard to get green waste
Lack of commercial waste
Lack of feedstock

LA policies/changes
Changing patterns of waste collection
Commingled food and green waste which will need AD or IVC so undermines open windrow sites, divert away from open windrow
Continuation of LA not policing rounds and educating public about what is compostable and what is not – contamination; more interaction and communication between WRAP AfOR and EA
Cornwall council contracts - drop in Green Waste inputs
Council budget cuts
Councils are not loyal
Local Authority lack of interest
Councils changing policy on collection
Local councils changing collection criteria; green and cardboard mixed for example
County Council forcing to get PAS 100; which means road sweepings. Irresponsible attitude - has his own standards which are better than PAS, but he has to reduce certain input wastes (sludges for example). Paying for green waste collection
Drive from local authorities for combined food and waste systems which would need to require other technologies which they don't do
Highlands not adopting new legislation
Inputs come from LA - cut back on garden waste coming in
Poor attitude from council
Lack of commitment to long-term contracts
Local government needs to be more proactive on how they work their contracts, very short term so can't put investment in which is needed, framework contract so can move between companies i.e. who is closest or if there is a problem with 1 site they will just use another - would like 10-15 year contract
Long term contracts so these are being reduced to short term agreements
Removal of LATS
Removal of LF target and LATS

Regulation / legislation / planning
Bioaerosols
SEPA not published guidance on bio aerosols
Odour and planning
Odour issues *(2 mentions)*
Odour management
Planning
Planning and odour

Planning restrictions *(2 mentions)*
Planning restrictions and environmental restrictions
Long winded planning applications, cost in planning process, misunderstanding from the public about waste operations, internet scare mongering about waste operations, continuous red tape and bureaucracy
Trouble with planners
Change in policy
Civil servants and red tape, planning to expand, could employ more people
Constraints and costs on non-PAS 100 applications
Delays with EA & local planners over new covered windrow
EA focusing attention on the Site as a result of local NIMBY pressure group
EA have withdrawn deployments for non-conforming compost
Increasingly hard to get Deployments from EA
EA tightening up on rules and regulations
EAs outlook on what our product is and what it is fit for, results in possible increase in cost of disposal
Attitude of EA on permitting guidance, poor technical advice and lack of training. Some Officers are unwilling to be flexible
New permitting regulations
Waste exemptions to land expiring.
Challenging regulations
Regulation *(2 mentions)*
Regulation and licensing laws
Regulatory change
Regulatory problems with EA
Regulatory problems with EA and lack of structure regarding waste movements and pricing
Regulatory stance on odour
Potential for unreasonable regulation
Exclusion of bio-solids
Gold plating legislation
Changes to legislation - zero waste not implemented would be a big threat
Government regulation; food segregation - misguided
Lack of clarity regarding OMP and other regulatory issues
Legislation *(2 mentions)*
Legislation requirements
Legislation surrounding bioaerosols causing too much cost. Unfair playing field

Public attitudes
Composting is intrusive and there have been complaints from locals
Local community NIMBYs
Public perception - too much bad press, NIMBYism.

PAS 100 issues
Cost of PAS 100 *(2 mentions)*
Failure to achieve PAS
Farm is registered to Quality Meat Scotland and as such PAS 100 is required even for a site only processing 1500T PA. PAS 100 costs >£2000 PA
Lack of flexibility of the standards in relation to market demand
Meeting quality standards
PAS 100 changes - EA should monitor scheme
PAS 100 changes difficult and expensive - increasing cost
PAS 100 rules becoming too onerous on contaminants
PAS 100 too stringent!
Reduction in PAS 100 upper limits.

Lack of end markets
End markets for outputs
Finding homes for compost not used
Lack of end markets *(2 mentions)*
Lack of markets for CLO
Lack of markets for compost in local area
Lack of ready markets for outputs inhibited by regulations
No outlet, paying to get rid of it, exemptions needed so farmer going to put costs on the composter
Over production of compost

Low perceived value of compost
Compost seen as low quality product
Limited returns for outputs
Low value product

Operational costs
Being taxed and rates
Business rates
Energy costs
Fuel costs
Gate fees are limited and long delays in developing supply chains.
Haulage costs
High costs of EA deployments.
Maintenance costs
Operational costs, haulage
Paying out for rates and courses and exams
Price of fuel going too high to make it worthwhile
Operating pressures surrounding logistics
Static gate fees, high cost of dealing with contamination.

Contamination
High levels of contaminants in feedstock
High levels of contamination, packaging
Ongoing issue with plastic contamination

Other
Careful management and treatment methods, gaining correct mix of materials is important
Change processes to meet other people's demands
Geographical location but not if market is there due to rural location
In AONB which restricts planning
Not composting any more
Plant build quality

COMPOSTING - Opportunities

Expanding/new markets
Biomass market for added value output sales
Biomass market for green waste
Export markets to biomass
Oversize to biomass market
Create mulch for markets; biofuel markets
New development of brownfield in the area. Dewatering of sludges.
Agriculture and landscaping, reclamation
Agricultural markets
Growth in agricultural markets, approached by a lot of farmers
Sale of compost into agriculture
Oversize contamination removal - biowaste potential
Oversize for fuel
Horticulture expansions
Bagging of compost; selling direct from farm shop; small loads short distances
Restoration of landfill
Restoration projects
Local landfill site closing?
Specialisation in niche markets
Added value markets for products
Developing new markets for product; increasing value
Sale of end product
Developing new markets *(2 mentions)*
End markets
Expanding
Expanding markets for outputs *(2 mentions)*
Model to take out to wider market
Expansion if they could

New/expanding feedstock supplies
Ban of food waste to landfill *(2 mentions)*
But expand to meet changing waste streams
Combined food and green waste
Commercial food waste collection and AD
Commercial waste streams
Food waste our LA would like us to move towards
Green waste and small scale food and factory waste
Increasing recycling
Tenders for green waste processing.

New products
Producing a higher quality 0-10mm compost or bagged compost - moving to peat free by 2020 - peat alternative products
Peat-free compost potential
Turning waste to product; peat replacement
Looking to bag materials themselves
Can expand on what they do with their compost
Further development of products and sales
Greater diversification of products
New products *(4 mentions)*

High quality of the product
We are part of peat free compost which is increasing in the market, quality control is very good so people come back to us
Improve quality of compost to reach high value end markets
Keep in touch with what's happening, make it a quality product
Washing plant now 10mm will be washed - rich compost

Legislation / regulation
Diverting waste from landfill, but threats also an opportunity
Food waste bans to landfill
Landfill bans for organics
Landfill escalator
Legislation changes - food to landfill
Legislation - food separation compulsory
New regulations forcing increasing recycling rates
Zero waste - build up food waste collection service
Peat free targets

Diversification
Could go IVC with food waste but LA not planning on doing food waste but could approach none LA but again it's investment that is an issue
Developing AD plant on site
Moving into AD
Talk of permission to get AD plant
Potential to send stuff through to AD or biomass but seeing this more as diversification
Renewable energy

PAS 100
Achieve PAS and the benefits it brings
PAS 100 establish external markets
PAS 100 now last year in 2011 but no appetite to sell yet but there could be a market for sand etc in soil - a menu of blends available
PAS 100 product, move into market place.

Higher inorganic fertiliser process
Fertiliser prices, so compost more of a value
Increasing fertiliser value in compost. AD capability for food waste recycling challenging
Price of artificial nitrogen goes up then greater demand for compost
Using compost as a fertiliser in a world of rising oil prices

Operational
Improve the process and machinery
Be green, keep compost themselves
Benefits of compost to their farm business
Increased capability to process food cost effectively

Other
Better price on sale of compost, AD and food waste
Educating local agricultural markets - educating farmers, not enough literature with benefits - level of paperwork with tracking material
Olympics

AD - Threats

Competition for feedstock (leading to lower gate fees)
Availability of feedstock
Competition for feedstocks; big issue
More AD plants will mean more competition for feedstock
Other technologies
Gate fees

Regulation / legislation / planning
Government policy
Government policy decreasing gate fees
Additional legislation
Unreasonable legislation
Excess regulation, end of waste in digestate
Regulation
Regulatory uncertainty and cost of regulation
EA

Public attitudes
Local stakeholders

PAS 110 issues
Cost of sludge removal=PAS 110 - too expensive
PAS 110
PAS 110 costs
PAS 110 problems/issues

Incentives/electricity prices
Falling electricity prices
Electricity prices; markets
Tariffs
Uncertainty over ROCs
Uncertainty over ROCs/ROCs2

Operational issues
Consistent income
Getting the technology to a state where it performs well and robustly
Transport costs

Finance
Lack of finance
Removal of government assistance to such schemes

Other
Island location

AD - Opportunities

Expanding/new markets
Selling digestate
Heat uses
Wider uses for heat

New/expanding feedstock supplies
As gate fees decrease more green in
Gate fees may mean more green waste input
Bring in waste at a gate fee
Waste arisings needing treatment
Food waste
Feedstock supply consistently
Local business - waste disposal

Legislation / regulation
Bans on food waste to landfill
Food waste ban to landfill

Incentives/electricity prices
Good incentives; ROCS

Operational
Composting their own outputs
Innovation improved technology – wider uses
Increase capacity and upgrade to gas injection
New tech increasing output – lignin
Performance and robustness of facility
Small scale so put next to small scale producers
CHP - as next step
CHP unit/cash in on feed in tariffs/ reduced energy bills

MBT - Threats

CLO Markets
Markets for CLO
Finding sustainable outputs for CLO
Difficult to plan until we understand the definition of recycling?
EA decision regarding CLO applications to land
Allowance of CLO in recycling figures - recovery rates improved by composting outputs, if outputs not allowed to be classed as compost then LAs won't meet targets
Lack of understanding of the output and the markets

Declining organic fraction
Waste composition - organic fraction declining
Exports

MBT - Opportunities

Renewable heat production
Creating better recyclable materials

Waste & Resources Action Programme

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