Report

8th December 2014

A survey of the organics reprocessing industry in Scotland in 2013

A report on the structure of the Scottish AD & composting sectors and the markets for outputs

Executive summary

The purpose of this study was to quantify the processing of organic material in Scotland by means of survey of the operators of composting and AD sites. This report summarises the methodology employed and the results obtained from the survey.

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 Anaerobic Digestion and Biogas Association (ADBA), the Renewable Energy Association (REA) and the Environmental Services Association (ESA). The report on the UK results (which are from a survey of the AD sector only) is available from the WRAP website.

Methodology

A telephone survey was carried out between February and April of 2014, collecting data on the state of the sector in the calendar year 2013. Attempts were made to contact all of the known composting and AD sites in Scotland. Composting sites, including both In Vessel Composting (IVC) and windrow sites, were identified based on past surveys and the knowledge of the contractor. AD sites were identified from the list on the AD Information Portal (http://www.biogas-info.co.uk/index.php/ad-map.html), but excluded water (sewage) treatment plants and mechanical biological treatment (MBT) plants which process residual waste but have an AD plant to process the organic fraction extracted.

The response rate for composting sites was 90%: 26 sites answered at least some of the survey questions, out of an operational population (during 2013) of 29 sites. This compares to a response rate of 76% (25 out of 33 operational sites) in the survey of 2012.

The response rate for AD sites was 73%: 8 sites answered at least some of the survey questions, out of an operational population (during 2013) of 11 sites. This was identical to the response rate in the survey of 2012.

This report classifies AD plants into four categories, as follows:

Commercial – sites which accept waste from off-site, on a commercial basis (i.e. for a gate fee). Such sites may be based on a farm.

Industrial – sites which process their own wastes, typically on a large scale, such as food and drink manufacturers.

On-farm – sites which are both located on a farm and process only material generated on-farm (including energy crops).

Demonstration – demonstration/R&D sites. AD sites that process feedstock for demonstration or feasibility purposes. Such sites may contract in waste but not on a large scale.

Key Findings

Composting

The number of composting sites operating in Scotland has reduced between 2012 and 2013, from 33 to 29, with a corresponding reduction in the amount of material processed, from 475,000 tonnes to 411,000 tonnes and a reduction in employment from 146 full-time-equivalents to 139.

The majority (60%) of material processed at composting sites continues to be processed using Open Air Windrow (OAW) and while the number of OAW processes in operation remained static, the number of IVC processes in operation decreased from nine to seven.

The majority (83%) of material processed by composting sites continues to come from local authority sources but this proportion is lower than in 2012 (91%) – a reduction of 50,000 tonnes. In contrast, the quantity of material sourced from food manufacturers and processors increased from 2,000 tonnes in 2012 to 38,000 tonnes in 2013. This increase is likely to be due to businesses pre-empting a change in regulation requiring some food businesses to present food waste for separate collection from 1 January 2014.

The reduction in scale of the composting sites is reflected in a reduction in the estimated total amount of compost produced from 233,000 tonnes in 2012 to 203,000 tonnes in 2013. This overall decrease in compost produced is reflected in lower quantities being supplied to three out of the seven individual end markets: agriculture, horticulture/growing media and landfill restoration. Conversely there has been a large proportional increase in the turf and landscaping/landscape development markets.

Using the same methodology as for 2012, the estimate for the market value for compost produced in Scotland in 2013 is £690,000 compared with £566,000 in 2012, an increase of 22% despite the reduction of 13% in the amount of compost produced. This reflects the shift to higher value end markets.

Most (22 of the 26 surveyed) composters said that they were producing compost certified to PAS100 and all of these intend to maintain their certification.

Anaerobic Digestion

The number of AD sites has not increased in Scotland (in contrast to the UK as a whole where there has been an increase of 34%). The 2013 figure of 11 sites includes one additional industrial site and one fewer on-farm site, compared to 2012.

Employment has risen from 62 full time equivalents in 2012 to 70 in 2013.

It is estimated that industrial sites co-located with drinks manufacturers, breweries and distilleries which process large volumes of liquid and discharge to sewer accounted for 2 million tonnes of throughput in Scotland in 2013. All other types of site processed an estimated 132,000 tonnes in 2013, an increase of 9% on 2012.

Excluding the industrial sites which discharge treated water to sewers, the majority of input to AD plants in 2013 was separated solid food (64%, increased from 54% in 2012) with almost all the rest (34%) being liquids (as opposed to manures or purpose grown crops, which account for 31% of inputs to AD in the UK as a whole).

Excluding the industrial sites which discharge treated water to sewers, an estimated 120,000 tonnes of digestate was produced in 2013 compared to 110,000 tonnes in 2012.

For the majority (76%) of outputs from the sites (whole digestate and separated fibre and liquor) the operator of the AD plant paid the end user to remove them and no Scottish operators reported selling outputs to the end user. For the UK as a whole the market for digestate is slightly more developed, with some sites supplying it free of charge or obtaining a price. Only one of the eight sites responding to the survey produced outputs certified to PAS110.

Sites were asked if there had been any RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013) accidents at their AD plants in 2013. All eight sites responded to this question and none of them had experienced a RIDDOR accident.

Conclusions

The survey illustrates the mature nature of the composting industry in Scotland. There has been some contraction, in terms of number of composting sites and total quantity processed, but this has mostly been due to the disappearance of the 'lower tech' processes such as aerated static piles. At the same time, there is evidence of the remaining composters gaining access to higher value end markets.

In contrast, the data from the AD sites indicates a sector which is smaller and less developed, with less evidence of commitment to certified quality assurance and capturing value through end markets for their digestate.

Both sectors contribute to the Scottish economy through employment and the value of their outputs, both to the operators and to their end markets.

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Acknowledgements

The authors would like to thank all of those companies that took part in this survey for their time and contribution. The authors would also like to thank the members of the Steering Group for their valuable input and support, including:

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Ollie More, Anaerobic Digestion and Biogas Association (ADBA)

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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 Scotland and the UK as a whole, the capacity of the Scottish and UK organics processing/recycling infrastructure, and the nature, volume and value of the markets available for the outputs.

Zero Waste Scotland and other public bodies require information and data on the Scottish organics treatment sector covering a range of organic waste treatment 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). Zero Waste Scotland undertakes this work because the data collected in the survey is widely used by industry bodies, Zero Waste Scotland itself and bodies distributing industry funding throughout the UK to monitor inputs, outputs and markets. The results help Zero Waste Scotland 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.

1.2 Scope of the work

This study involved telephone surveys of processors of organic waste, both composting sites and AD sites. Composting sites include In Vessel Composting (IVC) and windrow processes listed on the database produced from last year's survey, supplemented by SEPA data and the sector knowledge of the contractor. AD sites included industrial, commercial and farm based AD plants listed on the AD Information Portal map but excluding AD facilities used for waste water treatment and sites which took input solely from their associated MBT facilities. The database that underlies the AD Information Portal map is the most comprehensive list of AD facilities but it is acknowledged that certain types of sites (such as those on food manufacturing/processing sites and on farms) can be missed if planning permission is not required. MBT sites which produce an organic output were not surveyed this year.

This research focuses on the calendar year 2013 and is comparable with the 2012 survey, which was conducted in 2013.

The results of the survey build on those from previous years, and include information and data from composting and AD facilities. Repeated annually for all organic waste recycling technologies since the mid-1990s, this report has come to be regarded as the most up to date and definitive source of data on the sector.

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 EA and WRAP support in later years) and more recently by Zero Waste Scotland and WRAP with the support of the Association for Organics Recycling (AfOR)[1], the Anaerobic Digestion and Biogas Association (ADBA), the Renewable Energy Association (REA) and the Environmental Services Association (ESA). The additional sector bodies have been included in recognition of the diverse range of technologies now operating in the organics treatment sector and in particular to track the expansion of AD.

Copies of the four most recent UK-wide surveys can be found on the WRAP website and previous reports (the annual State of the Composting and Biological Waste Treatment Industry reports produced by AfOR) can be found on the ORG website.

[1] *In 2013 REA and AfOR merged and AfOR is now represented by the Organics Recycling Group (ORG) within REA.*

1.4 Context

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. Zero Waste Scotland is funded by the Scottish Government to support the delivery of this Zero Waste Plan and other low carbon and resource efficiency policy priorities.

May 2012 saw the passing of the Waste (Scotland) Regulations 2012 which represent perhaps the most significant development in recycling that Scotland has ever seen and are designed to help us realise the true value of resources we currently throw away. This has the potential to boost Scotland's economy and create green jobs in the process. The new Regulations will also play a key role in helping Scotland reach its ambitious target of 70% recycling of all waste by 2025. In the context of organic waste, the role for Zero Waste Scotland is to provide practical help and support to enable a sustainable and profitable organics treatment industry. It does this through its support to organics treatment 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; and work with all sectors to encourage greater uptake of AD.

2 Methodology

2.1 Introduction

The data for this report was collected via a structured telephone survey.

The survey used questionnaires to capture data pertaining to the organics treatment industry. Separate questionnaires were developed for permitted composting and anaerobic digestion (AD). A database of sites to be contacted to participate in the survey was produced using the "Organic Recycling Site Register" (ORSR) database produced from the 2012 survey, plus information sourced from the Scottish Environmental Protection Agency (SEPA) register and information on composting sites known to the consultant who conducted the interviews, Jenny Grant. For AD, the survey attempted to interview all sites operational during 2013, based on the data collected for the AD Information Portal map (available at http://www.biogas-info.co.uk/maps/index2.htm) but excluding waste water treatment facilities and those sites co-located with an MBT and which only process the organic fraction of the MBT's output.

For Composting sites, the telephone survey was conducted by Jenny Grant and for AD sites the telephone survey was carried out by BDS Marketing Research Ltd, contacting individual sites and recording responses electronically during the call.

The survey was publicised by the sector trade bodies and Zero Waste Scotland to raise 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 focused on the calendar year 2013 and largely replicated the 2012 survey, which was delivered in 2013, although this year MBT sites were not included.

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

2.2 Changes to the 2012 composting results

The market estimates for the composting sector in 2012 are different in this report to those in the report published in 2013. After conducting the 2013 survey it became apparent that changes would need to be made to the 2012 composting results to make them comparable to 2013. This was because five sites that were operating in 2012 had not been included in the 2012 survey and two sites that were surveyed in 2013 were revealed to have been operating under an exemption in 2012. As a result, the five sites were added and the two exempt sites removed from the 2012 data. This was done as follows:

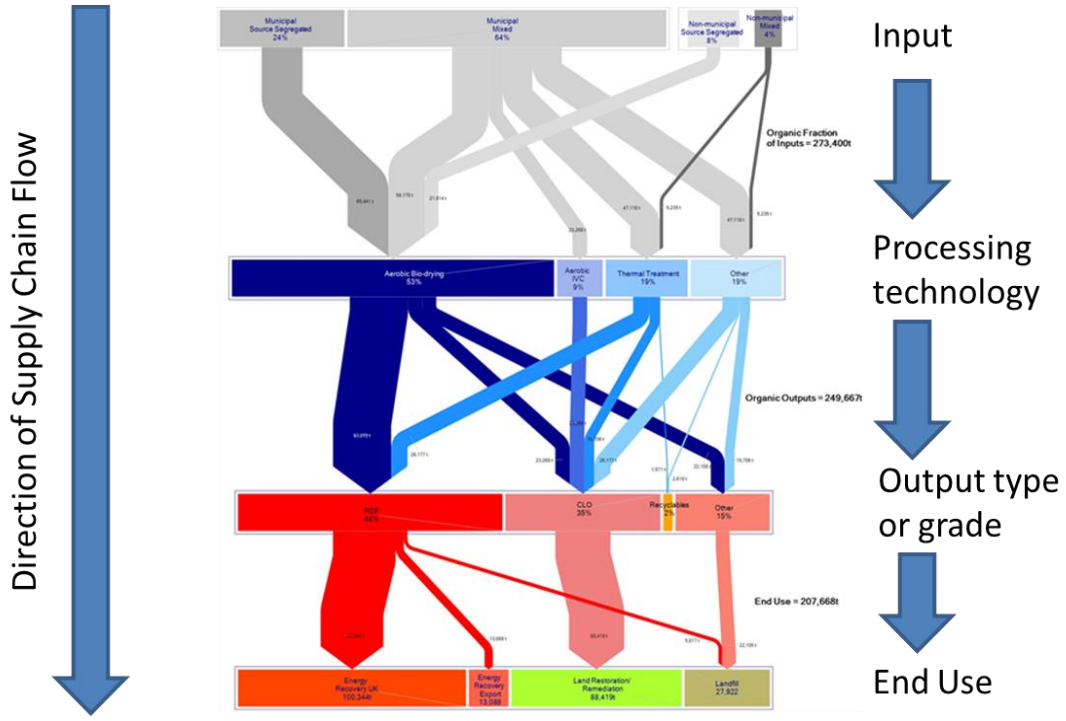
1. All data for the two exempt sites was removed from the 2012 data (and excluded from the 2013 data).
2. The 2013 data for the five overlooked sites was reviewed in light of the contractor's knowledge of their operations in 2012. In four cases, it was agreed that there had been no significant change between the two years, so the 2013 input and output figures were used for 2012. In the fifth case, actual data for 2012 was available and so this was used.
3. The figures for the number of operational and the number of not operational/not relevant sites in 2012 were amended.
4. The revised 2012 raw data was grossed using the same methodology as originally used (explained in Appendix 3) to produce a new estimate for the Scottish composting industry in 2012.

As a result of this process, where grossed figures for 2012 for site capacity, inputs, outputs and employees are quoted in the report they are the revised figures. This not only affects the headline results it also filters through to results showing, for example, the inputs per facility type and the overall financial value of the composting market.

2.3 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 1 Example Sankey diagram layout



Note: 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.

3 Results

This section outlines the results of the analysis of the survey responses, providing narrative where this is required to explain or enhance the results.

Overall, the methodology employed for this survey was similar to that used in for surveying the sector for 2012, and year-on-year comparisons have been made, where appropriate.

When applied to the raw data collected in the survey, the grossing methodology calculates estimates to the nearest tonne. These estimated figures are presented in this report rounded to the nearest 1,000 tonnes.

NOTE:

Some of the tonnages presented in this report are sector estimates, calculated by grossing up, from the survey responses, to make allowance for the sites which did not respond to the survey. These figures are described as 'grossed tonnages'.
Other tonnages are the figures reported by the sample of sites which provided answers. These figures are described as 'reported tonnages'. The number of operators providing answers can vary from question to question.

3.1 Permitted Composting

3.1.1 Survey Performance and Participation

Successful contact was made with 33 composting sites from an initial list of 35. From these sites, 26 completed usable interviews[2], compared to 25 surveyed for 2012. Of the 33 sites where contact was made, two were operating under an exemption, four were not operating in 2013 and one chose not to take part. Attempts were made to make contact with the remaining two sites but without success.

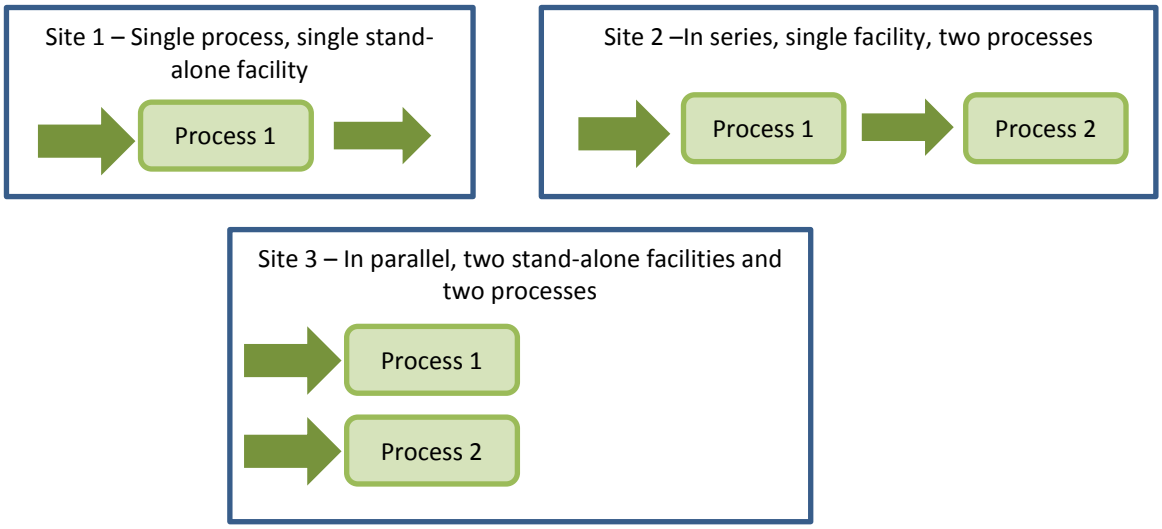
It is worth noting at this point that, for the purposes of this report, where there is reference to:

'Site' - this is the physical composting location and may house more than one facility and more than one process.
'Facility' - it is a single stand-alone process or combination of processes operating in series.
'Process' - it is an individual composting technology e.g. IVC or aerated static pile.

Therefore, the survey collected responses from 26 sites operating 28 different facilities and 34 separate processes i.e. two sites each operated two facilities in parallel. Figure 2 illustrates the various possible configurations.

[2] *There were actually a total of 28 surveys completed by composting sites but during the survey it was noted that two of these were operating under an exemption in 2013 so the results were excluded as noted in Section 2.2.*

Figure 2 Distinguishing between sites, facilities and processes



The breakdown of participation rates is summarised in Table 1.

Table 1 Scotland Composting site survey - participation rates

	2013	2012	2010
Sites listed [(i)]	35	37	36
Not operational/not relevant [(ii)]	6	4	3
Refused	1	2	2
Sites Surveyed	26	25	24
No conclusive contact [(iii)]	2	6	7
Active Population	**29**	**33**	**33**
Proportion of Active Population Surveyed	**90%**	**76%**	**73%**

Notes:

(i) This is the contact database developed using the ORSR contact database (developed in delivery of the 2012 survey), data provided by SEPA and the industry knowledge of the surveyor.

(ii) These are sites that responded that they were not operating in 2013 or were operating under an exemption.

(iii) These are sites where no contact was made with any individual able to answer the survey either because the appropriate individual was constantly unavailable or because there was no answer to calls to the site. For 2012 it includes 5 sites that were operating in 2012 but were overlooked for the 2012 survey due to the way they had been categorised by SEPA.

3.1.2 The Size of the Scottish Composting sector

To estimate the size of the total inputs and outputs to composting sites in Scotland in 2013, the data from the 26 surveyed sites was applied to the whole population of the 29 operational sites in Scotland, using the methodology which is summarised in Appendix 3 and which is the same as was used for the 2010 and 2012 surveys. It was performed following extensive quality checks of the raw data collected.

Table 2 provides estimated inputs and outputs. The 2013 figures have been presented alongside the revised 2012 figures to enable comparisons to be made. The grossed figures provide estimates for the whole of the composting sector in Scotland.

Table 2 Size of the Scotland Composting Sector 2013

	Scotland 2013	Scotland 2012 (revised) (i)	Change
Total surveyed inputs (tonnes)	369,000	432,000	
Grossed inputs (tonnes)	**411,000**	**475,000**	**-13%**
Surveyed site capacity (tonnes) (ii)	536,000	563,000	
Grossed site capacity (tonnes) (ii)	**598,000**	**641,000**	**-7%**
Total compost output surveyed (tonnes)	182,000	212,000	
Grossed compost output (tonnes)	**203,000**	**233,000**	**-13%**
Total employees surveyed	120	133	
Grossed employees	**139**	**146**	**-5%**

Notes:

- Tonnages rounded to nearest 1,000. % change calculated on the unrounded figures

(i) See section 2.2 above for details of the revision.

(ii) Operators were asked for the practical operational capacity of their site, which is not generally the same as the permitted capacity.

These results show:

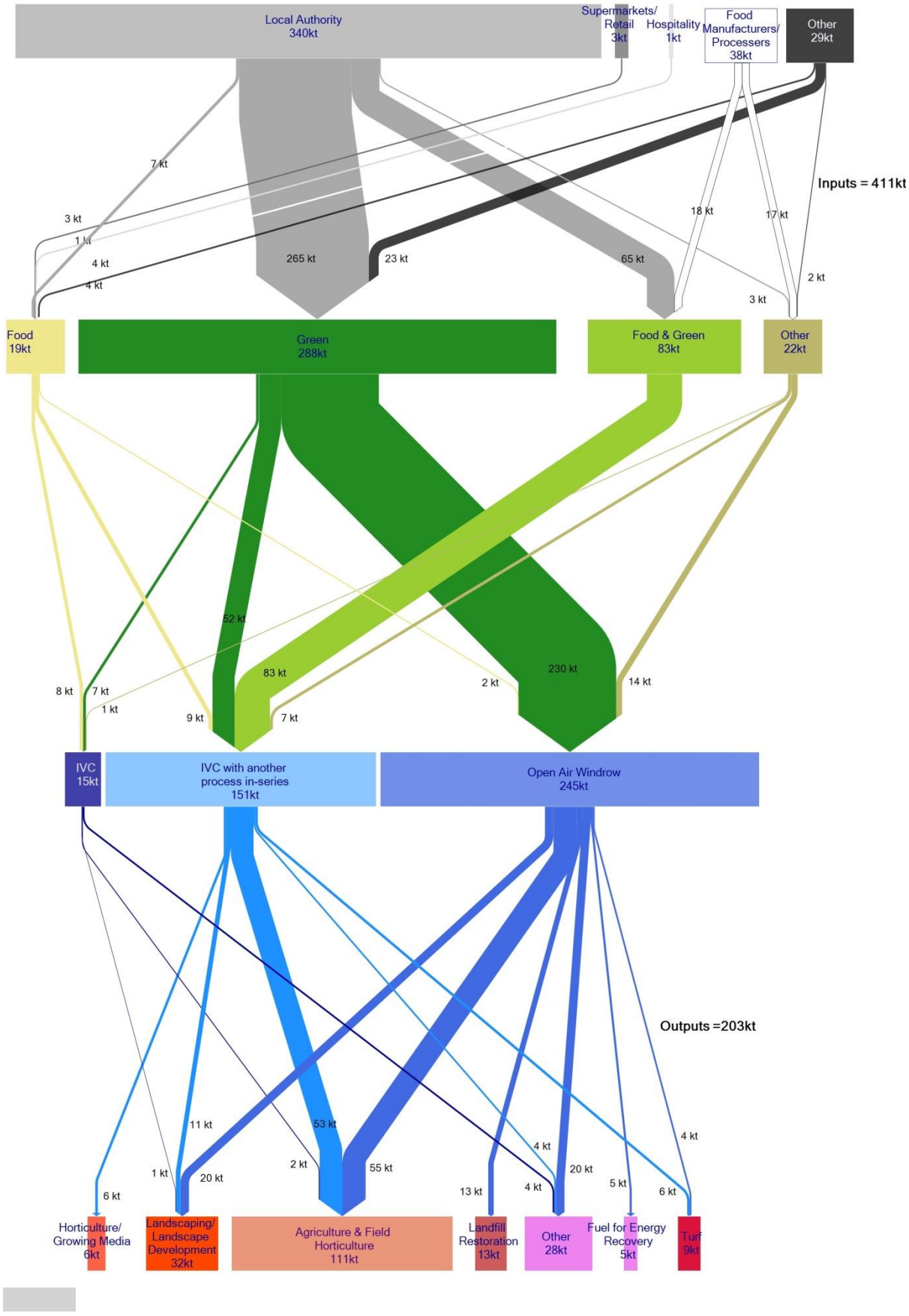
- A Scottish market size (total throughput) for all permitted sites of 411,000 tonnes, down by 13% compared to the 2012 survey, with compost outputs of 203,000 tonnes, down by 15% compared to the 2012 survey.
- Scottish total composting capacity has also decreased, to 598,000 tonnes, suggesting a 69% capacity utilisation (compared to 74% in 2012).
- A total employment in Scottish composting of 139 full time equivalents which is a 5% decrease on 2012.
- The average annual input per site in 2013 was 14,000 tonnes per annum, with a range of 100 tonnes to 63,000 tonnes; it was also 14,000 tonnes per annum in 2012, with a range of 100 tonnes to 69,000 tonnes.

3.1.2.1 Supply Chain Flow

As described in Section 2.3, Sankey diagrams are a useful tool for visually presenting complex data. The figure overleaf is the Sankey diagram for composting flows.

When the inputs for each type of facility are grossed it has an effect on the proportion of the different feedstocks. Grossed figures are used in the Sankey diagram whereas survey results are noted elsewhere in the report.

Figure 3 Scottish Composting 2013 supply chain flow



3.1.2.2 Structural changes in the composting sector

The reduction in the number of active sites in Scotland from 33 in 2012 to 29 in 2013 is the result of five sites ceasing operation between the two years with only one site coming on line (this site moved from operating under an exemption in 2012 to operating with a permit during 2013). The five sites that have ceased to operate were previously operating composting facilities as follows:

- 1 x IVC & OAW in series
- 1 x stand alone OAW
- 1 x aerated static pile
- 2 x 'other' e.g. Rocket system

The site that moved from being exempt to being permitted operates a stand alone OAW facility.

This change in the population of sites has a significant impact on the headline results, causing a net reduction in input to sites of more than 33,000 tonnes per annum[3]. These changes also result in the disappearance of aerated static pile and 'other' processes from the sites surveyed in 2013 but have little impact on the instances in the survey of the two main processes of IVC and OAW as Table 3 shows. It is worth highlighting that windrow under cover (WUC) was being utilised by surveyed sites in four instances in 2013 where it was not recorded for any surveyed site in 2012.

Table 3 Comparison of number of surveyed sites using different types of process in 2013 & 2012

Type of facility	Instances of process type being used in 2013	Proportion	Instances of process type being used in 2012	Proportion	Difference
IVC (i)	7	21%	9	24%	-2
Open Air Windrow	23	68%	23	62%	0
Windrow Under Cover	4	12%	0	0%	4
Aerated static pile	0	0%	2	5%	-2
Other (i)	0	0%	3	8%	-3
Total number of processes	34		37		-3

Notes:

- Percentages (%) do not add to 100% due to rounding

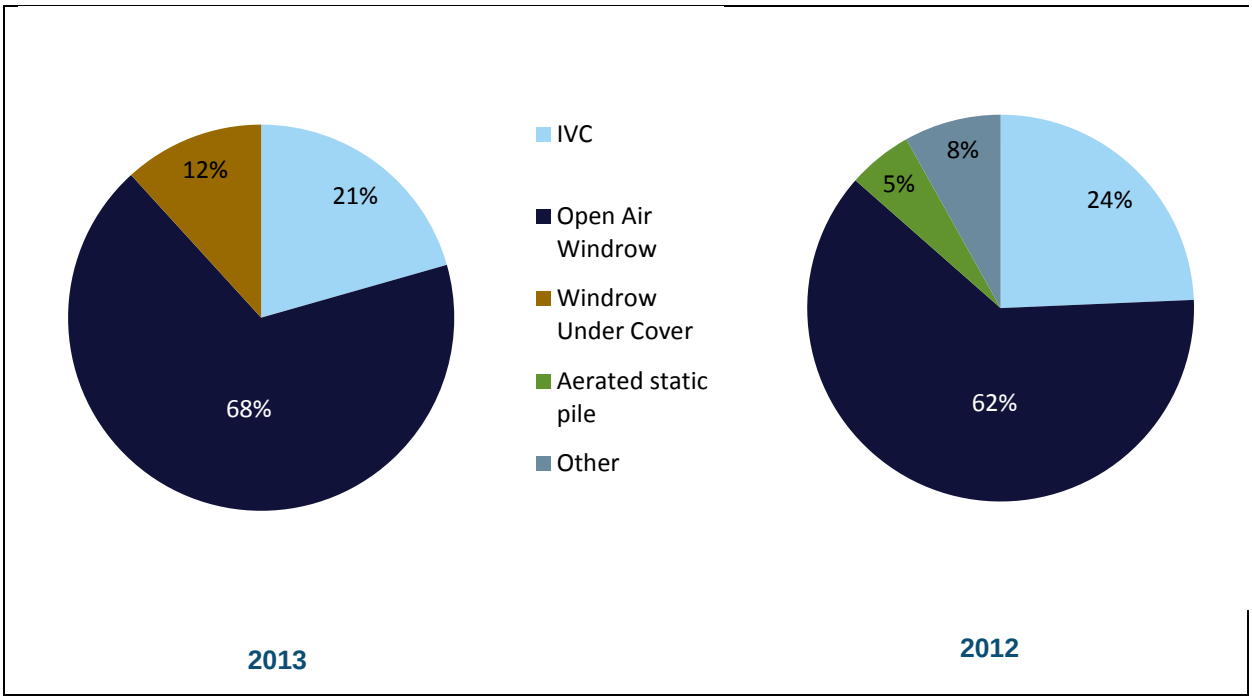
(i) The table shows a reduction of two sites for IVC; one of the IVC sites surveyed in 2012 has now ceased to operate, as noted above, and another IVC site refused to take part for 2013. Two of the three processes classed as 'other' have ceased operation and the remaining process, operating in series with aerated static pile, has been switched to OAW.

As noted above, the 2013 survey showed that there were 34 processes operating at 28 facilities on 26 sites; two sites were using two processes and three sites used three processes. Table 3 shows the

[3] *The calculation of net inputs takes into account that three of the five sites reported moving their production to a different site which had been operational in 2012, although these quantities are small, at 2,000 tonnes combined.*

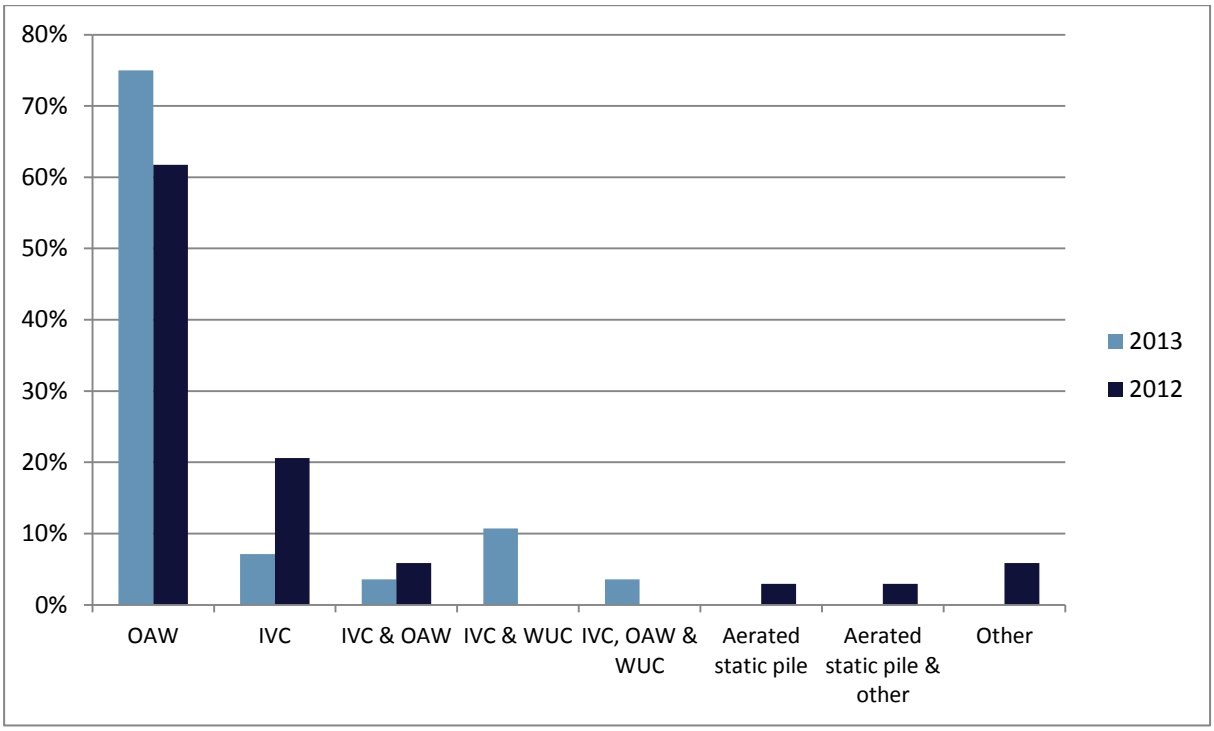
breakdown of processes surveyed for 2013. This illustrates the continued dominance of IVC and OAW, which accounted for 89% of all processes used (86% in 2012). In all cases where sites reported the use of windrow under cover (WUC) processes, these were operating in series with an IVC process. Figure 4 presents these differences.

Figure 4 Proportion of each type of process surveyed (% of total processes) 2013 & 2012



If the types of *facilities* utilised are compared between the two years (surveyed sites only) it is apparent that there has been an increase in the proportion of sites operating OAW as stand alone and a decrease in the proportion of sites operating stand alone IVC – see Figure 5. In addition, the proportion of IVC processes operating in series with OAW has decreased, with IVC operating in series with WUC and in series with both OAW and WUC being used in 2013 where this was not apparent in 2012.

Figure 5 Different facilities utilised, as % of all responses (2013 & 2012)



Notes:

- Where a process is listed on its own this refers to a stand alone facility, where technologies are listed together, these are facilities operating processes in series.

3.1.2.3 Site Capacity

Sites were asked what their practical annual operational capacity was in 2013. 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 2013. Grossing the survey data for operational capacity results in an estimated practical capacity (as opposed to permitted capacity) of 598,000 tonnes per year at composting sites in Scotland in 2013, this compares with 641,000 tonnes of capacity in 2012. This reduction is the result of the closure of the five sites that ceased operation between the two years, the capacity for four of these sites (one did not provide data) totalled 52,000 tonnes in 2012. The average site capacity has increased by 6%, from 19,000 tonnes in 2012 to 21,000 tonnes in 2013. This data suggests that capacity utilisation was 69% across all sites in 2013 (74% in 2012) i.e. there was a potential spare capacity of 140,000 tonnes (166,000 tonnes in 2012).

Capacity was only provided at site level and not for the different facilities operating in parallel. Therefore, capacity and utilisation for the sites operating facilities in parallel are combined and included as a separate entry for 2013 in Table 4 below.

Table 4 Capacity and utilisation of the main composting site types in Scotland (2013 & 2012)

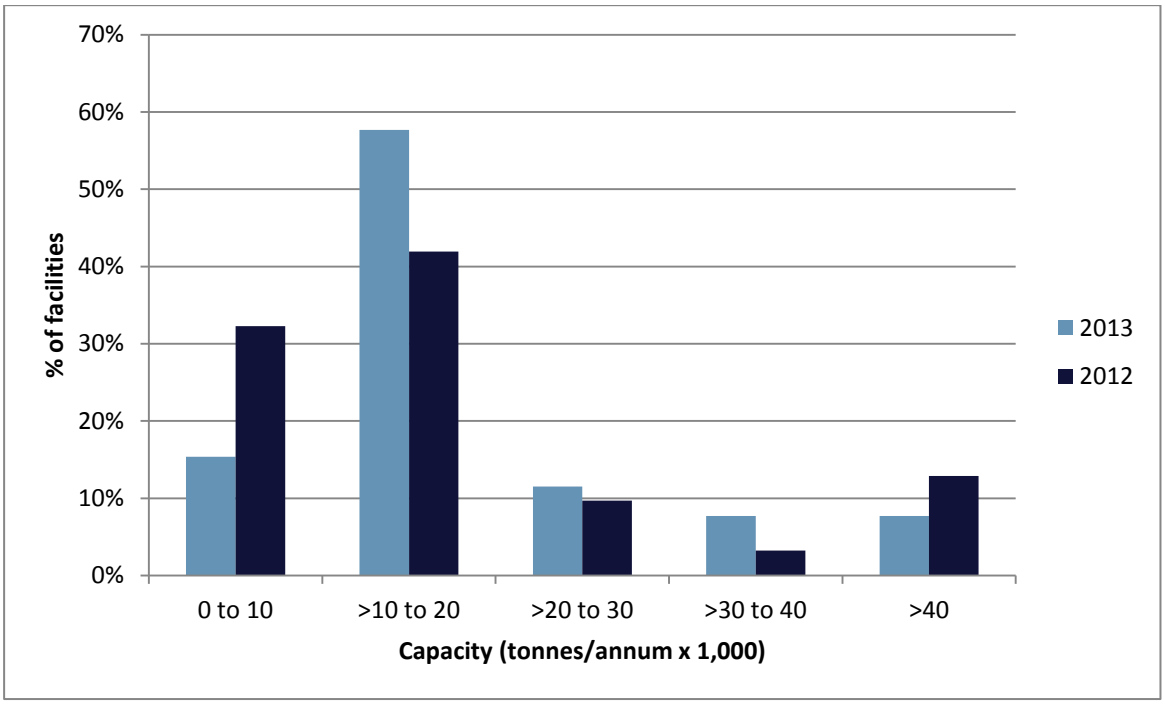
	2013			2012		
Facility	**Capacity**	**Utilisation**	**Spare Capacity**	**Capacity**	**Utilisation**	**Spare Capacity**
Sites containing IVC operating as stand alone or in series	143,000	86%	20,000	208,000	89%	23,000
Stand alone Open Air Windrow	344,000	60%	138,000	415,000	65%	134,000
Sites operating IVC & OAW in series	112,000	74%	29,000	Included in above		
Total	**598,000**	**69%**	**187,000**	**641,000**	**74%**	**142,000**

Notes:

- Tonnages rounded to nearest 1,000. %'s calculated on the unrounded figures
- Details for minority site types (aerated static pile and 'other') have been suppressed to avoid disclosure of individual site information.

Analysis also shows that 73% of sites had a practical annual operational capacity of 20,000 tonnes or less (74% for 2012). However, Figure 6 suggests a shift in capacity from 10,000 tonnes per annum or less to between 10,000 tonnes and 20,000 tonnes per annum between the two years; of those sites that ceased operation three had an operational capacity of less than 10,000 as does the newly permitted site, which suggests a shift away from smaller sites.

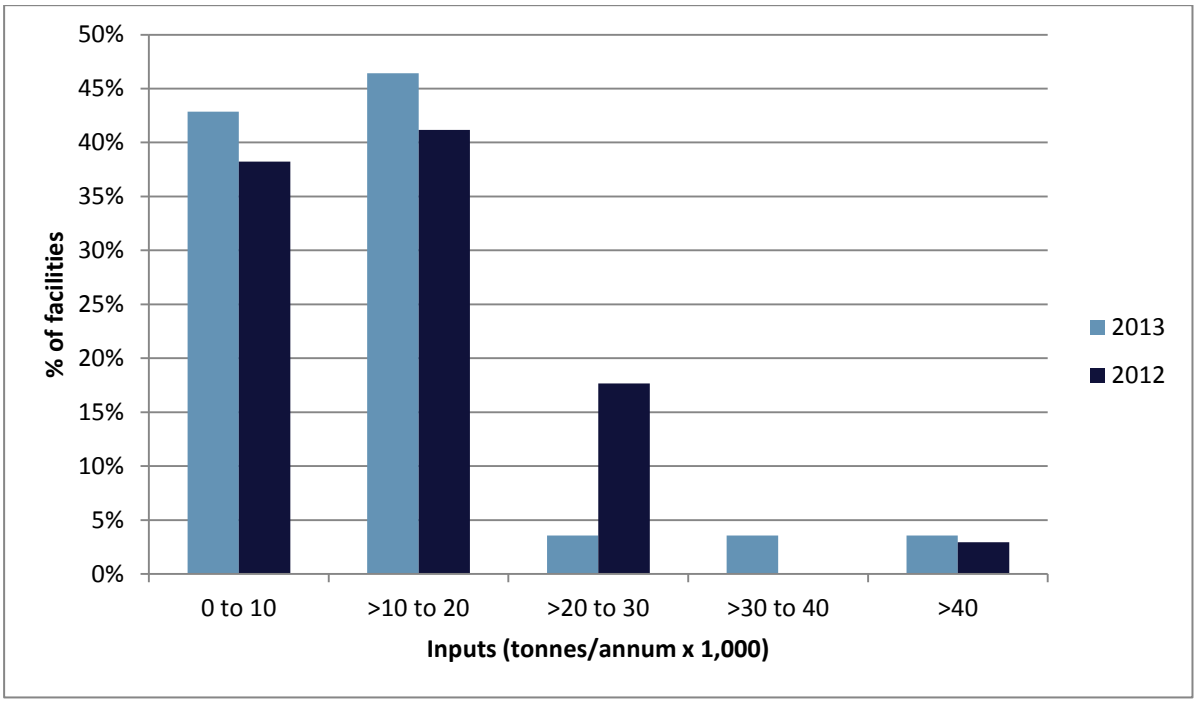
Figure 6 Annual practical operational capacity, as % of all responses (2013 & 2012)



3.1.2.4 Site Throughput

Survey responses showed that 89% of Scottish sites processed 20,000 tonnes or less of organic waste in 2013 (79% in 2012). This compares with just 73% of sites that have an annual practical operational capacity of 20,000 tonnes or less (Figure 6). What is particularly apparent when comparing inputs with capacity is just 15% of sites report a capacity of 10,000 tonnes per annum or less whereas 43% of sites report an annual input figure of 10,000 tonnes or less. Both of these observations support the idea that capacity is being under-utilised as shown in Table 4, above.

Figure 7 Input per composting facility, as % of all responses (2013 & 2012)



3.1.2.5 Process types and inputs

The majority (60%) of organic waste that was processed at composting sites in 2013 was done so using OAW (59% in 2012).

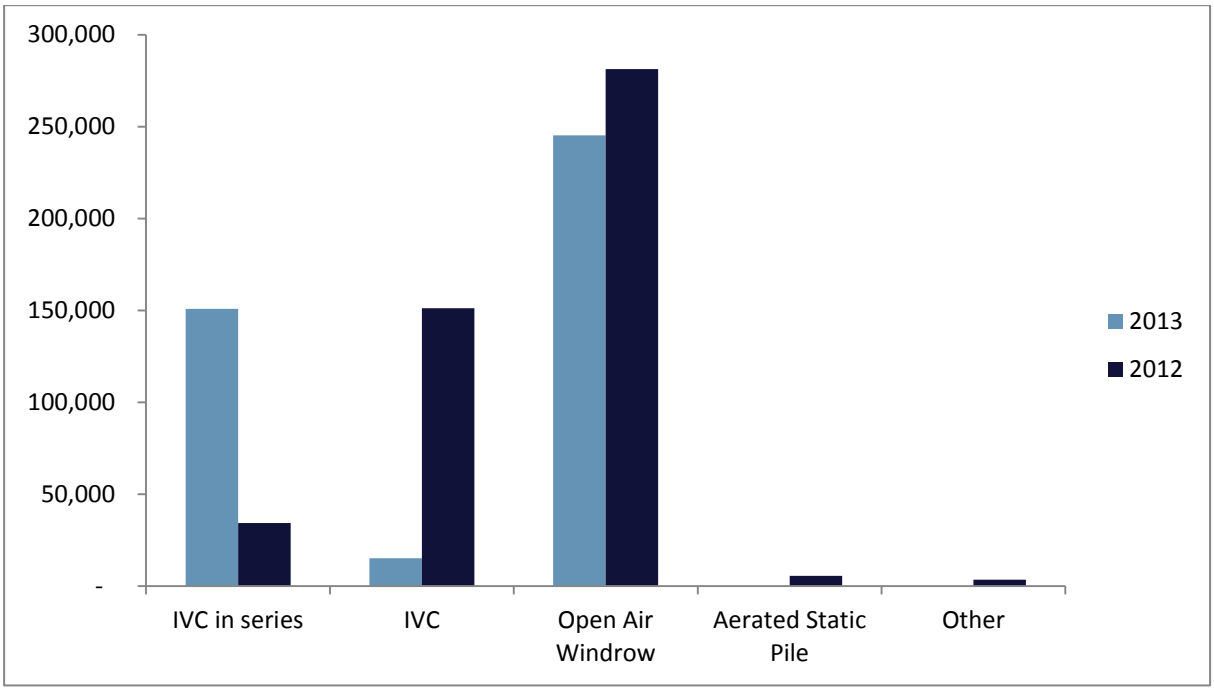
IVC technology covers a myriad of systems largely designed to meet the requirements of the ABPR. The higher capital cost of enclosing composting systems means that many operators opt to complete some of the process using other technologies. The survey results show that five (71%) of the seven sites that operated an IVC facility also operated at least one other type of facility at the same site. Of these five sites, three operated the other process(es) in series with the IVC system and two both in parallel and in series.

Further analysis of IVC sites shows that the shift from operating IVC as a stand-alone process to using it in series with another process has also led to a shift in the quantities received at these types of facility:

- Sites where IVC operated independently of other processes received 4% of total Scottish composting inputs compared with 32% of inputs in 2012.
- Sites where IVC operated in series with another process accounted for 37% of total Scottish composting inputs. In 2012 IVC operating in series received 7% of inputs.
- Where IVC was operated in series with another process, the process was: windrow under cover in three cases, OAW in one case and both windrow under cover and OAW in one case.

This change is illustrated in Figure 8.

Figure 8 Comparison between 2013 and 2012 input quantities for each type of facility



Notes:

- Windrow under cover is not represented separately here because in all instances it operated in series with IVC, therefore it is included with the 'IVC in series' facilities. However, it is shown in Figure 4 on page 12 because it is counted as a separate process type.

Whilst there are the same number of stand alone OAW facilities in 2013 as there were in 2012 (21), the inputs to these facilities has decreased, as Figure 8**Error! Reference source not found.** shows. This is due largely to those OAW sites that completed the survey in both 2012 and 2013 showing a net reduction in inputs of 33,000 tonnes per annum between the two years, which may be at least partly a result of the competition for feedstocks from AD, mentioned under 'Business Issues' on page 34.

Overall, IVC (operating in series or as stand alone) processed 19,000 fewer tonnes in 2013 than in 2012. The sites common to both surveys reported an 8,000 tonnes increase in the amount of material treated but the site operating an IVC process that closed between 2012 and 2013 reported significant inputs and this closure has contributed significantly to the overall reduction between the two years. The reported changes from IVC operating as stand alone to IVC in series is a result of four sites that are common to both surveys noting that they used IVC in series with another process in 2013, whereas in 2012 IVC was stand alone.

3.1.3 Feedstock

3.1.3.1 Waste feedstock sources

The survey results show that all of the waste processed was from external third party sources (i.e. it was from sources outside the site at which the plant is located and outside the site's own business group). The 2012 survey recorded 99% of inputs as being from external third party sources, with the remainder being from the site at which the plant is located and zero from the same business/group.

Table 5 summarises the data on feedstock sources, which shows:

- The proportion of feedstocks received from local authority sources was 83%, by weight, of the total input to sites, down from 91% in 2012. The total quantity received from local authority sources is estimated to have decreased from 390,000 tonnes in 2012 to 340,000 tonnes in 2013, which is a 13% drop – the sites that ceased operation are responsible for 34,000 tonnes of this reduction.
- The reduction in LA waste has been offset to some degree by an increase in commercial (non-municipal) waste inputs to 69,000 tonnes in 2013 from 37,000 tonnes in 2012.
- The large increase in material received from food manufacturers/processors (from 2,000 tonnes in 2012 to 38,000 tonnes in 2013) is likely to be due to the Waste (Scotland) Regulations 2012 which state: "Food businesses (except in rural areas) which produce over 50 kg of food waste per week to present that food waste for separate collection from 1 January 2014." Although the regulations did not come into force until 2014, the results of this survey suggest that businesses were already changing their practice in 2013 to meet the requirements of the new regulations.

Table 5 Source of material input to sites (Grossed figures, 2013 & 2012)

Source	Quantity (tonnes) 2013	Proportion 2013	Quantity (tonnes) 2012	Proportion 2012
Local Authority	340,000	83%	433,000	91%
Food manufacturers/processors	38,000	9%	2,000	<1%
Supermarkets/retail	3,000	<1%	1,000	<1%
Hospitality	1,000	<1%	4,000	<1%
Other source (i)	29,000	7%	35,000	7%
Total	**411,000**		**475,000**	

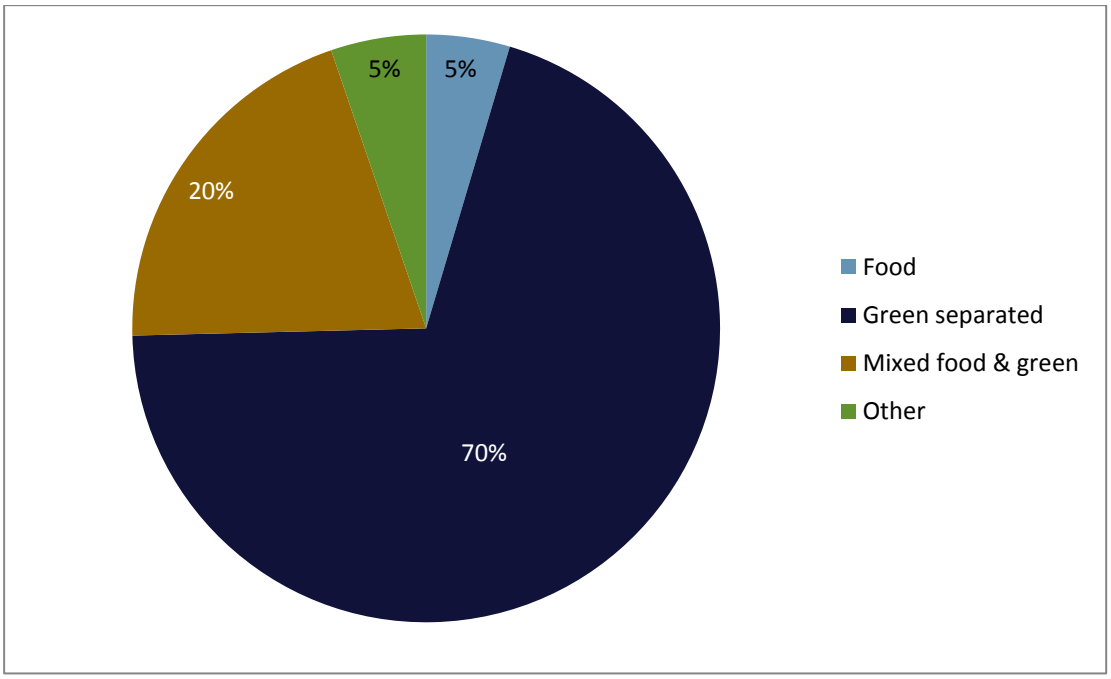
Notes:

- Tonnages rounded to nearest 1,000. %s calculated on the unrounded figures

(i) In 2013, "Other" was mainly identified as 'other waste companies' and 'landscapers'. No detail was obtained in 2012

As illustrated in Figure 9 below, the majority of inputs to sites were of separated green/garden waste at 70% of total inputs (65% in 2012). Mixed food and green waste was 20% of inputs (32% in 2012) with separated food waste at 5% (2%, 2012) and 'other' material providing 5% (1%, 2012); examples of materials entered as 'other' were cardboard, paper sludge and fish waste. The decrease in inputs of mixed food and green waste coupled with the increase in separated green/garden waste and separated food waste could be attributable to the push in Scotland for more local authorities to collect separate food waste; this is something that sites have commented on, see 3.1.3.10 on page 34 for further details.

Figure 9 Type of material input to sites proportioned by weight (% of total, Scotland, 2013)



3.1.3.2 Facility type and inputs

Survey results showed that 100% (98% in 2012) of mixed food and green waste and 90% (100%, 2012) of separated food waste was processed at sites with an in-vessel composting (IVC) facility. 80% (85%, 2012) of separated green/garden waste was processed at sites containing only an open air windrow (OAW) facility. 'Other' inputs (amounting to 5% of all wastes processed) were also mainly processed at OAW sites (64%; 74% in 2012). These results are summarised in Table 6.

Table 6 Proportion of the waste types processed by each facility type (% of total weight, Scotland, 2013)

	2013			2012		
	Separated Food	Separated Green/ Garden	Mixed Food & Green	Separated Food	Separated Green/ Garden	Mixed Food & Green
IVC with another technology in series [(i)]	50%	18%	100%	9%	8%	8%
IVC	40%	2%	0%	91%	5%	90%
Open Air Windrow	10%	80%	0%	0%	85%	0%
Aerated Static Pile	None surveyed			0%	2%	0%
Other process [(ii)]	None surveyed			<1%	<1%	2%

Notes:

- The bases (number of sites reporting data) are small for all input streams in both years apart from 'separated green/garden', so these percentages are indicative rather than definitive.
- Columns may not add up to 100% due to rounding.
- All sites provided data for this question.
- The 'Separated Food' processed at OAW sites has been confirmed as non-ABPR waste.

(i) These are sites where IVC is part of an in series system. Where sites have more than one facility but these run in parallel, data relating to each facility is recorded separately under the respective heading.
(ii) These are all the facilities classified as 'other' that operated as stand alone or in series in 2012.

3.1.3.3 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.

For 2013, all the sites reported some kind of pre-processing, whereas for 2012 two sites reported no pre-processing, both of these sites were not operational in 2013. All sites surveyed in 2013 undertook shredding, up from 86% in 2012 and none of the sites now undertake screening compared with 10% in 2012 - these changes are due in part to sites surveyed in 2012 becoming non-operational in 2013. The increase in the percentage of sites hand picking is due to six of the ten sites that did not undertake hand picking in 2012 being either not operational (5 sites) or not surveyed (1 site) for 2013, whereas six of the seven sites that were surveyed in 2013 but not 2012 do undertake hand picking.

All sites that reported undertaking visual inspection in 2013 are OAW sites; each of these also undertakes hand picking and shredding. As would be expected, all sites that de-package materials (essentially food items) utilise an IVC process. The results show no other correlation between technology type and pre-processing undertaken.

92% of sites reported using more than one type of pre-processing in 2013; it was 81% in 2012. Table 9 illustrates the pre-processing activity reported in each year.

Table 7 Proportion of sites undertaking pre-processing activities

Type of pre-processing	Proportion of sites	
	2013	2012
Shredding	100%	86%
Hand picking	89%	66%
Blending/Mixing	11%	17%
De-packaging	11%	7%
Screening	0%	10%
Other [(i)]	21%	3%

Notes:

(i) 'Other' was mainly 'visual inspection' in 2013, and using a magnet to remove contaminants in 2012.

3.1.3.4 Contamination

Respondents were asked to estimate the level of contamination they typically found per tonne of feedstock, with contamination being defined as items which are not biodegradable. The results are shown in Table 8. Respondents were also asked from which source the main contamination was received; the results of this are shown in Table 9.

Table 8 Estimated levels of contamination in feedstock reported by surveyed facilities (2013 & 2012)

	2013		2012	
Contamination level	Responses	Proportion	Responses	Proportion
Less than 1%	13	46%	13	45%
1% - 5%	11	39%	14	48%
6% - 10%	4	14%	1	3.4%
Greater than 10%	0	0%	1	3.4%
Total responses (facilities)	**28**		**29**	

Notes:

- Where there are two facilities operating in parallel at a single site a response was obtained for each facility.

This is supported by the results noted in Figure 15 on page 34 and the following text which show that 35% of sites feel that contamination in feedstocks impacts greatly on their business.

This year we asked operators which of the sources of feedstock was the main source of contamination and Table 9 shows the responses given. Clearly more composting sites receive material from local authorities than from any other source and so it is logical that LA collections are the main source of contamination received at composting sites in Scotland.

Table 9 Main sources of contamination at composting sites (Scotland, 2013)

Main source of contamination	Number of responses	% of responses	Total number of facilities receiving inputs from source
LA Collections	22	76%	27
Food manufacturers/ processors	2	7%	10
Supermarkets/ retail	2	7%	3
Hospitality	1	3%	2
Other	2	7%	5
Total responses	29		

Notes:

- One of the respondents ranked two sources equally ('supermarkets/retail' & 'hospitality'); therefore the table contains 29 responses from 28 facilities.
- Question not asked in previous years.

3.1.3.5 Composting Period

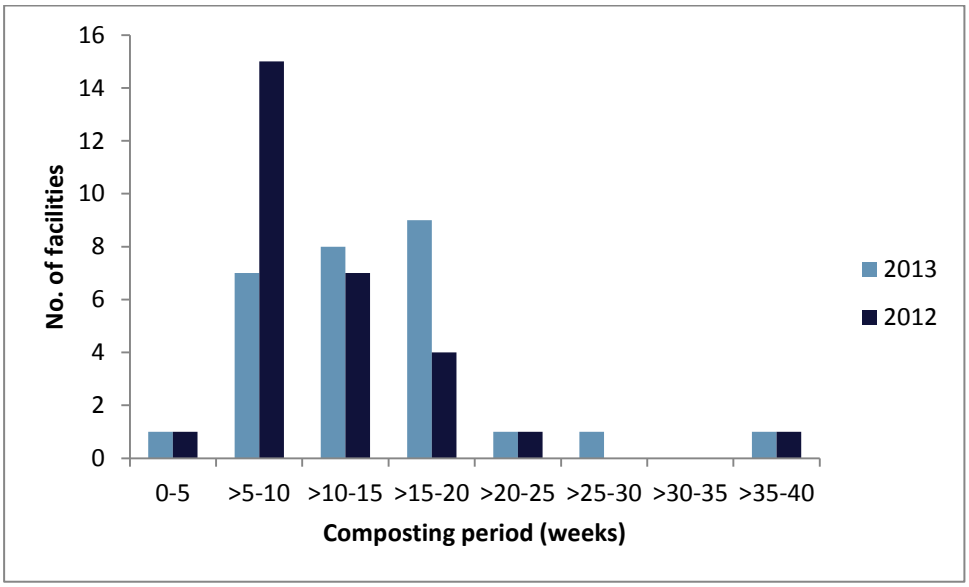
Sites were asked for the composting period of the facilities they operate, covering the sanitisation, stabilisation and maturation stages. Based upon the survey responses, the average composting period was 15 weeks compared with 12 weeks in 2012. This increase in the average is likely to be due to the increase in the proportion of sites operating OAW facilities in 2013, which have a longer composting period. For facilities utilising IVC (stand alone and in-series) the average period was 11 weeks (also 11 weeks in 2012) and for stand alone OAW it was 16 weeks (15 weeks in 2012). The most common composting period noted by respondents was 16 weeks in 2013; 8 weeks and 10 weeks were the most common periods in 2012.

Figure 10 compares the composting period at sites surveyed for 2012 with those surveyed for 2013. Whilst it does show a reduction in the number of facilities reporting a composting period of between 5 and 10 weeks (three of the sites that ceased operation between the two years had a composting period in this range), the majority of sites reported a composting period of between 5 and 20 weeks (86% in 2013 compared with 90% in 2012). A single IVC facility reported a composting period of five

weeks and a single OAW facility reported a composting period of 36 weeks; these two facilities reported the same composting periods for 2012.

Of the sites that were surveyed for both 2012 and 2013, two reported a decrease in composting period (both three weeks less), nine reported an increase (eight reported an increase of four weeks or less with one reporting a 10 week increase) and nine reported no change. The composting period can of course vary at some sites depending upon the time of year, the weather, the feedstock and the free capacity available.

Figure 10 Composting Period - distribution of responses per surveyed facility



The composting period can also be shown by facility type as illustrated in Table 10.

Table 10 Composting Period - distribution of responses by facility type , 2013

	Composting period (weeks)			
Facility type	**Mean**	**Max**	**Min**	**No. of facilities**
IVC stand alone	9	n/a	n/a	2
IVC in series	12	26	5	5
OAW stand alone	16	36	8	21

Notes:

- Max & Min for 'IVC stand alone' have not been provided to avoid disclosure of individual site information.

3.1.3.6 Compost Outputs

The material produced at composting sites is sent for use in numerous end markets. The total estimated output from composting sites in Scotland was 198,000 tonnes in 2013 compared to 233,000 tonnes in 2012, i.e. a 15% decrease between the two years. This decrease in outputs compares with a 13% decrease in inputs. The decrease in outputs can partly be accounted for by the sites that have ceased operation; their outputs in 2012 less the output of the newly permitted site in 2013 results in a net reduction of 17,000 tonnes per annum.

The 2013 survey returned an input to output ratio of 48% (49% in 2012).

The estimated grossed quantity of compost going to each end market in Scotland is shown in Table 11 which also presents 2012 figures for comparison.

Table 11 Estimated market destination of compost, Scotland 2013 v. 2012 (grossed)

	Tonnes 2013	Proportion 2013	Tonnes 2012	Proportion 2012	Difference %	Difference Tonnes
Agriculture & field horticulture	111,000	55%	140,000	60%	-21%	-29,000
Horticulture/growing media	6,000	3%	19,000	8%	-71%	-13,000
Landscaping/landscape development	32,000	16%	21,000	9%	52%	11,000
Turf	9,000	5%	2,000	1%	357%	7,000
Landfill restoration	13,000	6%	28,000	12%	-54%	-15,000
Fuel for energy recovery (i)	5,000	2%	5,000	2%	-8%	0
Other market (ii)	28,000	14%	19,000	8%	46%	9,000
Total	**203,000**		**233,000**		**-13%**	**-30,000**

Notes:

- Tonnages rounded to nearest 1,000 so columns may not add to total shown. % change calculated on the unrounded figures.

(i) The 'Fuel for energy recovery' figures do not include material sent to this market that was removed at the pre-processing stage. Five surveyed sites in 2013 sent material removed during pre-processing totalling 9,000 tonnes to this market.

(iii) The 'other market' category contains material used in the manufacture of topsoil, compost sold to local residents and, in 2013, that used for brownfield site remediation.

The overall decrease in compost produced is reflected in lower quantities being supplied to three out of the seven individual end markets. The greatest reduction in quantity is seen in material sent for

agricultural use which has decreased by an estimated 29,000 tonnes. The greatest proportional decrease is for the horticulture/growing media market which has reduced by 71%.

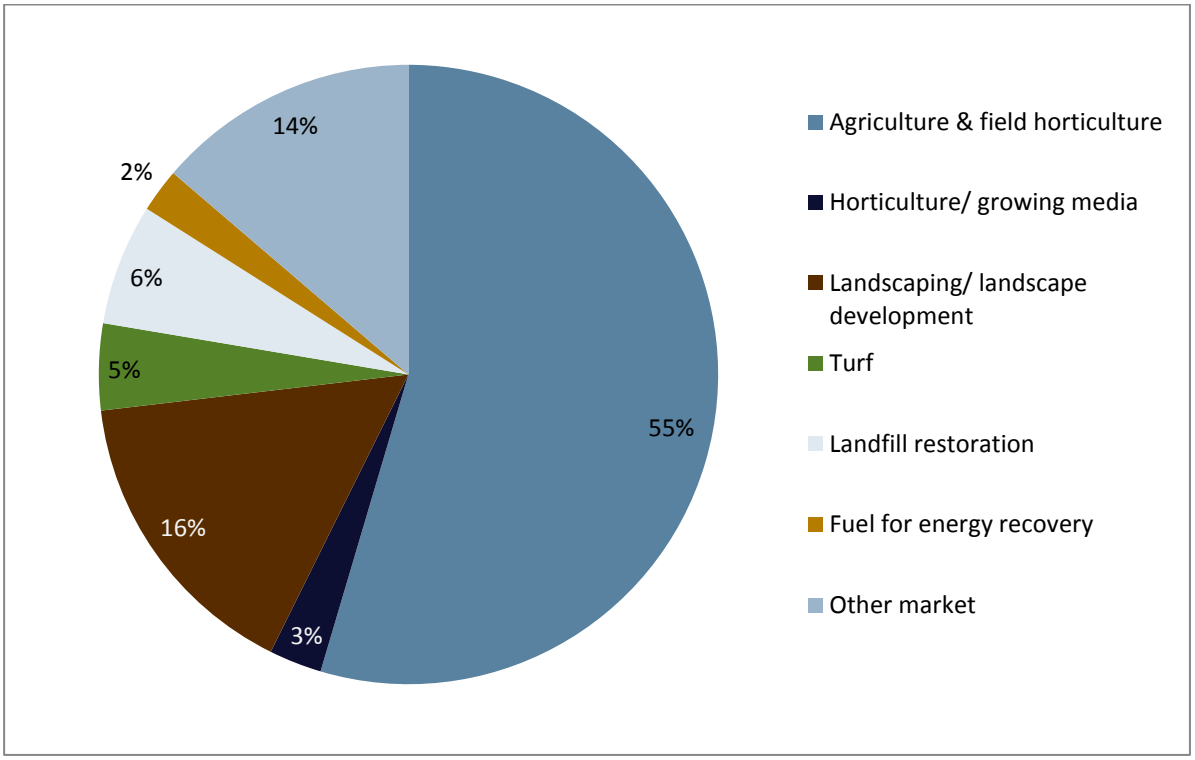
The market for landfill restoration has decreased significantly again in 2013, more than halving in size since 2012, following a reduction of 70% between 2010 and 2012. This means that the overall reduction between 2010 and 2013 is 86% or 82,000 tonnes per annum and landfill restoration now accounts for just 6% of the overall compost market compared with 34% in 2010. This is likely to be due to the change in regulations whereby if local authorities send material to sites which then sell/use the compost for landfill daily cover it does not count towards the local authority's recycling rates (unless it is used for final restoration).

Conversely there has been a large proportional increase in the turf market, which in 2013 is almost five times as large as it was in 2012 (2,000 tonnes per annum to 9,000 tonnes per annum). There have also been increases of 52% (11,000 tonnes per annum) in the landscaping/landscape development market and 46% (9,000 tonnes per annum) in the 'other' market, where compost has been used in the manufacture of topsoil, sold to local residents and used for remediation. It is worth noting that opportunities presented by end markets was cited more often than any other aspect as a positive business factor (see section 3.1.3.10, below).

The sites that ceased operation between the two years produced compost that was fairly evenly distributed across the markets for horticulture, landscaping and landfill restoration at around 6,000 tonnes per market. As such, they contribute to the reductions in the markets for horticulture and landfill restoration but the landscaping market has increased despite this reduction.

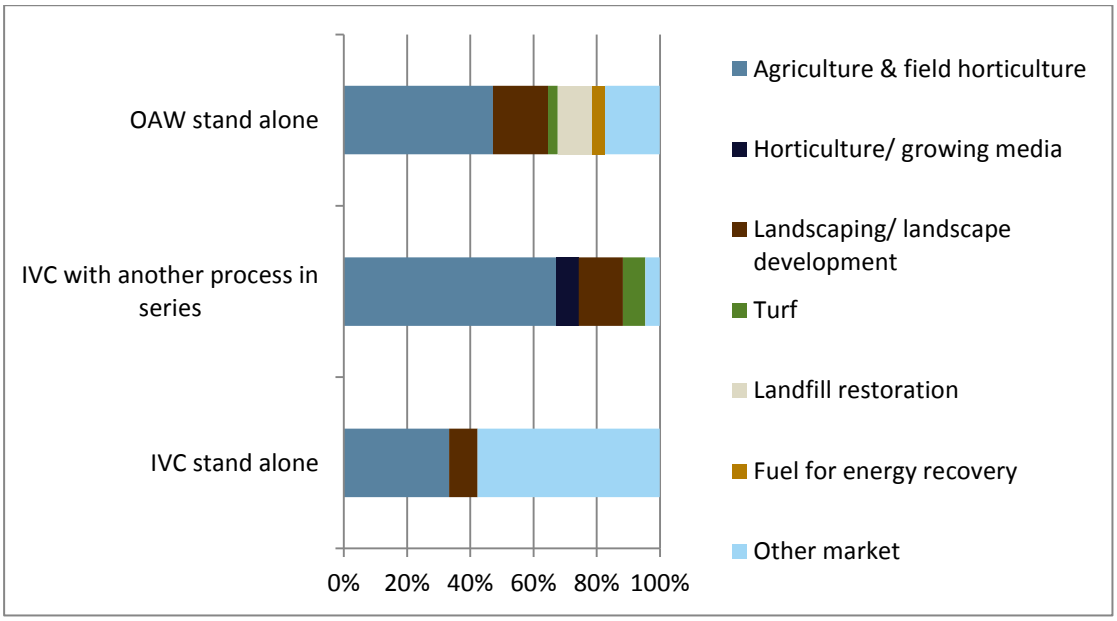
Despite an estimated 21% drop in the quantity of compost supplied to agriculture, it remains the largest market for compost products in Scotland. 55% of all compost produced is reported as being supplied to agricultural markets, which compares with 60% reported in the 2012 survey. End markets for compost are summarised in Figure 11.

Figure 11 End Markets for Compost Output, as % of total Scottish market by weight, 2013



The proportion of outputs from each type of facility going to each end market is shown in Figure 12.

Figure 12 Markets for outputs per facility type



Sites were asked to provide details of the grade of compost being produced. The results are shown in Table 12 and suggest a decrease in the production of the finest grade and an increase in the production of 0-20mm and 0-40mm grades since the 2012 survey.

Table 12 Proportion each grade of compost in total produced, 2013 v. 2012

Grade	0-10mm	0-20mm	0- 40mm	"Oversize"	Other [(i)]	
2013	14%	30%	47%	2%	7%	100%
2012	26%	23%	38%	2%	11%	100%

Notes:

(i) Compost classified as 'other' was a mixture of grades not fitting the categories above e.g. 0-6mm and 0-25mm. In 2012 'other' was all at grade 20-40mm.

Table 13 shows which markets the grades were supplied to. As can be observed, the majority of the 0-10mm grade is going to the horticulture/growing media, landscaping/landscape development and turf markets, whereas the coarser grades are used mainly for agriculture (0-40mm). There has been a sizeable change in the proportion of 0-10mm grade being used in the turf market in 2013, this was 4% in 2012, compared with 28% in 2013. Similarly the use of 0-10mm and 0-20mm in the landfill restoration market has reduced significantly since 2012, when 15% and 43% respectively of each grade was used.

Table 13 Proportion of each grade supplied to each market, 2013

Market	Grade				
	0-10 mm	0-20 mm	0- 40 mm	Oversize	Other
Agriculture & field horticulture	2%	43%	87%	0%	21%
Horticulture/ growing media	17%	0%	0%	0%	0%
Landscaping/ landscape development	19%	40%	2%	0%	2%
Turf	28%	0%	0%	0%	0%
Landfill restoration	0%	3%	4%	0%	65%
Fuel for energy recovery	0%	0%	0%	100%	0%
Other market	34%	14%	7%	0%	12%
Grade Total	**100%**	**100%**	**100%**	**100%**	**100%**

3.1.3.7 Sales prices

The survey asked participants what their average sales price was in 2013 for compost sold into various end markets. The figures listed in Table 14 show the ex-works sales prices i.e. the financial transaction is an “at the gate” exchange which excludes costs for transport and any spreading of material, and compares this to 2012. The negative prices represent the site paying to have the material taken away.

The data collected suggests that the price most commonly obtained for compost is £0 but the mean price has increased in three of the five markets where comparison is possible and has decreased in the other two (there was only a single response for horticulture/growing media in 2013 and only one operator sent material to the fuel for energy recovery market, so these prices are not disclosed). The prices received in the respective markets for compost sold by the sites that ceased operation between the two years were all below the estimated average for 2012. For two of these markets the mean price has decreased between the two years indicating that any changes in these markets cannot be linked to these closures (no comparison is possible in the third market due to there being just one price provided in 2013).

The largest increase was in the turf market where the mean price per tonne rose from £10.00 in 2012 to £15.00 in 2013, although the 2013 mean is based on just two prices (the mean price was also £15.00 in 2010). The most significant price increase, that of £0.57 per tonne (38%), is for the agriculture & field horticulture market, this being the largest market in Scotland in terms of the quantity of compost used. The largest decrease in mean price per tonne is in the landscaping/landscape

development market where it has dropped from £7.93 in 2012 to £3.75 in 2013. Table 14 compares the prices for the various end markets in Scotland in 2013 with 2012.

Generally, the number of sites providing price data in each market is small, so that the figures must be treated with caution. In addition the ranges are wide, making the mean prices less representative.

Table 14 Analysis of sales price by end-use market, 2013 & 2012 (prices are ex-works in £/tonne)

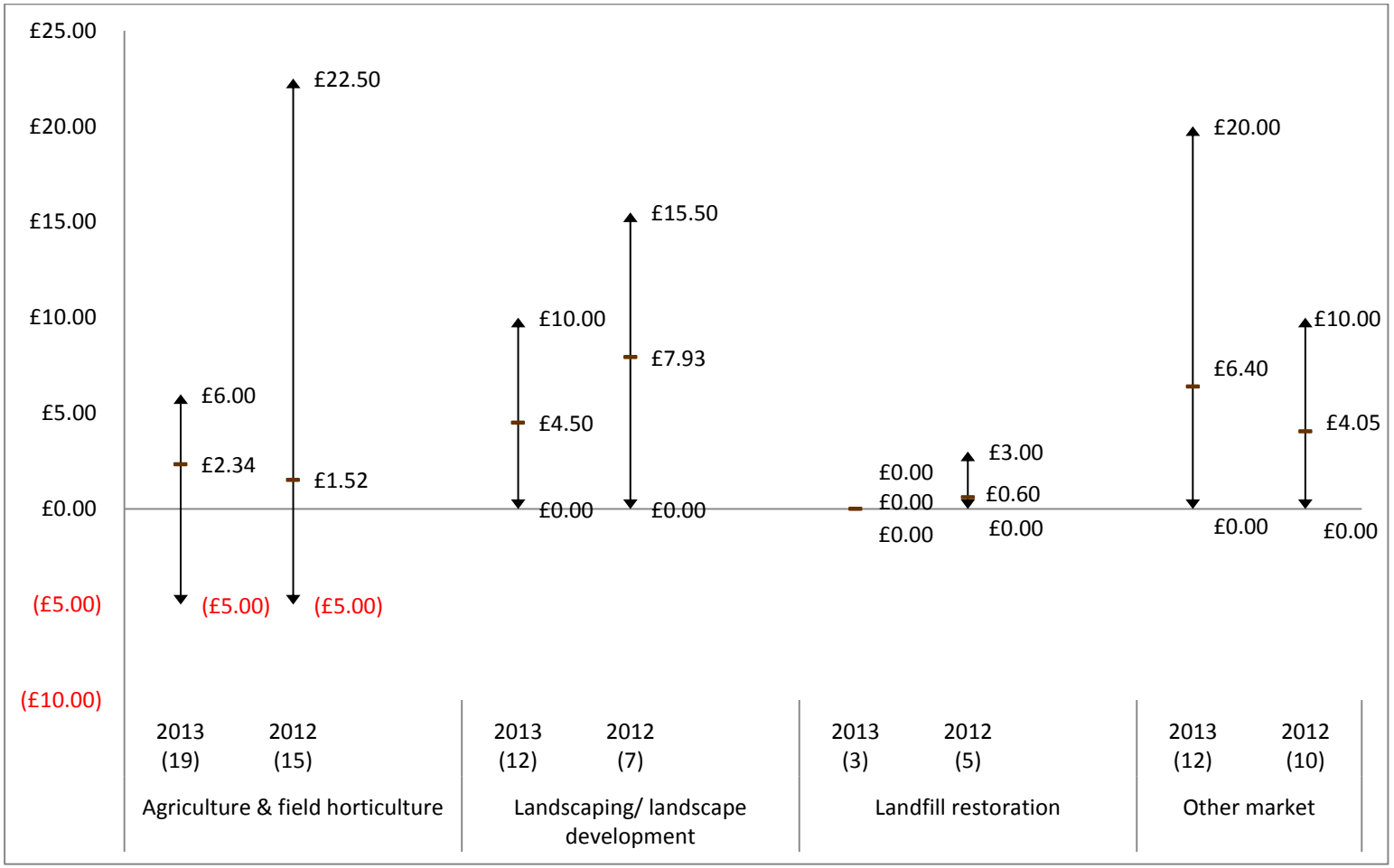
	2013					2012	
Market	**Base**	**Max Price**	**Min Price (i)**	**Mean Price**	**Mode (ii)**	**Max/Min**	**Mean/ Mode**
Agriculture & field horticulture	19	£6.00	-£5.00	£2.09	£0.00	£22.50 / -£5.00	£1.52 / £0.00
Horticulture/ growing media	1	(iii)	(iii)	(iii)	(iii)	£5.00 / £0.00	£3.17 / £5.00
Landscaping/ landscape development	12	£10.00	£0.00	£3.75	£0.00	£15.50 / £0.00	£7.93 / £15.50
Turf	2	(iii)	(iii)	£15.00	n/a	£10.00 / £10.00	£10.00 / £10.00
Landfill restoration	3	£0.00	£0.00	£0.00	£0.00	£3.00 / £0.00	£0.60 / £0.00
Fuel for energy recovery	4	(iii)	(iii)	£2.50	£2.50	(iii)	£2.50 / £2.50
Other market	16	£20.00	£0.00	£4.80	£0.00	£10.00 / £0.00	£4.05 / £0.00

Notes:

(i) Negative prices indicate fee charged by end user to take the compost away.
(ii) The mode is the data point (or points) that occur most frequently in a dataset.
(iii) Data suppressed to avoid disclosing prices achieved by individual sites.

Reported prices varied considerably, with large differences in the minimum and maximum prices in most markets in Scotland, as illustrated in Figure 13.

Figure 13 Maximum, Minimum and Mean Compost Sales prices (in £/t) by end use application, 2013 & 2012



Notes:

- Figures in brackets show the number of responses.
- There is no comparison made here for the horticulture/growing media, turf and fuel for energy recovery markets because there were too few responses.

The value of the end markets has also been calculated as shown in Table 15 below. This is compared with the market value for Scotland in 2012. Market values have been calculated by multiplying the mean price per tonne for that market with the estimated grossed quantity of compost going to that market in the relevant year.

Table 15 Compost market values, 2013 & 2012

	2013			2012		
Market	**Mean Price/ Tonne**	**Market Size (tonnes)**	**Market Value [(i)]**	**Mean Price/ Tonne**	**Market Size (tonnes)**	**Market Value**
Agriculture & field horticulture	£2.09	111,000	£231,000	£1.52	140,000	£213,000
Horticulture/ growing media	[(ii)]	6,000	n/a	£3.17	19,000	£60,000
Landscaping/ landscape development	£3.75	32,000	£120,000	£7.93	21,000	£167,000
Turf	£15.00	9,000	£137,000	£10.00	2,000	£20,000
Landfill restoration	£0.00	13,000	£0	£0.60	28,000	£17,000
Fuel for energy recovery	[(ii)]	5,000	n/a	£2.50	5,000	£13,000
Other	£4.80	28,000	£133,000	£4.05	19,000	£77,000
Total		**203,000**	**£690,000**		**233,000**	**£566,000**

Notes:

- Due to rounding, columns may not add up to totals and market value may not be an exact result of Mean x Market Size.

(i) The 2013 value of the markets for 'horticulture/growing media' and 'fuel for energy recovery' have been calculated and added to the total market value but are not shown separately for each market to avoid disclosure of individual site information.

(ii) Data suppressed to avoid disclosing prices achieved by individual sites.

The overall market value calculated in this way has shown an increase of £124,000 (22%) between 2012 and 2013 despite a reduction of 13% in the quantity of compost produced.

This increase is due in particular to an expansion in the 'turf' market. This market alone accounts for £117,000 of growth and, coupled with an estimated increase in the value of the agriculture & field horticulture and 'other' markets, more than offsets the decrease in the value of the landscaping/ landscape development and landfill restoration markets. Although the mean prices have decreased for some of the markets, the overall mean price, across all markets, has increased by 40% to £3.39 per tonne in 2013 from £2.42 per tonne in 2012.

For 2013, we have also adopted a new approach to zero prices compared with previous years. During the 2013 survey, where a price of £0.00 was given by a site this was investigated further to establish what this figure represented. In the 2012 data £0.00 could mean one of three things: the compost was given away for free, the compost was used on the producer's own land or the compost was given to the local authority which provided the feedstock, as part of the contract; but in the majority of cases it was not possible to tell which. For 2013, where a reported price of £0.00 was found to relate to either of the latter two circumstances it has been excluded from the analysis because £0.00 does not reflect the actual value to the operator. Further detail can be found in Appendix 2.

This has also had the effect of reducing the prices provided for the landfill restoration market to zero as all were £0.00 with the material being used on the operator's own landfill site. The usable prices are shown in Table 16.

Table 16 Analysis of sales price by end-use market where non-zero prices of £0.00 have been removed, 2013 (prices are ex-works in £/tonne)

Market	Base	Max Price	Min Price	Mean Price	Mode
Agriculture & field horticulture	17	£6.00	-£5.00	£2.34	£2.00
Landscaping/ landscape development	10	£10.00	£0.00	£4.50	£6.00
Turf	2	(i)	(i)	£15.00	(i)
Other market	12	£20.00	£0.00	£6.40	£4.00

Notes:

(i) Data suppressed to avoid disclosing prices achieved by individual sites. Similarly, details for 'Horticulture/growing media', 'Landfill restoration' and 'Fuel for energy recovery' have been removed to avoid disclosure of individual site information.

Table 16 shows the market value when the prices of £0.00 have been removed using the method noted in Appendix 2. The quantities of material that the removed prices of £0.00 represent have also been removed from the estimate. This has been done by calculating the proportion the surveyed quantity of material makes up of the respective market and deducting this proportion from the grossed figures – note 1 below Table 17 provides detail of the quantities removed from each market.

Table 17 Compost market values where non-zero prices of £0.00 have been removed, 2013

	Mean Price/ Tonne	Market Size (tonnes) [i]	Market Value [ii]
Agriculture & field horticulture	£2.34	107,000	£250,000
Horticulture/ growing media	[ii]	6,000	[iii]
Landscaping/ landscape development	£4.50	23,000	£104,000
Turf	£15.00	9,000	£137,000
Landfill restoration	n/a	0	n/a
Fuel for energy recovery	[ii]	5,000	[iii]
Other	£6.40	23,000	£146,000
Total		**172,000**	**£705,000**
Markets of undisclosed value		31,000	unknown

Notes:

Due to rounding, columns may not add up to totals and market value may not be an exact result of Mean x Market Size.

(i) Quantities (tonnes) removed from markets are as follows:
Agriculture & field horticulture – 4,000 (3%).
Landscaping/ landscape development – 9,000 (28%).
Landfill restoration – 13,000 (100%).
Other – 5,000 (18%).

(ii) Data suppressed to avoid disclosing prices achieved by individual sites.

(iii) The value of the markets for 'horticulture/growing media' and 'fuel for energy recovery' in 2013 have been calculated and added to the total market value but are not shown separately for each market to avoid disclosure of individual site information.

On this basis, we can say that the value of the Scottish composting market is 'at least' £705,000, since both the compost returned to the Local Authorities and the compost used on the producers' own land will have an undisclosed (and possibly uncalculated) value.

3.1.3.8 PAS 100

Of the surveyed composting sites, 22 (19 in 2012) stated they were currently (i.e. at the time of the survey in February 2014) producing compost certified to PAS 100 and four (six in 2012) that they were not. Only one of the five sites that ceased operation between the two years produced compost certified to PAS 100. Respondents that stated they were producing compost certified to PAS 100 were also asked if the certification applied to all or part of the outputs and 100% of these sites stated that all of their outputs were PAS 100 certified.

Where sites were producing compost with PAS 100 certification all 22 sites stated that they intend to maintain the certification. Of the four sites that were not producing compost certified to PAS 100, two noted that they intend to obtain certification and two that they did not, one of these sites had produced PAS 100 certified compost throughout 2013 but had ceased to do so at the time of the survey. Where respondents noted that they did not intend to obtain certification the reasons for this were:

- Planning to close site.
- Too little compost produced to warrant cost of PAS100 and it is all used on own land.

Of the four sites that were not producing compost to PAS100 in 2013, three provided figures for the prices obtained for their output and all were £0. Comparing this to the figures in Table 16 suggests that certification does have a positive effect on price, so long as markets are available to the producer.

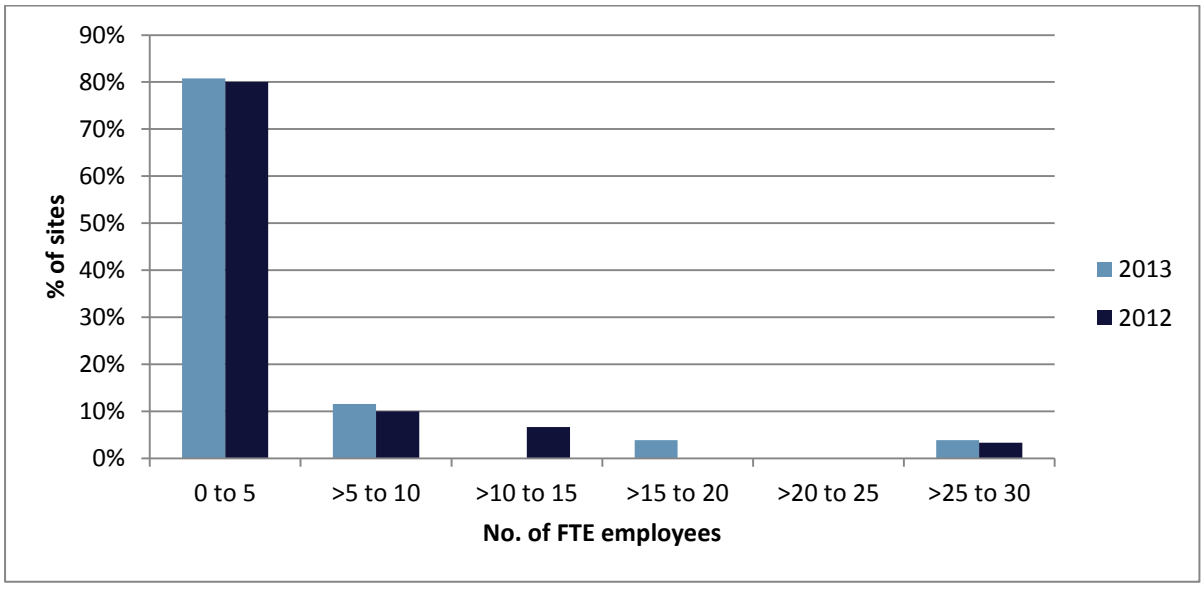
3.1.3.9 Site employees

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

The collected data identified 120 staff employed at the sites surveyed. Grossing these figures for the Scottish market as a whole gave a Scottish total employment figure of 139. The estimated number of employees in 2012 was 146 FTE, showing the negative effect that site closures have had on employment between the two years.

Analysing individual site data (as summarised in Figure 14) showed that most of the composting sites surveyed employed between 1 and 5 FTE employees (81% of the sites surveyed) and that the situation was similar in 2012.

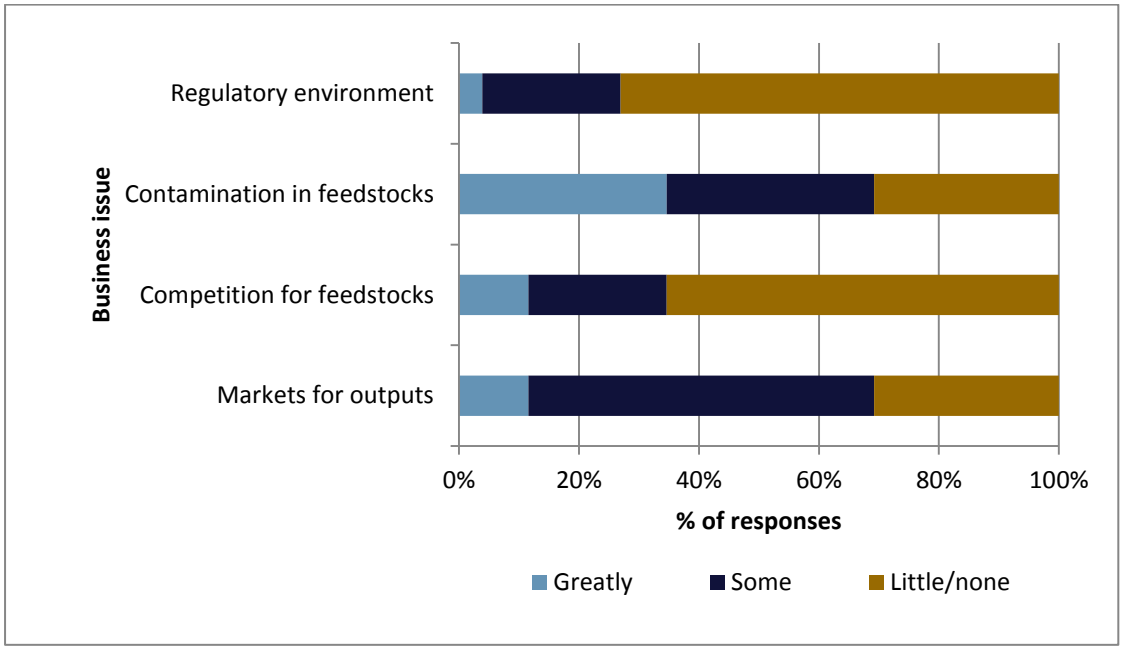
Figure 14 Employment bands (full time equivalents) for Scotland composting sites, as % of all responses, 2013 & 2012



3.1.3.10 Business Issues

Respondents to the survey were asked the extent to which four potential issues affected their operation. The results of this are shown in Figure 15.

Figure 15 The extent to which specified business issues affect composting operations



The issue which operators were more likely to perceive as impacting on their business in 2013 was contamination in feedstocks. 35% of sites stated that this affected them greatly and 35% that this had some impact on their business. In 2012 just 7% of sites noted that this affected them greatly and 41% that it had some impact. This is in line with the answers provided in Table 8 on page 21, which notes that the proportion of sites experiencing high levels of contamination in feedstocks has increased since 2012; it also echoes the main issue highlighted by respondents when asked to describe issues for their business (outlined below).

In 2012 the regulatory environment was viewed as having some or a great impact on 67% of sites and this has reduced to just 27% in 2013, with the remainder (73%) stating that the regulatory environment had little or no impact. Furthermore, the regulatory environment is cited almost as often as a positive as a negative when respondents were invited to comment more generally on business issues and opportunities (see below).

When sites were asked for any other comments they might have on the current opportunities and issues for their businesses, 14 operators provided comment on opportunities and 18 on issues. The positives/opportunities highlighted by most operators (11) centred on the end markets and the feeling that markets are currently good and improving. The most commonly noted issue for operators (11) was contamination in feedstocks, which echoes the concern noted in Figure 15 above. The summary below reflects the range of topics raised.

Respondents nominated the following as being positive or offering potential opportunities to their business (the figures in brackets are the number of operators noting this):

- End market opportunities (11).
- Waste Scotland regulations (4).
- Feedback systems improving contamination levels (3).
- PAS 100 (2).

Respondents perceived the following as issues for their business:

- Contamination/cost of removal of contamination (11).
- Regulation/regulatory bodies (6).
- Competition for feedstocks (4).
- PAS100 (3).
- End markets (3).
- Government support for AD (2).

To put these two sets of responses into context, the responses to the 'closed' question represented in Figure 15 have been analysed against the responses to the 'open' question. Only 1 of the 4 who commented on regulation as an opportunity described regulation as having a 'great effect' in the preceding question and only 1 of the 7 who commented on regulation as a negative factor described regulation as having a 'great effect' in the preceding question.

3.1.4 Conclusion

Surveys for 26 composting sites in Scotland were conducted for 2013 out of an active population of 29; this compares with 25 surveys for 2012 out of an active population of 33. This decrease in the active population of sites is 12% and is caused by the closure of five sites, and the addition of a single site moving from operating under an exemption to operating with a permit. There was no survey conducted across any of the other nations of the UK for 2013 so no comparison can be made with wider UK data.

Data from the 26 sites surveyed was applied to the population of 29 to produce a grossed estimate for the amount of material processed by the Scottish composting sector in 2013 of 411,000 tonnes compared with 475,000 tonnes in 2012, a reduction of 13%. There has also been a 13% reduction in the estimated total amount of compost produced from 233,000 tonnes in 2012 to 203,000 tonnes in 2013. Estimated site capacity has also reduced, but by a lower proportion, 7%, from 641,000 tonnes to 598,000 tonnes – this suggests a capacity utilisation in 2013 of 69% compared with 74% in 2012.

Although there has been a reduction in the active population of composting sites, the number of OAW processes operating remains at 23 (68% of all processes in 2013, 62% in 2012). Instances of IVC have reduced from nine to seven (from 24% to 21% of all processes). There were four instances of WUC in 2013 (none in 2012) and no instances of aerated static pile and processes classified as 'other' (five in 2012). In total there were 34 processes operating at 28 facilities in 2013.

As in 2012, the majority of organic waste that was processed at composting sites in 2013 was done so using OAW (60% v. 59% in 2012). The remainder was processed by IVC sites operating as stand alone (4%) or in series with another process (37%). Whilst there are the same number of stand alone OAW facilities in 2013 as in 2012 (21), the inputs to these facilities has decreased. This is due largely to those OAW sites that completed the survey in both years showing a net reduction in inputs of 33,000 tonnes per annum between the two years. Overall, IVC (operating in series or as stand alone) processed 19,000 fewer tonnes in 2013 than in 2012.

The proportion of feedstocks received from local authority sources was 83% by weight in 2013 (91% in 2012), which represents a reduction of 50,000 tonnes. This compares with an increase in feedstocks from non-municipal sources of 32,000 tonnes to 69,000 tonnes (an 86% increase). This increase is likely to be due to a change in regulation requiring some food businesses to present food waste for separate collection from 1 January 2014.

The majority of inputs to sites were of green/garden waste at 70% of total inputs (65% in 2012), with mixed food & green waste at 20% (32% in 2012), separated food waste at 5% (2% in 2012) and 'other' material also at 5% (1% in 2012). The decrease in inputs of mixed food and green waste could

be attributable to the push in Scotland for more local authorities to collect separated food waste, although composting sites appear to be seeing relatively little of this.

Sites were asked about contamination in feedstocks and, whilst the proportion of facilities reporting less than 5% contamination levels has remained much the same, there has been a sharp increase in the proportion reporting 6%-10%, which suggests contamination is an increasing issue. Higher levels of contamination are most often seen at sites receiving local authority collections, which reflects the high number of facilities receiving local authority sourced material.

The overall decrease in compost produced is reflected in lower quantities being supplied to three out of the seven individual end markets. The greatest reduction in quantity is seen in material sent for agricultural use which has decreased by an estimated 29,000 tonnes. The greatest proportional decrease is for the horticulture/growing media market which has reduced by 71%. The market for landfill restoration has decreased significantly again in 2013, more than halving in size since 2012, following a reduction of 70% between 2010 and 2012.

Conversely there has been a large proportional increase in the turf market, which in 2013 is almost five times as large as it was in 2012 (2,000 tonnes per annum to 9,000 tonnes per annum). There have also been increases of 52% (11,000 tonnes per annum) in the landscaping/landscape development market and 46% (9,000 tonnes per annum) in the 'other' market.

Some sites gave information on the prices obtained for compost provided to the various end markets. These showed that the price most commonly obtained for compost is £0 although the mean price has increased in three of the five markets where comparison is possible with 2012 i.e. agriculture & field horticulture (£1.52/tonne to £2.09), turf (£10.00/tonne to £15.00) and 'other' (£4.05/tonne to £4.80). In contrast, the mean price per tonne in the landscaping/landscape development market has dropped from £7.93 in 2012 to £3.75 in 2013.

Using the same methodology as for 2012, the estimate for the market value for compost produced in Scotland in 2013 is £690,000 compared with £566,000 in 2012, an increase of 22% despite a reduction of 13% in the amount of compost produced. A new approach to estimating market value in 2013 removed some prices quoted as £0.00, which has the effect of increasing the estimated market value in 2013 to at least £705,000.

Of the surveyed composting sites, 22 (19 in 2012) stated they were currently producing compost certified to PAS 100 and four (six in 2012) that they were not. All 22 sites stated that they intend to maintain certification. Of the four sites not producing compost certified to PAS 100, two noted that they intend to obtain certification and two that they did not. Comparing prices for certified and non-certified compost suggests that PAS 100 certification has a positive effect on price.

Operators were asked about the impact of specific issues on their own businesses. Contamination in feedstocks was cited most often as the issue that affected them greatly (35% of sites v.7% in 2012) and 35% of sites saying it had some impact on their business (41% in 2012). The regulatory environment was cited less often as affecting them greatly or to some degree (27% in 2013 v 73% in 2012).

When sites were asked for their own ideas on the current opportunities and issues for their businesses, the positives/opportunities highlighted most by operators centred on the end markets and the feeling that markets are currently good and improving (11 comments); the most commonly noted issue for operators was contamination in feedstocks (also 11 comments).

3.2 Anaerobic Digestion

3.2.1 Survey Performance and Participation

All sites from an initial list of 13 in Scotland were contacted by telephone in an attempt to obtain a complete survey response from each. Of these, one was new to the survey having started operation in 2013.

The survey successfully contacted all 13 sites and delivered eight completed surveys, the same as in 2012. Of those 13 sites contacted, two were discovered to be not operational in 2013, two chose not to take part (one in 2012) and contact was inconclusive with another site. Participation rates are summarised in Table 18; 73% of operational sites were surveyed for 2013 which was the same as for 2012.

Of the eight sites that participated in the 2012 survey, six were also surveyed for 2013, one refused to participate and one had become non-operational. Two sites were interviewed for 2013 that were not interviewed for 2012, one of which had commenced operation at the start of 2013.

Table 18 Scotland Anaerobic digestion site survey – 2013 and 2012 participation rates

Outcome	No of Sites 2013	No of Sites 2012
Survey undertaken	8	8
No contact established	0	2
No response	1	0
Refused	2	1
Not operational	2	1
Not relevant	0	4
Total Sites listed	**13**	**16**
Operational sites [(i)]	**11**	**11**
Survey participation rate (as % operational sites)	73%	73%

Notes:

(i) All sites less those not applicable and confirmed not operating

The categorisation of operational AD sites in 2013 for Scotland and the UK is shown in Table 19. These categories were used as the basis for grossing surveyed input, capacity and output figures to produce a picture of the whole industry in Scotland and the UK.

Table 19 Scotland & UK Operational & Surveyed AD Sites – 2013

Classification [4]	Scotland	UK	Scotland as % of UK
Commercial	5	37	14%
Demonstration	0	6	0%
Industrial	0	8	0%
Industrial –discharging to sewer	4	16	25%
On-farm	2	50	4%
Total operational	**11**	**117**	**9%**
Sites Surveyed	**8**	**88**	**9%**
Participation rate	73%	75%	

All of the commercial sites noted in Table 19 participated in the survey, two of the industrial sites discharging to sewer also did along with one on-farm site. As this is the case, in the main it has not been possible to present results by site type, therefore combined results are shown unless stated.

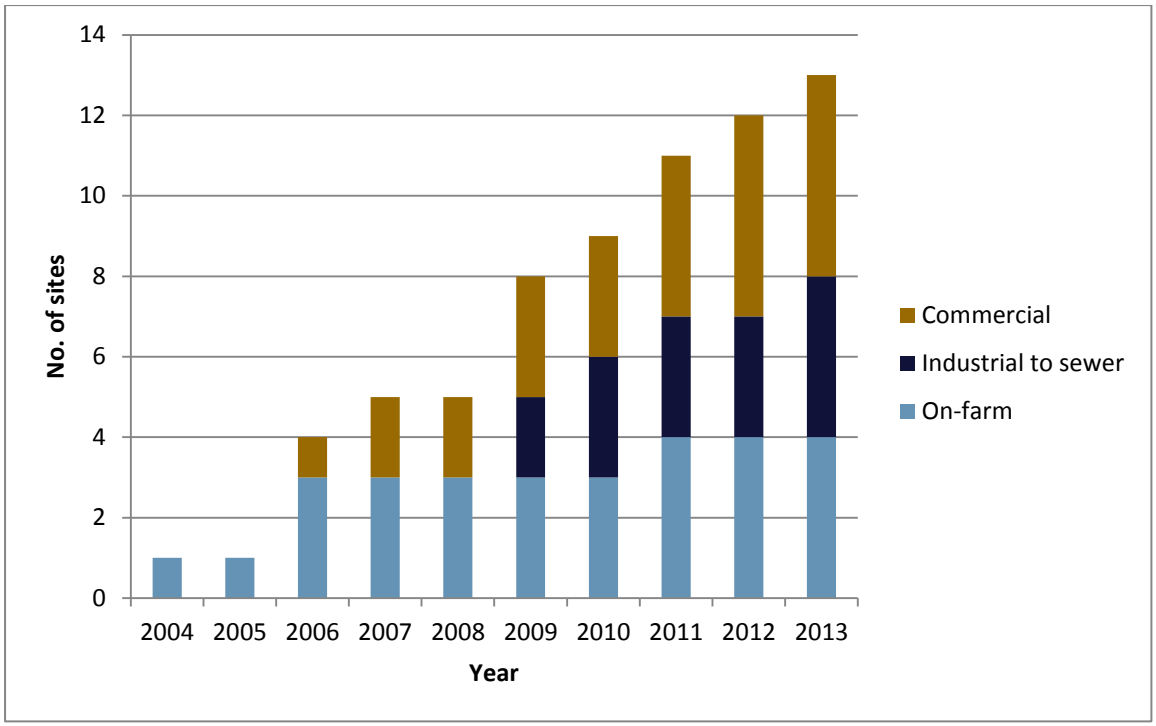
Comparison to the 2012 data shows that the total number of operational sites in Scotland has remained the same between 2012 and 2013, although one site has ceased operation (in June 2012) and one site commenced operation (in January 2013) between the two surveys.

Sites were asked for the year they started operating and the results obtained are summarised in Figure 16 below, which provides an overview of the rate of start-ups and cumulative start-ups. The chart shows that the number of start-ups each year in Scotland has been fairly consistent since 2006. This is very different from the UK picture, where growth in the number of AD plants has more of an exponential shape (ref: WRAP, 2014, Banbury, Survey of the UK Anaerobic Digestion industry in 2013, Prepared by LRS Consultancy).

[4] *Definitions used for this study:*

- *'Commercial' – sites which accept waste from off-site, on a commercial basis (i.e. for a gate fee). May be a farm based enterprise*
- *'Industrial' – sites which process their own wastes, typically on a large scale, such as food and drink manufacturers.*
- *'On-farm' – sites which are both located on a farm and process only material generated on-farm (including energy crops)*
- *'Demonstration' – demonstration/R&D AD sites that process feedstock for demonstration or feasibility purposes. May contract in waste but not on a large scale*

Figure 16 Year AD facilities started operation – cumulative number of facilities



Note: Start-up dates were available for all 13 sites contacted for the 2013; this includes two sites that have ceased to operate. The chart shows all start-up dates for these 13 sites, hence the number of start-ups to 2013 is 13.

3.2.2 The Size of the Scottish AD sector

To estimate the size of the total inputs, capacities and outputs for AD plants in Scotland and the UK, the data from the eight surveyed sites in Scotland and the 88 surveyed sites in the UK were used to estimate the data for the remaining 3 Scottish and 29 UK sites, using the same methodology as the survey for 2012, which is summarised in Appendix 3 – Grossing Methodology.

Across the whole of the UK, AD sites classified as 'industrial' include facilities located on the same sites as drinks manufacturers, breweries and distilleries which process large volumes of liquid and discharge to sewer. For Scotland in 2013 there were four industrial sites, all of which were located on the same sites as distilleries, and two of which were surveyed. The two surveyed sites processed in excess of 1 million tonnes of liquids in 2013 and produced a very small amount of 'sludge'. As this is the case they have a considerable impact on grossed throughputs but very little impact on the digestate end market. Therefore, for clarity, information on inputs, feedstocks and outputs for these facilities is reported separately.

Table 20 summarises the estimates for inputs, operating capacity, outputs and number of employees, based on the survey data obtained from the 6 Scottish non-industrial AD plants and shows the equivalent figures for the UK as a whole.

Table 20 Size of the Scottish and UK AD sectors, 2013 [i] [ii]

	Scotland	UK
Input - Surveyed (tonnes)	111,000	2,010,000
Input - Grossed (tonnes)	**132,000**	**2,550,000**
Grossed Input 2012 (tonnes)	121,000	1,690,000
Change 2013 v 2012	9%	51%
Operating Capacity [iii] – Surveyed (tonnes)	168,000 [iv]	3,030,000
Operating Capacity [iii] – Grossed (tonnes)	**168,000** [iv]	**3,200,000**
Grossed Operating Capacity 2012 (tonnes) [iii]	189,000	2,070,000
Change 2013 v 2012	-11%	55%
Digestate - Surveyed (tonnes)	104,000	1,620,000
Digestate - Grossed (tonnes)	**119,000**	**2,120,000**
Grossed Digestate 2012 (tonnes)	106,000	1,440,000
Change 2013 v 2012	12%	47%
Employees – Surveyed (FTE)	45	306
Employees – Grossed (FTE)	**70**	**421**
Grossed Employees 2012 (FTE)	62	354
Change 2013 v 2012	13%	19%

Notes:

(i) Input, capacity, digestate and employment data exclude industrial sites co-located with drinks manufacturers, breweries and distilleries which process large volumes of liquid and discharge to sewer. It is estimated that these facilities amounted to an additional 2 million tonnes of throughput in Scotland in 2013 (7.5 million tonnes in the UK as a whole).

(ii) Tonnages are rounded to the nearest 1,000 tonnes for Scotland and 10,000 tonnes for the UK; % change based upon actual tonnages

(iii) Plant operators were asked for the practical operational capacity of their site, which can differ significantly from the permitted capacity.

(iv) Even though only 6 out of the 7 non-industrial sites in Scotland gave a full survey response, operating capacity figures were available for all 7 sites.

Grossing up the operators' estimates of the inputs from the surveyed sites leads to an estimate for Scottish throughput of 132,000 tonnes (excluding industrial facilities processing large volumes of liquids and discharging to sewer). Similar grossing of operational capacity produces an estimate for Scottish operating capacity of 168,000 tonnes compared with 189,000 tonnes in 2012. This implies a utilisation of capacity of 77% in 2013, compared with the 63% calculated in 2012. The main reason for the reduction in operating capacity recorded between 2012 and 2013 is that one site gave an operational capacity which was 20,000 tonnes lower in 2013 and stated that they are already operating at the limit of their operational capacity (the on-farm site that ceased operation had little impact on overall capacity estimates).

As can be observed, the growth in the AD market is far less in Scotland (9%) than for the UK (51%). In the UK as a whole, the number of operational AD sites increased from 77 to 111 (excluding industrial sites discharging to sewer), compared with a reduction in the number of operational sites in Scotland from 8 to 7 (excluding industrial sites discharging to sewer).

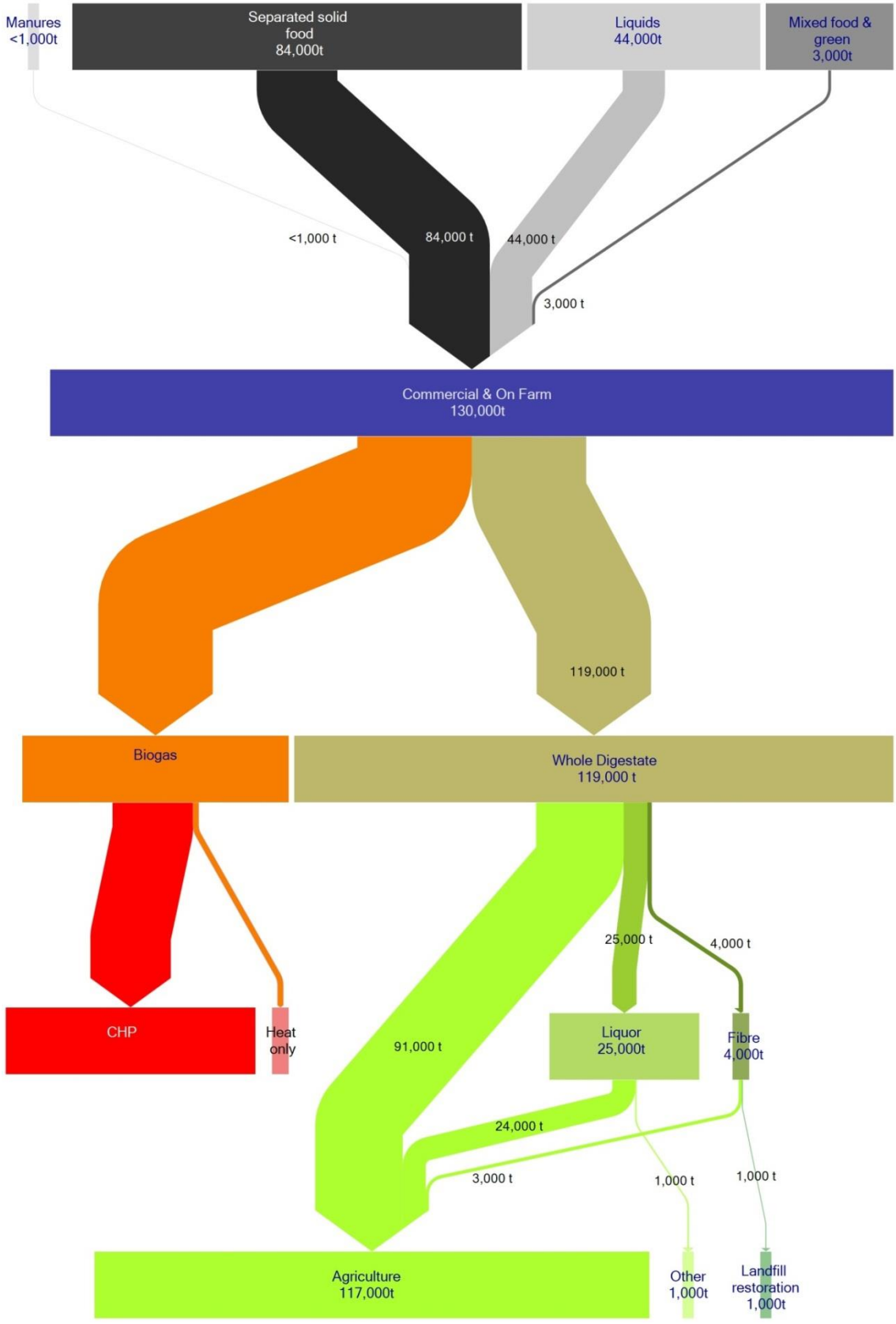
The estimated grossed input figures for Scotland show that commercial sites and on-farm sites, combined, are estimated to have received 130,000 tonnes of inputs in 2013; there were no demonstration sites and no industrial sites that did not discharge their processed liquid to sewer. Grossed capacity at commercial sites is estimated to be 130,000 tonnes and at on-farm sites 40,000 tonnes, suggesting 69% and 100% capacity utilisation respectively.

3.2.3 Supply Chain Flow

As described in Section 2.3, Sankey diagrams are a useful tool for visually presenting complex data. The figure overleaf is the Sankey diagram for AD flows, excluding industrial sites co-located with drinks manufacturers which process large volumes of liquid and discharge to sewer. Data for commercial and on-farm sites have been combined to avoid disclosing data for the one on-farm site which participated in the survey.

When the inputs for each type of facility are grossed it has an effect on the proportion of the different feedstocks. Grossed figures are used in the Sankey diagram whereas survey results are noted elsewhere in the report.

Figure 17: Scottish AD 2013 supply chain flow



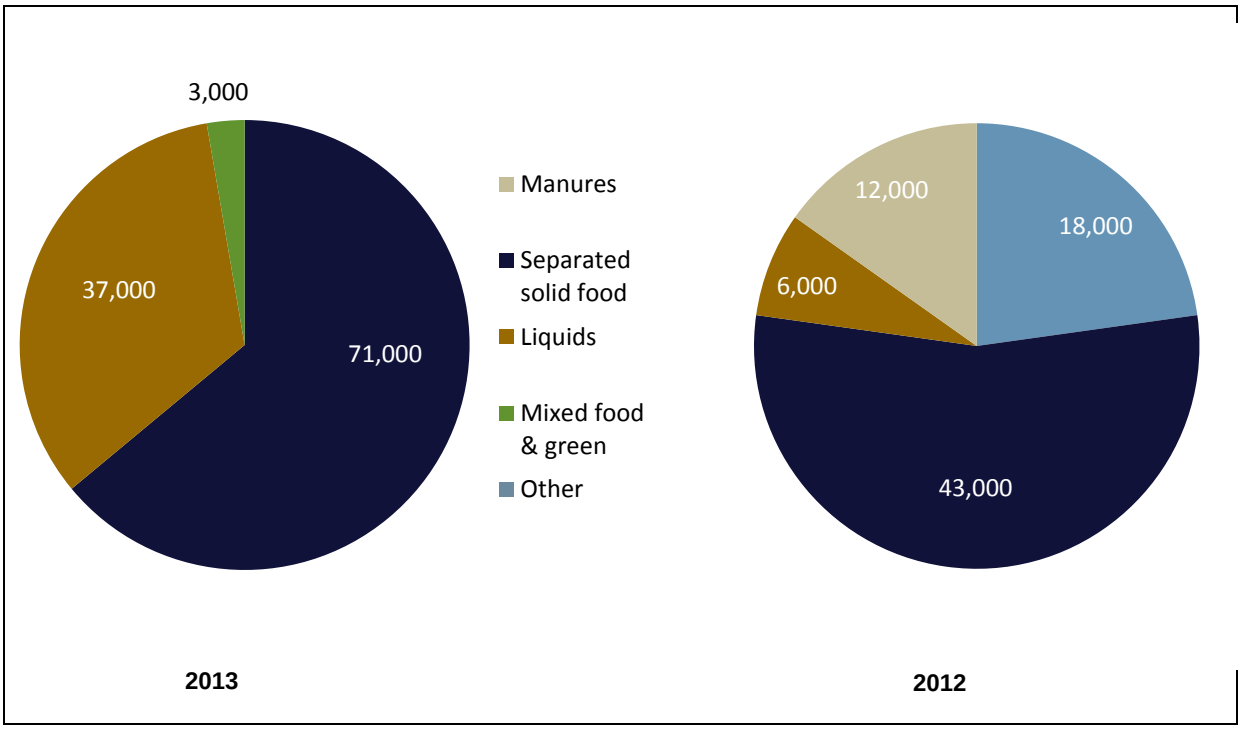
3.2.4 Feedstock

3.2.4.1 Sources

Operators were asked to quantify their inputs by material type, and to identify the sources as a percentage of each type. Excluding the distillery sites, five sites in Scotland provided this level of detail, for inputs of 111,000 tonnes, compared to seven sites in 2012 with 77,000 tonnes of inputs. This apparent doubling of the average input per site between 2013 and 2012 is heavily influenced by two surveyed sites that processed 40,000 tonnes or more per annum, which is not typical of the sites which were not surveyed. As noted in Appendix 3, the grossing methodology uses known capacities to estimate the inputs processed by sites not surveyed, to calculate a national total. On this basis, the estimate for the total market size suggests an increase of just 9%.

Figure 18 compares the quantites of each feedstock type reported by sites in Scotland in 2013 and 2012. This shows that the profile of the inputs processed by the 5 sites which gave data in 2013 is very different from the profile for the 7 which provided data in 2012: separated solid food[5] accounted for 64% by weight (71,000 tonnes) of the input reported, compared with 54% (43,000 tonnes) in 2012 (for the UK it was 38% in 2013). Liquids were 34% (37,000 tonnes) of the inputs reported (30% for the UK) compared to 8% (6,000 tonnes) in 2012. This difference was due to two sites reporting significant quantities of liquid inputs, one of which reported zero in 2012 and one of which was not in the 2012 survey. Manures accounted for just 0.1% (<1,000 tonnes) of reported inputs in 2013 (31%, UK) compared to 23% (12,000 tonnes) for 2012. This is due to the two most significant recipients of manures in 2012 reporting zero tonnes as feedstock for 2013.

Figure 18: Quantity of feedstock type (reported), Scotland 2013 & 2012 (i)



Notes:

(i) Excludes feedstock for industrial facilities that discharge to sewer.
(ii) None of the reported inputs were classified as 'Purpose grown energy crops' in either year.
(iii) Inputs of manure were reported for 2013 but in a quantity too small to appear in the figure.

[5] *The term 'separated solid food' is used to distinguish (a) from food collected mixed with green waste (typically by local authorities) and (b) from liquid food such as milk and drinks*

It is not possible to make comparisons of the feedstock types processed by the different types of sites (i.e. commercial, on-farm etc.) because once the distilleries are excluded, input details were only available from commercial sites and a single on-farm site.

For waste types other than purpose-grown crops and manures, operators were asked to identify sources of these materials.

By reported weight, and excluding the distilleries which process large volumes of liquid and discharge to sewer, the majority of the non-agricultural input material (i.e. excluding manures) came from food & drink manufacturers and processors (66% of the total reported), local authority collections (19%) and supermarkets (8%). Reported quantities are given in Table 21 below and summarised in Figure 19.

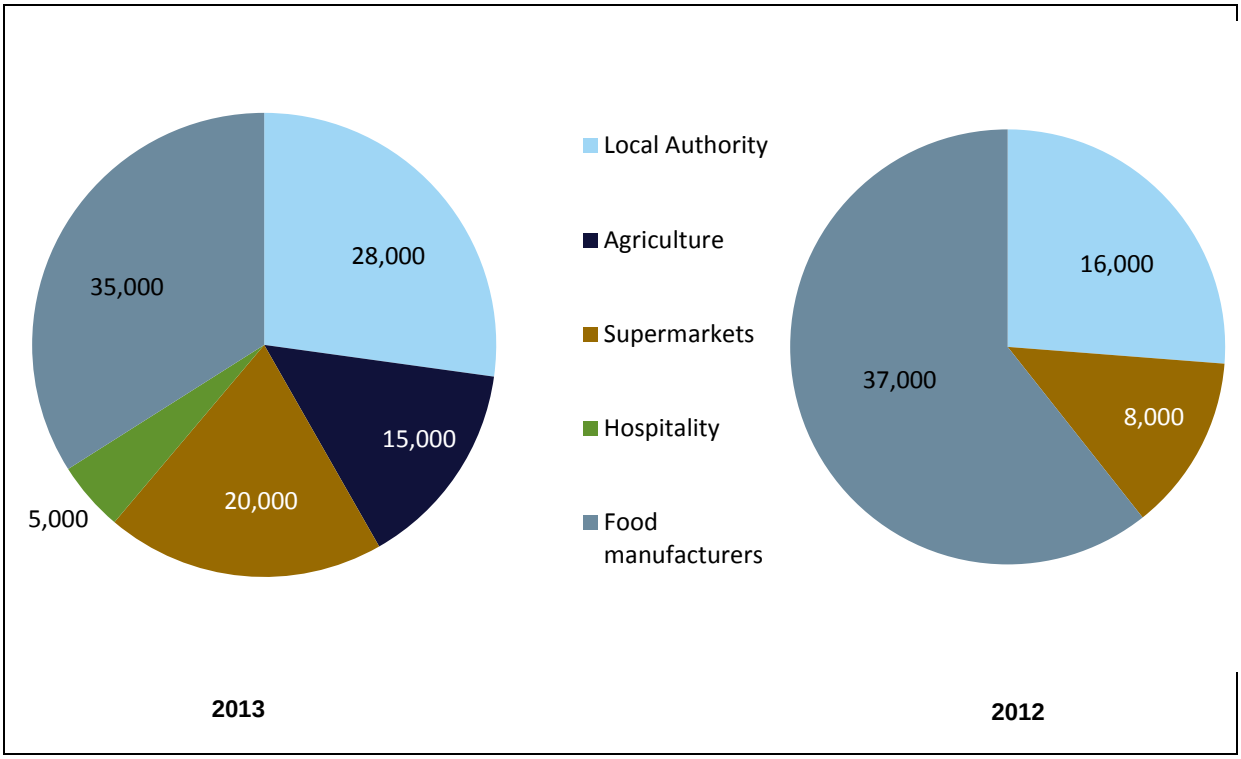
Table 21: Feedstock sources by feedstock type (reported tonnages), Scotland 2013

	Local Authority	Agriculture	Super-markets	Hospitality	Food manufacturers	Other
Separated solid food	25,000	5,000	20,000	5,000	17,000	0
Liquids	0	10,000	0	0	18,000	0
Mixed food & green	3,000	0	0	0	0	0
Other	0	0	0	0	0	0
Source Totals	**28,000**	**15,000**	**20,000**	**5,000**	**35,000**	**0**

Notes:

- In addition to the 103,000 tonnes accounted for in this table there were 10,000 tonnes of liquids for which no information on source was provided by the operator.
- Figure 19 shows these figures when grossed and compares them to grossed figures for 2012.

Figure 19: Sources of waste based [(i)] feedstocks (grossed), Scotland 2013 & 2012 [(ii)]



Notes:

(i) i.e. excluding purpose grown crops and manures.
(ii) Excludes feedstock for industrial facilities that discharge to sewer
(iii) There were no waste based inputs from agriculture and no inputs at all from hospitality in 2012. There were no inputs from sources described as 'other' in either year.

The proportion of reported waste input from local authorities was similar in 2013 to 2012 (27% v 26%) although the reported quantity was 12,000 tonnes greater. Elsewhere there were significant differences in the proprtions from the different sources: the proportion of reported inputs from food manufacturers was far lower (34% v 62%, although the tonnages reported were just 2,000 tonnes less); reported inputs from supermarkets in 2013 were more than double the figures reported in 2012 (representing 19% of material, compared to 13% in 2013) and there were also waste based inputs reported from agriculture (15,000 tonnes) and hospitality (5,000 tonnes) which were not seen in 2012.

Respondents were also asked if their inputs were sourced on or off site. Of the sites responding, but excluding the distilleries, just 3% of feedstock by weight came from the same site as the AD operation (41% in 2012). The remainder, 97%, came from sources external to the site and unrelated businesses (59% in 2012). Both distilleries that were surveyed sourced 100% of their input from their own site.

3.2.5 Contamination

Operators were asked what level of reject material they typically found in their feedstock. This was defined as non-biodegradable material contained within the organic feedstocks that the operator had to dispose of as waste. The level of rejected material is likely to vary considerably from load to load but since they had to dispose of this material separately, operators were expected to have records to refer to.

Table 22 compares the 2013 results to this question with those for 2012 and for the UK as a whole in 2013. As can be observed there is little difference in the distribution of answers for Scotland in the two years. In the UK overall a greater proportion of sites experienced less than 1% rejects. Since rejection is less relevant for sites taking on-site generated inputs, the difference in the proportion of on-farm and industrial sites in the UK (Table 19) may account for this lower level of rejects.

Table 22 Rejection levels from feedstock to AD plants, Scotland 2013 & 2012 and UK 2013

Contamination Level	Number of sites		
	Scotland		UK
	2013	2012	2013
Less than 1%	4	4	58
1% - 5%	0	1	9
6% - 10%	1	2	6
Greater than 10%	2	1	7

3.2.6 Process and Technology

The survey collected data on the process types and technology being used in Scotland anaerobic digestion facilities. These figures include data collected from the two distilleries surveyed that process large volumes of liquid and discharge to sewer, which were excluded from the sector size calculations.

3.2.6.1 Process

Of the eight sites for which we have information on process type, two ran a two stage process with the remaining six all operating single stage[6]. This compares to three two stage and five single stage sites reported in 2012. This suggests that there is a higher proportion of sites using single stage processes in Scotland than in the UK as whole (75% v 59%).

Seven out of the eight sites ran a continuous process, with the remaining site running a batch process[7]; seven out of eight sites operated a wet process with the remaining site operating a dry process. These findings are unchanged from 2012.

3.2.6.2 Operating Conditions

Half of facilities, four out of eight, reported using a mesophilic process[8] (four out of seven in 2012), with four sites operating a thermophilic process (three in 2012).

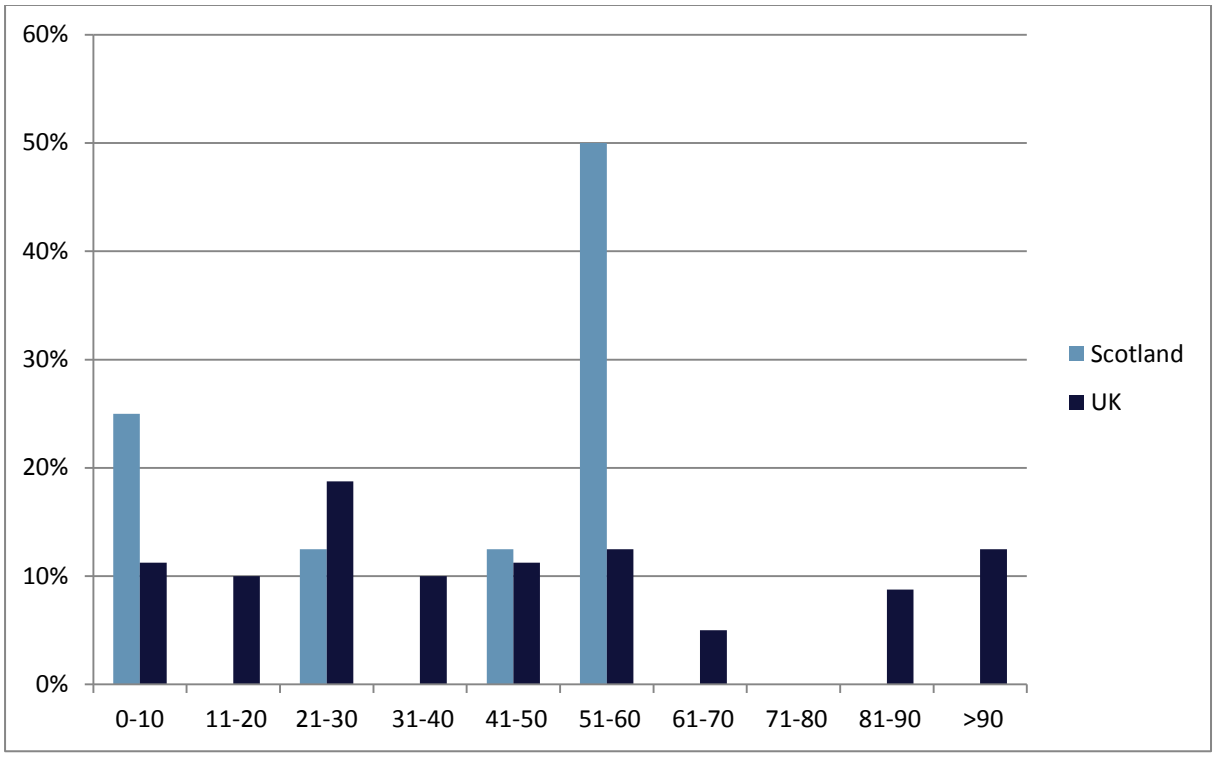
The mean of the hydraulic retention times reported, i.e. the number of days that material is held in the anaerobic digester, was 37 days (46 days for the UK as a whole and 23 days for Scotland in 2012) however responses varied considerably, from 0.25 to 60 days. The distribution of responses is given in Figure 20 below, which compares Scotland with the UK.

[6] *A single stage system is defined as one which utilises just one sealed reactor and a two stage system utilises two*

[7] *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.*

[8] *Mesophilic anaerobic digestion operates at temperatures between 20°C and about 40°, typically 37°C. Thermophilic digesters operates at temperatures above 50°C.*

Figure 20: Anaerobic Digestion Hydraulic Retention Time (Days, as % of all responses, for Scotland & UK 2013)



Notes:

- This Figure includes data from distilleries. Percentages are presented to enable comparison but the Scottish percentages are based on just 8 sites

3.2.6.3 Pasteurisation

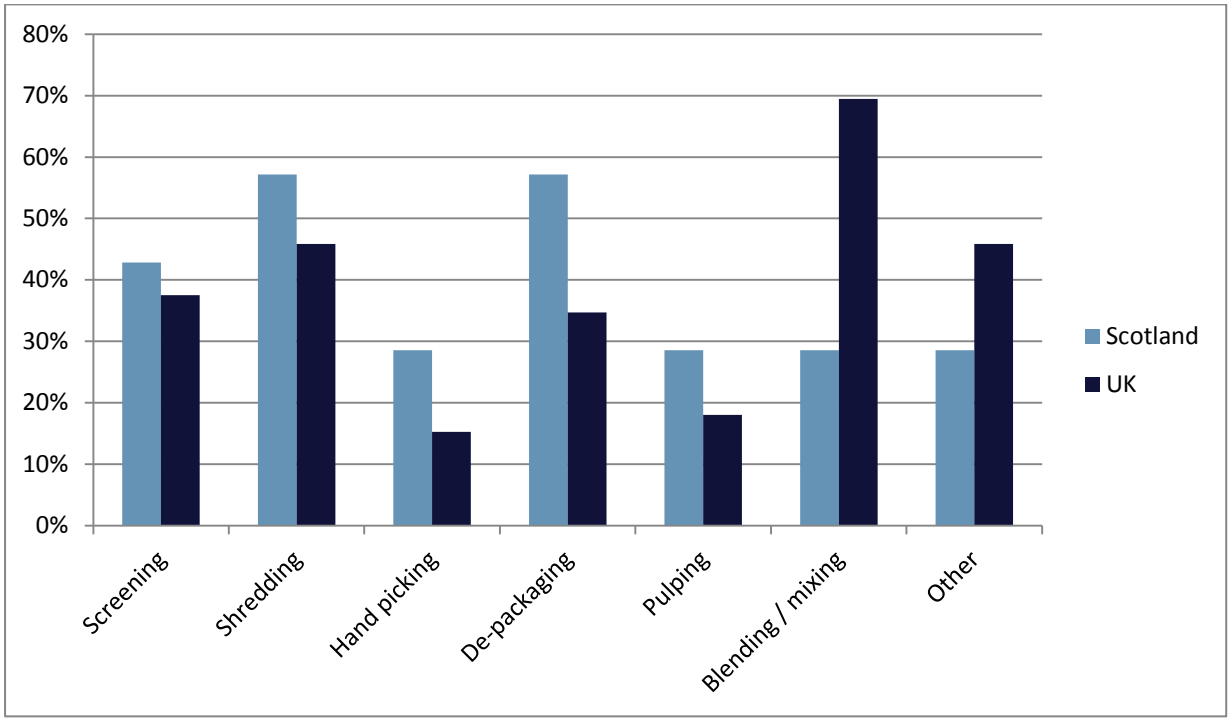
Of the facilities responding to this question, five reported using pasteurisation, three pre and two post digestion; in 2012 four out of eight plants said they were using pasteurisation, two pre and two post digestion. The two distilleries that provided an answer in 2013 stated that they did not use pasteurisation as part of the AD system but one of the sites noted that this is because feedstock from its production plant is already pasteurised.

3.2.6.4 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. Of the six sites that responded to this question, four reported using shredding and four de-packaging. In addition, three reported screening and two blending/mixing.

The proportions using each method are summarised in Figure 21 below, comparing responses from this survey to that of the UK as a whole.

Figure 21: Pre-processing - % of respondents (multiple responses possible), Scotland & UK 2013



Notes:

- Percentages are presented to enable comparison but the Scottish percentages are based on just six sites
- Other reported methods included extruding for Scotland and for the UK macerating and pH correction.

3.2.6.5 Odour Treatment

All eight of the sites surveyed responded to this question with six reporting that they used odour treatment. Sites were not specifically asked what type of odour management they were using but two volunteered this information, stating that they used biofilters. For the UK as a whole, just over half (i.e. 46) of sites reported using odour treatment and examples given were biofilters, bark filters, alkali scrubbers, gas flaring and UV irradiation.

3.2.7 Outputs

Sites were asked to report on their production of biogas and digestate and how these are utilised.

3.2.7.1 Biogas & Heat

Of the eight sites surveyed, four provided a figure for their biogas yield, of which three were commercial sites and one was a distillery. The commercial sites had an average yield per tonne of input material[9] of 158m^3 (UK wide it was 136m^3 for commercial sites and 109m^3 for on-farm sites). The biogas yield per tonne of input reported by the distillery was considerably lower. Given the relatively low proportion of AD operators providing this information, this survey cannot provide a robust estimate of the total biogas production by AD in Scotland.

Six sites provided information on their use of biogas, of which five reported using biogas for on-site combined heat and power (CHP) including electricity generation with the remaining site reporting heat generation (boiler only). In 2012, all eight sites surveyed reported using biogas for CHP. No sites reported exporting biogas or using biogas as a vehicle fuel in 2013. Only one site reported flaring

[9] *The Wales Centre of Excellence for Anaerobic Digestion quotes a typical range of 70-170 m^3 biogas per tonne of waste input for AD operations.*

biogas (8% of their production, the rest used for CHP), the other five sites reported using 100% of their biogas for CHP or heat production.

Respondents were also asked how much of their heat they exported, and if the answer was less than 100% what the remainder was used for. None of the five sites that responded to this question reported exporting any heat, it was either used solely on site (two sites), partially used on site and partially vented (two sites) or all vented (one site). Two of the sites that were venting heat noted that they were looking into ways to use this on site or export in the future.

3.2.7.2 Electricity

Operators were asked for the electricity output of their facilities in MWh. A total of 41 GWh was reported by 4 facilities i.e. an average of 10 GWh per facility, which is somewhat higher than the average output for facilities across the UK as a whole. Three facilities, two of which were distilleries, noted that they did not know or did not record this figure.

Operators were also asked how much of this output was exported – responses varied from 0% (i.e. all used on site) to 90%, with an average from 6 responses of 54% (62% average for the whole of the UK).

Given the relatively low proportion of AD operators providing this information, this survey cannot provide a robust estimate of the total electricity generation by AD. The latest DECC report on renewable energy generation in the UK gives a figure of 707 GWh generated by AD in 2013, an increase of 42% on 2012[10].

3.2.7.3 Digestate

Five of the eight sites surveyed provided information on the quantity of digestate produced in 2013 (seven in 2012) and their total reported production was 104,000 tonnes (70,000 tonnes in 2012). In addition, the two distilleries provided information on the 'sludge' they produce as a by-product of the process and this totalled 4,000 tonnes in 2013.

Excluding the distilleries and grossing for sites not supplying output data, gave a total market estimate of 120,000 tonnes per annum of digestate compared to 110,000 tonnes in 2012. UK wide the estimated figure is 2.12 million tonnes for 2013 compared to 1.44 million tonnes in 2012, as shown in Table 20 on page 40.

3.2.7.4 Processing of digestate

Three of the eight sites responding to the question noted that they processed the digestate further following digestion. All three used some form of separation, two performed this with a centrifuge and one with a press. This compares to four sites (50%) that reported using separation in 2012 – three used a centrifuge and one used a press. No further (tertiary) treatment of either the fibre or liquor following separation was reported by any of the sites answering this question.

41% of sites across the UK that responded to the question processed the digestate following digestion. Of these, 59% reported using separation, 13% screening and the remaining 28% a variety of methods including composting, dilution and pasteurisation.

3.2.7.5 End Use of Products

Respondents were asked about the destinations for their outputs. Excluding the distilleries, which discharged large amounts of liquid to sewer as well as producing a small amount of 'sludge', outputs from the surveyed AD sites in Scotland are as shown in Table 23; this is not broken down by facility type because only a single on-farm site responded to this question, the other four sites all being commercial.

[10] *https://www.gov.uk/government/statistics/energy-trends-section-6-renewables*

Table 23: Destinations of outputs from AD facilities (reported figures), Scotland 2013

Destination	Whole Digestate	Fibre	Liquor
Number of sites reporting	2	3	3
Operator paid user to remove	39,000 (73%)	<1,000 (19%)	6,000 (38%)
Used by own business	14,000 (26%)	0	<1,000 (3%)
Provided free of charge to users off site	0	0	8,000 (55%)
Disposed of in landfill	0	2,000 (81%)	0
Disposed of to sewer	0	0	<1,000 (4%)
Sold off site	0	0	0
Total	**53,000**	**2,000**	**15,000**

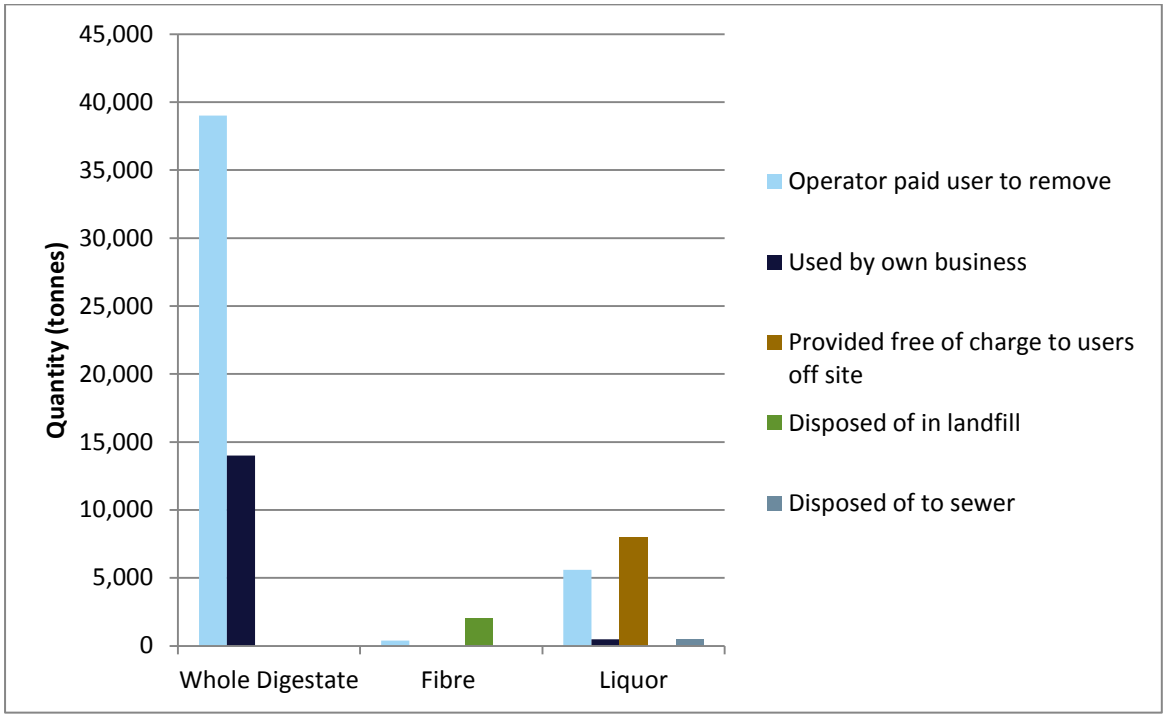
Notes:

- This table excludes outputs from distilleries.
- Figures in brackets are percentages of the column total.
- All figures are rounded to the nearest 1,000 tonnes so column totals may not sum as shown. Percentages calculated on pre-rounded figures.

The destinations of outputs shown in Table 23 are markedly different from those for the UK as a whole because the UK responses include a high proportion of on-farm sites (26 responses out of 58). When data from the one Scottish on-farm site are removed and the remaining commercial sites' responses compared with the responses from UK commercial sites, the proportion of outputs used by the business operating the plant are similar: 28% of outputs from commercial sites across the UK compared with 23% of outputs from commercial sites in Scotland. However, and again considering just commercial sites, for Scotland the dominant destination was off-site with the operator paying the user to remove the material (61% of outputs all of which was whole digestate) with only 13% of outputs supplied free of charge to off site users (all of which was liquor). For UK commercial sites as a whole, the proportion of their outputs that operators had to pay users to remove was just 26% with 28% supplied free of charge. Furthermore, no Scottish AD operators report having sold their output whereas for the UK as a whole 18% of output was reported as sold. All of this suggests that the market for AD outputs is less well developed in Scotland than it is for the UK as a whole.

The data shown in Table 23 can also be summarised as in Figure 22 below:

Figure 22: Product end destination by product type, Scotland 2013



Notes:

- Outputs from distilleries are not shown as they are mostly large volumes of liquid discharged to sewer.
- No sites reported selling output of any type.

Where outputs of whole digestate, fibre and liquor were not disposed of to landfill or sewers, operators were asked where it was applied. Of the 50,000 tonnes reported in Scotland (excluding outputs from distilleries), 99% went to agriculture with the remaining 1% being liquor that is reintroduced to the AD process. For the UK as a whole it was a similar situation, with 97% going to agriculture, 2% for use as a fuel and 1% for landfill restoration (there was also a small amount of whole digestate used in field grown horticulture and a small amount of liquor reintroduced to the AD process as noted above).

3.2.8 Prices

Most operators surveyed cited commercial confidentiality as a reason for not giving digestate selling prices. Only a single site in Scotland responded to this question, providing a figure for the price paid to the user for removing material from the site. For the UK as a whole, few operators provided any data; it was a similar situation for 2012.

3.2.9 PAS 110

Respondents were asked for the PAS 110 status of their outputs. Only one of the eight sites responding to the survey produced outputs certified to PAS110 and this site intended to maintain the certification; the same site was the only one surveyed that was producing PAS110 certified outputs in 2012. Of the remaining seven sites, four said that they intend to obtain the certification, one as early as summer 2014. One of the three sites that did not intend to obtain the certification gave a reason for this, it being that they do not require it. For the UK as a whole, 21 out of 88 sites reported that their outputs were certified to PAS 110[11] with all of these stating that they would renew their certification. Of the remaining 67 sites, 20 reported that they intended to obtain the certification.

[11] *Note this figure is higher than that reported by the certification body, see http://www.biofertiliser.org.uk/members, suggesting some misunderstanding of PAS certification.*

Because of AD operators' unwillingness to disclose selling prices (costs), it is not possible to compare the value of PAS certified digestate to uncertified material.

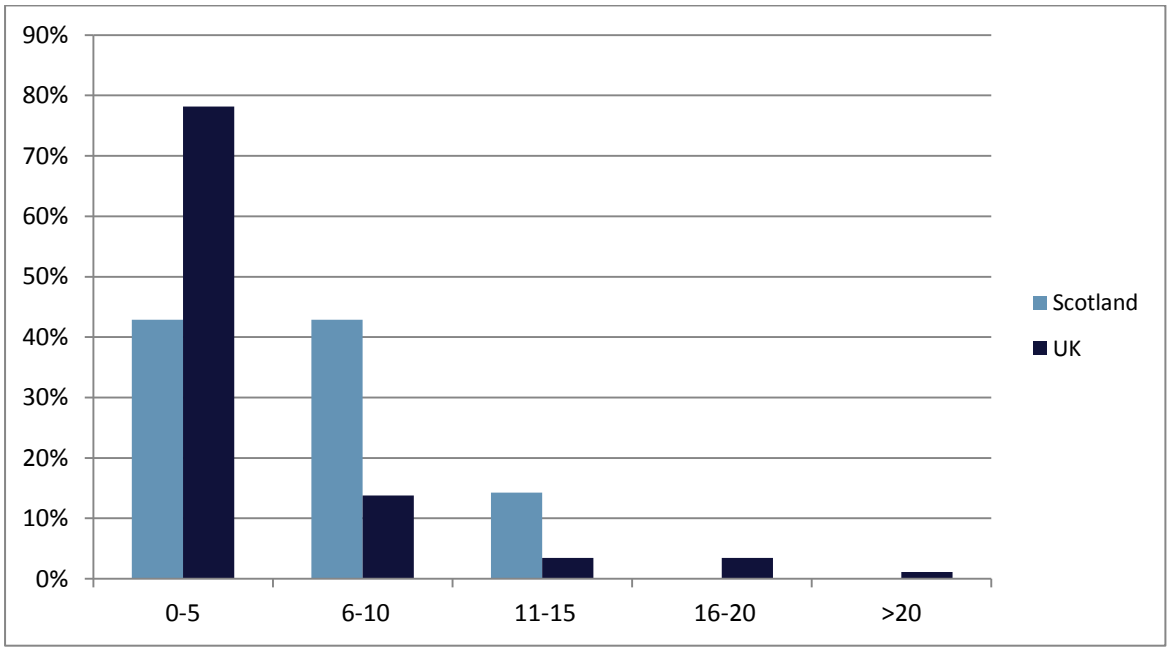
3.2.10 *Employment*

Sites contacted were asked for the total number of employees involved in the AD operation, as full time equivalents (FTE). The collected data identified 45 employees (excluding distillery sites) across six sites (39 employees at five sites in 2012). Grossing these figures for the Scottish AD sector as a whole (i.e. compensating for those sites where employee data was not collected) gave an estimate of total employment in Scottish AD of 70 compared to 62 in 2012 i.e. a 13% increase.

All but one of the Scottish sites answering this question had 10 or fewer employees.

Figure 23 shows the proportion of sites with FTE employee numbers in a range of bands, comparing sites in Scotland with sites across the UK as a whole. Percentages are presented to enable comparison but the Scottish percentages are based on responses from just 7 sites.

Figure 23 Employment bands for Scottish and UK AD sites, as % of all responses (as full time equivalents)



3.2.11 *Business Issues*

Respondents to the survey were asked the extent to which a number of specified business issues affected their operation, those issues being:

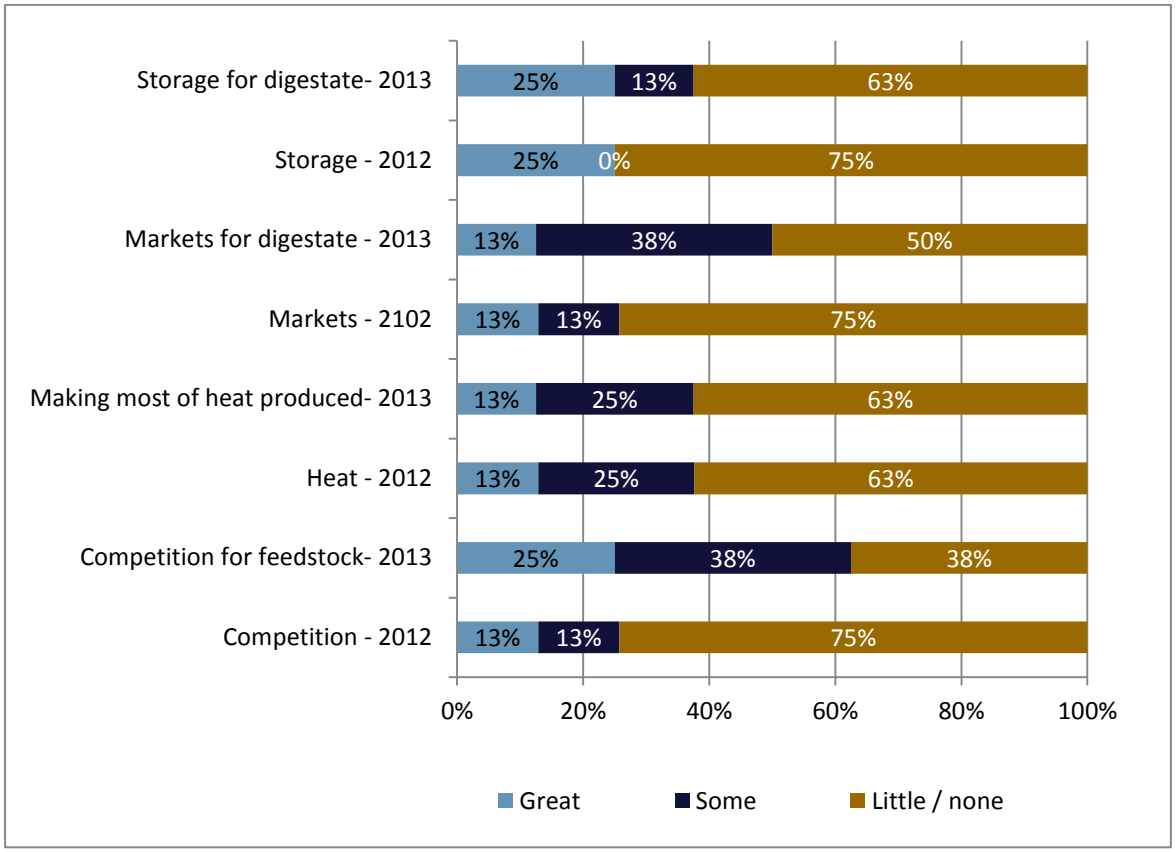
- Storage for digestate;
- Markets for digestate;
- Making the most of the heat produced; and
- Competition for feedstocks.

For 2012 the majority of sites in Scotland (between 63% and 75%) said that all the factors had little or no impact on their business. However, for 2013 there are markedly fewer operators saying that 'competition for feedstocks' had little or no impact (38% v 75%). This suggests that competition for feedstocks has become more of an issue. For the other three business issues, whilst there is still a majority of sites saying that there was little or no impact, a greater number of sites felt the factors had great or some impact.

Comparing Scotland to the UK as whole shows fairly similar responses for 'making the most of the heat produced' and 'storage for digestate'. However, for 'competition for feedstocks' 39% of UK sites stated that this had an impact on their business, compared to 62% in Scotland. In addition, 33% of UK sites said that 'markets for digestate' had an impact on them compared with 50% of Scottish sites. This is probably a reflection of the observations made in section 3.2.7.5 on page 49 regarding end markets for the outputs from AD plants: more Scottish sites are paying for their outputs to be removed.

The results from the 8 facilities that responded to these questions are presented in Figure 24 with 2012 data also provided for comparison.

Figure 24: The extent to which specified business issues affect AD operations, Scotland 2013



Notes:

- No sites answered 'don't know' so this option has not been included

Sites were also asked whether they had any other comments to make about opportunities or issues for their businesses. Only three of the eight sites surveyed in Scotland provided comment here, with all of these commenting on issues and just one on opportunities.

Two of the sites noted that contamination in feedstocks was an issue (one of them received from municipal and the other from commercial sources) and the other site that new technologies as well as competition for feedstocks and digestate were a threat. With regards to opportunities a single site noted that waste regulation had expanded the market for feedstocks.

For the UK as a whole, a range of opportunities were cited, with the most common themes being the use of heat, the potential for growth and greater awareness of the technology.

The issues cited included two of the factors in the previous question (storage for digestate – typically in the context of the wet weather – and competition for feedstock). Others raised issues around the investment climate, contamination of feedstock and variations in the renewable energy tariffs as well as regulatory scrutiny.

3.2.12 RIDDOR Accidents

Sites were also asked if there had been any RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013) accidents at their AD plants in 2013. All eight sites responded to this question and none of them had experienced a RIDDOR accident. For the UK as a whole, four of the 85 sites responding to this question reported such instances.

3.2.13 Conclusion

The number of operational AD sites in Scotland has remained at 11 between 2012 and 2013, although there is one less on-farm site in this population and the number of industrial sites discharging large amounts of liquids to sewer have increased by one. In comparison, the UK as whole has seen a 34% increase in the number of sites, from 87 to 117 (44%, from 77 to 111 if industrial sites discharging to sewer are excluded). Eight of the 11 operational sites in Scotland participated in the survey for 2013, which is the same as for 2012.

This stability in the number of operational AD sites in Scotland is reflected in the small growth in inputs to these sites between 2012 and 2013. The estimated increase in grossed inputs has been 9% (from 121,000 tonnes in 2012 to 132,000 tonnes in 2013). For the UK as a whole there was a 51% increase, from 1.69 million tonnes in 2012 to 2.55 million tonnes in 2013 (these figures exclude large industrial sites discharging to sewer).

It is estimated that the industrial sites co-located with distilleries in Scotland, that process large volumes of liquid effluent and discharge to sewer, amount to an additional 2 million tonnes input (7.5 million tonnes across the UK).

The operating capacity of sites in Scotland has reduced by 11% from 189,000 tonnes per annum to 168,000 tonnes per annum; this is due to a single site reporting a reduction in its actual capacity (as opposed to its permitted capacity). For the UK as a whole capacity has increased by 55% from 2.0 million tonnes to 3.2 million tonnes. This suggests a capacity utilisation of 77% in Scotland, up from 63% in 2012; compared to around 80% for the UK as a whole in both 2012 and 2013.

Of the inputs, 64% by weight was separated solid food (54% in 2012 and 38% across the UK), 34% liquids (8% in 2012; 30% in UK). Manures accounted for just 0.1% of inputs (23% in 2012) and no use of purpose grown crops was recorded in either 2013 or 2012 (manures and purpose grown crops accounted for 31% of inputs in the UK). Analysing waste based inputs (i.e. excluding manures) from commercial and on-farm sites in Scotland shows an increase of 11,000 tonnes to 35,000 tonnes in materials received from local authority sources; an increase of 9,000 tonnes to 25,000 tonnes received from supermarkets; and a decrease of 14,000 tonnes to 44,000 tonnes received from food manufacturers. In 2013, waste based inputs were also received from agriculture (19,000 tonnes) and hospitality (6,000 tonnes), where none had been received in 2012.

In terms of outputs, excluding the distilleries and grossing for sites not supplying output data, gave a total market estimate of 120,000 tonnes per annum of digestate compared to 110,000 tonnes in 2012. UK wide the estimated figure is 2.12 million tonnes for 2013 compared to 1.44 million tonnes in 2012. As with inputs, the growth of outputs in Scotland between 2012 and 2013 of 12% is far less than the 47% for the UK as a whole.

For the majority (76%) of outputs from the sites (whole digestate and separated fibre and liquor) the operator of the AD plant paid the end user to remove them. No Scottish operators reported selling outputs to the end user compared with 10% of UK outputs being sold; UK plants were also able to provide the end user with 18% of all outputs free of charge whereas for Scotland this was just 8%. All of this suggests that the market for AD outputs is less well developed in Scotland than it is for the UK as a whole.

Respondents were asked for the PAS 110 status of their outputs. Only one of the eight sites responding to the survey produced outputs certified to PAS110 and this site intended to maintain the

certification; the same site was the only one surveyed that was producing PAS110 certified outputs in 2012. Of the remaining seven sites, four said that they intend to obtain the certification.

Operators were asked about the impact of specific issues on their own businesses. For 2012 the majority of sites in Scotland (between 63% and 75%) said that all the factors had little or no impact on their business. For 2013 the percentage saying that 'competition for feedstocks' had little or no impact is markedly lower (38% v 75%). For the other three business issues (i.e. 'storage for digestate', 'markets for digestate' and 'making the most of the heat produced') whilst there is still a majority of sites saying that there was little or no impact, the proportion has decreased, with a greater number of sites stating that factors had great or some impact.

Comparing Scotland to the UK as whole shows fairly similar responses for 'making the most of the heat produced' and 'storage for digestate'. However, for 'competition for feedstocks' 39% of UK sites stated that this had an impact on their business, compared to 62% in Scotland. In addition, 33% of UK sites said that 'markets for digestate' had an impact on them compared with 50% of Scottish sites. This is probably a reflection of the observations made in section 3.2.7.5 on page 49 regarding end markets for the outputs from AD plants: more Scottish sites are paying for their outputs to be removed.

Asked for any other opportunities and threats to their businesses, two sites noted that contamination in feedstocks was an issue and the other site that new technologies as well as competition for feedstocks and digestate were a threat. With regards to opportunities a single site noted that waste regulation had expanded the market for feedstocks.

4 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 (now merged with REA – see ORG, below))
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.
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.
Commercial AD Facility	Site which accepts waste from off-site, on a commercial basis (i.e. for a gate fee). May be a farm based enterprise
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).
Controlled waste	Controlled wastes are household, commercial and industrial wastes as defined in The Controlled Waste Regulations 1992 (as amended).
Demonstration AD Facility	Demonstration/R&D site. May contract in waste but not on a large scale
Digestate	Digestate is the residue resulting from the anaerobic digestion biodegradable materials. Whole digestate may be separated into liquor and fibre fractions.
EA	Environment Agency (England)
EWC Code	European Waste Catalogue Code
Industrial AD Facility	site which processes their own wastes, typically on a large scale, such as food and drink manufacturers

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.
On-Farm AD Facility	Site which is both located on a farm and process only material generated on-farm (including energy crops)
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.
ORG	The Organics Recycling Group. A section within the REA which represents the membership of the former AfOR.
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's specification for whole digestate, separated liquor and separated fibre derived from the AD of source-segregated biodegradable materials, published in February 2010.
Permitted/exempt waste operation	A permitted waste operation is one which is subject to the granting of an Environmental Permit. This is a permit granted by the regulator allowing the operation of a regulated facility subject to certain conditions.
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).
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 2013 and follows on from the 2012 survey, which was delivered in 2013 by the same project team. The surveys of 2009 and 2010 (delivered in 2011 and 2012) used an approach which relied on regulatory returns for input data which only become available 11-15 months after the year in question. This year, as in 2013, rather than have this significant time lag between the survey and the year in question, the survey for 2013 was started soon after the end of the calendar year, and respondents were asked to provide input tonnage figures.

Review of previous survey and impact on employed methodology

The 2013 survey used the same core delivery methodology as that delivered in 2012 so that the successful results of 2012 could be reproduced and built on, and so that data from 2013 and 2012 could be directly compared.

The questionnaires used for this survey were based upon those employed in 2012, although in some areas additional questions were included to broaden the amount of useful data collected. The survey of composting operations was delivered by Jenny Grant who has extensive knowledge and experience of composting in Scotland. The survey of AD operations was delivered by BDS Marketing Research Limited which has experience of collecting data from the AD sector for updating of the AD Information Portal map.

Development of contacts database

For the composting survey, Jenny Grant was supplied with the details of sites collated in previous years' surveys, plus the latest SEPA data and she supplemented it with her own knowledge of sites. For the AD operators survey, the list of AD facilities collated for the AD Information Portal map (http://www.biogas-info.co.uk/index.php/ad-map.html) was used.

Marketing

The survey was publicised by steering group members ADBA, REA and ESA, to their memberships. In addition, news releases were prepared and these were distributed by WRAP. The ESA also helped engage multi-site operators with the survey. 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.

Questionnaire development

Separate questionnaires were used for the composting and AD surveys, based on those used in previous years. Although the questionnaires were kept as consistent with previous years as possible, in order to allow for year-on-year comparisons, each questionnaire was reviewed for potential changes. 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 which would lengthen the interviews;
- to minimise the impact on the interviewee, particularly in terms of the time taken to deliver the survey; and
- to maintain consistency with the questionnaire used for the last survey, so that key data could be compared.

Once an initial draft of the questionnaires were formulated it was circulated to the steering group and feedback and comments incorporated.

Site Survey

The final versions of the questionnaires were provided to Jenny Grant and BDS Marketing as Word documents, with an accompanying set of briefing notes. The questionnaires were reproduced by Jenny Grant and BDS as MS Excel spreadsheets, which were used to collect the survey responses.

For the survey, site operators were contacted by telephone by the surveyors, and the responses to the survey entered directly into the structured spreadsheet. Interviewing took place between 17th February and 18th April 2014.

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

The BDS Director responsible for the AD survey checked data from the surveyors as it was returned, and some anomalies were referred back to the respondents, during the fieldwork period.

During data analysis, any items that appeared anomalous were identified (e.g. sense checked against other data collected and against the 2012 survey) and then checked, if required, directly with the site by phone and 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. The methodology used is explained in detail in Appendix 3, and was the same as that employed in the 2012 survey so that results could be compared.
- Distribution plots were produced to represent the spread of responses to questions such as selling prices of outputs, to indicate precision.

As noted in the section on compost prices, an alternative approach to the analysis was taken this year, in response to a recognition that the use of “£0” had been confused in last year’s survey responses. During the 2013 survey, where a price of £0.00 was given by a site this was investigated further to establish what this figure represented. In the 2012 data £0.00 could mean one of three things:

- the compost was given away for free,
- the compost was used on the producer’s own land
- the compost was given to the local authority which provided the feedstock, as part of the contract;

but in the majority of cases it was not possible to tell which. For 2013, where a reported price of £0.00 was found to relate to either of the latter two circumstances it has been excluded from the analysis because £0.00 does not reflect the actual value to the operator.

A full list of the circumstances in which prices of £0.00 have been removed is where the compost was:

- Returned to the local authority from which the original feedstock was received.
- Used by the local authority parks department (local authority operated sites).
- Given away free to local residents.
- Used on the operator's own landfill site.
- Used on the operator's own land e.g. farm land.

The price of £0.00 was only left in where it was felt this was a true reflection of the market for the product. In all cases this was where the producer stated that they did not feel the compost was of sufficient quality to warrant charging for.

This process has resulted in the removal of 11 prices of £0.00, the effect of which has been to increase the mean prices for those markets where the prices of £0.00 have been removed, these being:

- Agriculture & field horticulture.
- Landscaping/landscape development.
- Other.

Appendix 3 – Grossing Methodology

This survey has adopted the same grossing methodologies as the previous 2012 survey for site inputs, capacities, outputs and employee numbers as described below. This enables the results for 2012 and 2013 to be directly compared. For composting a stratified grossing methodology has been employed whereas for AD it is slightly different. For AD the grossing method was based upon the ratios of capacity to input, and input to outputs. However, for AD employee numbers a stratified grossing methodology was used. This was because a consistent ratio of input or capacity to employee numbers per site was not seen in the survey responses.

Grossing for Composting Sites

Grossing is required in order to mitigate for those sites which were either not surveyed or which were surveyed but did not provide responses for some questions, in order to calculate national estimates from the survey data. 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 (only employment) and MBT) at a national level. The grossing up methodology was executed on a category/band basis to take into account the variation within the data since there was significant variation in the data collected. The tonnage categories are sufficiently narrow and the assumption made is that the sample average per site for each category is representative of the population (i.e. total number of sites surveyed and those not surveyed) of that category.

To estimate the total capacity, inputs and outputs for composting sites, tonnage categories/bands were created and the number of sites that provided data in each tonnage category was established based on the survey data. Table 24 to Table 36 show the tonnage categories that were created (in this case for grossing inputs) and the number of sites in each band based on the survey data. Similar tonnage bands were used for grossing operating capacities and site outputs.

The total inputs, outputs and operating capacity for each of the categories was determined by summing up the data of the sites surveyed in each category. The average per site for each category was then determined using the total number of sites surveyed and total tonnage in each category for only the sites that provided data during the survey.

Before grossing up, the number of sites listed was reduced by the number of sites recorded as not operational in 2013 during the survey so that only those sites that were active in 2013 were used in the grossing process.

The proportion of sites with data in each category (input, output, capacity) was established based on the total number of sites with data in each category and the overall total number of sites surveyed for each nation. This proportion was then applied to the total number of sites without data, for each nation. The overall number of sites in each category (i.e. total sites with and without data) was then determined by summing the number of sites in each category that were surveyed and the estimated number of sites in each category with missing data for each nation.

The estimated number of sites in each tonnage category was then multiplied by the average tonnage per site for each category to estimate the total inputs, outputs and operating capacity for each band and hence the overall/grossed up tonnage for each nation.

It is worth noting 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.

Table 24 Composting inputs – Tonnage categories employed using actual survey data for 2013

Input categories (tonnes)	Number of sites surveyed	Survey Tonnage	Average tonnage per site surveyed
<5,000	9	15,762	1,751
5,000 - 10,000	1	*	*
10,001 - 15,000	10	127,255	12,726
15,001 - 20,000	3	52,051	17,350
20,001 - 25,000	3	66,395	22,132
25,001 - 35,000	2	55,181	27,591
35,001 - 50,000	1	*	*
>50,000	1	*	*
Total	**30**	**432,144**	

* Figures for single sites are not shown, to avoid disclosing site-specific information, but were used in the calculations

Table 25 Composting inputs – grossing tonnages based upon calculated totals for all operational sites in 2013

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)
<5,000	30.000%	1	10	17,338
5,000 - 10,000	3.333%	0	1	*
10,001 - 15,000	33.333%	1	11	139,981
15,001 - 20,000	10.000%	0	3	57,256
20,001 - 25,000	10.000%	0	3	73,035
25,001 - 35,000	6.667%	0	2	60,699
35,001 - 50,000	3.333%	0	1	*
>50,000	3.333%	0	1	*
Total	**100%**	**3**	**33**	**475,359**

***** Figures for single sites are not shown, to avoid disclosing site-specific information, but were used in the calculations

Grossing for AD Sites

The grossing methodology for AD sites was the same as that employed in 2012. In this (2013) survey, as in 2012, the decision was taken to include all AD apart from waste water treatment sites. In order to achieve a sensible grossing up, the AD sites were categorised by type of facility using the following classifications, based on categories held in the database which underpins the AD Portal map:

- Commercial – sites which accept waste from off-site, on a commercial basis (i.e. for a gate fee). May be a farm based enterprise
- Industrial – sites which process their own wastes, typically on a large scale, such as food and drink manufacturers.
- On-farm – sites which are both located on a farm and process only material generated on-farm (including energy crops)
- Demonstration – demonstration/R&D sites. May contract in waste but not on a large scale

To provide estimates of input, operating capacity and digestate where there was no data, ratios were used for calculations to fill any gaps in the survey data. The ratios used are shown in the table below, and are compared to those generated in 2012. Where there are blanks, there was survey data for all the sites and so no need for grossing up.

Table 26 Ratios input: digestate used for grossing calculations 2013 and 2012

	2013		2012	
Type	**Average Ratio (permitted capacity:input)**	**Average Ratio (input:digestate)**	**Average Ratio (permitted capacity:input)**	**Average Ratio (input:digestate)**
Commercial	1.444	1.435	1.414	1.155
Industrial to sewer	1.421	1.000		
On-Farm	1.200	1.148	1.057	1.140

To estimate inputs for sites where there was no input data, the average permitted capacity to input (permitted capacity:input) ratio for each facility type was calculated by using data for the surveyed sites that had both permitted capacity and input data. These ratios were then applied to the sites where there was permitted capacity data but no input data depending on type.

To provide an estimate of the overall operating capacity, for sites where there was no operating capacity data, the permitted capacity data was used as the operating capacity. For sites with neither permitted capacity nor operating capacity data, the permitted capacity was estimated using the average permitted capacity:input ratios derived as described above.

To provide an estimate of digestate produced for sites where there was no data, the average input to digestate (input:digestate) ratio for each type was calculated by using surveyed sites that had both input and digestate data. These ratios were then applied to the sites where there was input data but no digestate data depending on type.

For the reporting of grossed figures, industrial sites were separated into two categories. Those processing large volumes of liquid and discharging to sewer, not producing a digestate for market. These are typically breweries and distilleries with inputs >500,000tpa. They were removed from the reported input, capacity and output figures (9 sites surveyed of the 15 sites in the population).

Those similar to commercial sites with inputs <300,000 and producing a digestate for market, were reported.

Appendix 4 – Questionnaires used for the survey

Composting questionnaire

UK Organics Recycling Industry Annual Survey 2013

Permitted Composting Site

Contact Details			
Name		Telephone	
E-mail		Title	
Company Name		Company Postcode	
Site Name		Site Postcode	

Type of Facility

SIMPLY CHECK THIS AGAINST ANSWERS TO PREVIOUS SURVEY – IF AVAILABLE

Q1. When did the site become operational? (Please write in MM/YYYY) __/____

Q2. In 2010 was this site operating under an exemption, rather than a permit? Yes ☐ No ☐

Q2a. IF YES: When did you begin to operate under a permit? (MM/YYYY) __/____

Q3. How many people are employed at this site? (expressed as FTEs) _____

Q4. I understand that your permitted capacity was [*pre-complete*]. Taking into consideration planning, regulatory and physical constraints; what was the maximum working capacity of this site in 2013? _____ tonnes per year

Q5. What type or types of process was the site operating in 2013?
(*Please select all the options that apply)*

☐ IVC
☐ Windrow open
☐ Windrow under cover
☐ Aerated static pile
☐ Continuous block composting
☐ Other – please specify

_____
_

Q5a. IF MORE THAN ONE TYPE: Were these processes used in series (sequential treatment of the same material) OR in parallel (separate treatment of different material), or both?

Only used in series ☐ Only used in parallel ☐ Both in series and in parallel ☐

IF ANY OF THE PROCESSES ARE ENTIRELY USED IN PARALLEL, COMPLETE Q6-Q14 FOR EACH OF THOSE PROCESSES AND TICK HERE TO SHOW THE PROCESS THE FIRST RESPONSES RELATE TO

☐IVC ☐ Windrow open ☐ Windrow under cover ☐ Aerated static pile ☐ Continuous block ☐ Other

Q6. What was the typical composting period?

INTERVIEWER: IF IT HELPS THE RESPONDENT, BREAK IT INTO PHASES (sanitisation, stabilisation and maturation)**, BUT ONLY RECORD THE TOTAL, IN WEEKS**

TOTAL: _____ weeks

Q7. What types of pre-processing of feedstocks did you carry out in 2013?

(*Please select all the options that apply)*

- ☐ Screening
- ☐ Shredding
- ☐ De-packaging*
- ☐ Hand picking
- ☐ Pulping (e.g. screw or hydropulper)
- ☐ Blending / mixing
- ☐ Other - please specify _____

*INTERVIEWER NOTE: INCLUDES REMOVAL OF CADDY-LINERS, IF RELEVANT

Feedstocks

Q8. How much of your feedstocks in 2013 were: READ OUT TYPE AND ENTER QUANTITY IN TONNES.
CONFIRM THAT THE SUM OF THE FIGURES GIVEN EQUALS THE TOTAL THROUGHPUT IN 2013

PROVIDE A DESCRIPTION OF ANYTHING PUT AGAINST 'OTHER'

Q9. FOR EACH TYPE PROCESSED, ASK: What proportion of your (TYPE) feedstock came from each of the following sources: READ OUT SOURCE AND ENTER PERCENTAGE

PROVIDE A DESCRIPTION OF ANYTHING PUT AGAINST 'OTHER'

		SOURCE (percentages)					
	QUANTITY (tonnes)	LA sources	Agriculture	Super-markets /Retail	Hospitality sector	Food manufacturers/ processors	Other (specify)
Food (separated)							
Green/ garden material (separated)							
Mixed food and green material							
Other(specify)							
TOTAL		**INTERVIEWER CHECK = TOTAL THROUGHPUT AT THIS SITE IN 2013**					

Q10. What level of contamination do you typically find, per tonne? (INTERVIEWER: tick one)

Less than 1%	
1% - 5%	
6% - 10%	
Over 10%	

Q10b. Which of the sources of your feedstock is the main source of this contamination?

Local Authority collections	
Agriculture	
Supermarkets /Retail	
Hospitality sector	
Food manufacturers/ processors	
Other	

Q11. In 2013, approximately what percentage of your feedstock was sourced…?

from the site at which the plant is located _____%
from other sites within the same business (or business group) _____%
from external sources _____%

Outputs of Compost

Q12a. What was the quantity of compost produced in 2013? _____ tonnes

Q12b. Please give the quantity of the compost you produced in each grade, in 2013?

Grade

0-10mm _____ tonnes
0-20mm _____ tonnes
0- 40mm _____tonnes
Mulch _____tonnes
"Oversize" _____tonnes
Other – please specify _____tonnes
_____ _____ **INTERVIEWER: CHECK SUM = TOTAL OUTPUT**

Destination of Compost

Q13. Where was the compost that you produced in 2013 applied? (IN TONNES - WRITE IN FIRST COLUMN BELOW)

FOR EACH TYPE OF USE TO WHICH COMPOST WAS APPLIED IN 2013

Q14. What was the average ex-works sale price? WRITE IN SECOND COLUMN BELOW

	TONNES	Average ex-works sales price	
Agriculture and field horticulture	_____	_____	£/T
Horticulture /growing media	_____	_____	£/T
Landscaping/landscape development	_____	_____	£/T
Turf	_____	_____	£/T
Landfill restoration	_____	_____	£/T
Fuel for energy recovery	_____	_____	£/T
Other e.g. bagged compost for local sales (Please specify below) _____	_____	_____	£/kg or £/T INTERVIEWER DELETE AS APPLICABLE

SECOND PARALLEL PROCESS. TICK HERE TO SHOW THE PROCESS THE RESPONSES RELATE TO

☐IVC ☐ Windrow open ☐ Windrow under cover ☐ Aerated static pile ☐ Continuous block ☐ Other

Q6. What was the typical composting period?

INTERVIEWER: IF IT HELPS THE RESPONDENT, BREAK IT INTO PHASES (sanitisation, stabilisation and maturation)**, BUT ONLY RECORD THE TOTAL, IN WEEKS**

TOTAL: _____ weeks

Q7. What types of pre-processing of feedstocks did you carry out in 2013?

(*Please select all the options that apply)*

☐ Screening
☐ Shredding
☐ De-packaging*
☐ Hand picking
☐ Pulping (e.g. screw or hydropulper)
☐ Blending / mixing
☐ Other - please specify _____

*INTERVIEWER NOTE: INCLUDES REMOVAL OF CADDY-LINERS, IF RELEVANT

Feedstocks

Q8. How much of your feedstocks in 2013 were: READ OUT TYPE AND ENTER QUANTITY IN TONNES.
CONFIRM THAT THE SUM OF THE FIGURES GIVEN EQUALS THE TOTAL THROUGHPUT IN 2013

PROVIDE A DESCRIPTION OF ANYTHING PUT AGAINST 'OTHER'

Q9. FOR EACH TYPE PROCESSED, ASK: What proportion of your (TYPE) feedstock came from each of the following sources: READ OUT SOURCE AND ENTER PERCENTAGE

PROVIDE A DESCRIPTION OF ANYTHING PUT AGAINST 'OTHER'

		SOURCE (percentages)					
	QUANTITY (tonnes)	LA sources	Agricul-ture	Super-markets /Retail	Hospitality sector	Food manu-facturers/ processors	Other (specify)
Food (separated)							
Green/ garden material (separated)							
Mixed food and							

green material							
Other (specify)							
TOTAL		**INTERVIEWER CHECK = TOTAL THROUGHPUT AT THIS SITE IN 2013**					

Q10. What level of contamination do you typically find, per tonne? (INTERVIEWER: tick one)

Less than 1%	
1% - 5%	
6% - 10%	
Over 10%	

Q10b. Which of the sources of your feedstock is the main source of this contamination?

Local Authority collections	
Agriculture	
Supermarkets /Retail	
Hospitality sector	
Food manufacturers/ processors	
Other	

Q11. In 2013, approximately what percentage of your feedstock was sourced…?

from the site at which the plant is located _____%
from other sites within the same business (or business group) _____%
from external sources _____%

Outputs of Compost

Q12a. What was the quantity of compost produced in 2013? _____ tonnes

Q12b. Please give the quantity of the compost you produced in each grade, in 2013?

Grade

0-10mm _____ tonnes
0-20mm _____ tonnes

0- 40mm	_____tonnes
Mulch	_____tonnes
"Oversize"	_____tonnes
Other – please specify	_____tonnes
_____	_____ **INTERVIEWER: CHECK SUM = TOTAL OUTPUT**

Destination of Compost

Q13. Where was the compost that you produced in 2013 applied? (IN TONNES - WRITE IN FIRST COLUMN BELOW)

FOR EACH TYPE OF USE TO WHICH COMPOST WAS APPLIED IN 2013

Q14. What was the average ex-works sale price? WRITE IN SECOND COLUMN BELOW

	TONNES	Average ex-works sales price	
Agriculture and field horticulture	_____	_____	£/T
Horticulture /growing media	_____	_____	£/T
Landscaping/landscape development	_____	_____	£/T
Turf	_____	_____	£/T
Landfill restoration	_____	_____	£/T
Fuel for energy recovery	_____	_____	£/T
Other e.g. bagged compost for local sales (Please specify below) _____	_____	_____	£/kg or £/T INTERVIEWER DELETE AS APPLICABLE

Quality

Q15a. Are you <u>currently</u> producing compost certified to PAS100? Yes ☐ No ☐

IFYES TO Q15a: Q15b. Do you intend to maintain your PAS certification? Yes ☐ No ☐

IF NO TO Q15a: Q15c. Do you intend to obtain PAS certification? Yes ☐ No ☐

IF NO TO EITHER Q15b OR Q15c: Why is that?

_____

IFYES TO Q15a:

Q16. Does the certification apply to all or only part of your output? All ☐ Part ☐

IF PART: To which part? (grades, tonnages, process)

_____

"Have Your Say"

THESE QUESTIONS TO BE ASKED ONCE PER OPERATOR, NOT PER PROCESS/SITE

Q17. For each of the following business issues, please say the extent to which it affects your composting operation – great effect, some effect, little or no effect?

READ OUT EACH ISSUE AND OPTIONS, GET ONE ANSWER PER ISSUE

Issue	Great	Some	Little/ none	Don't know
Competition for feedstocks				
Markets for outputs				
Contamination in feedstocks				
Regulatory environment				

Q18. Do you have anything further you would like to add, in terms of opportunities or issues for your business?

RECORD WHETHER THE RESPONDENT REGARDS THE ISSUE AS NEGATIVE (A "THREAT") OR POSITIVE (AN "OPPORTUNITY")

Negative / Threats:	
Positive / Opportunities:	

Normal practice in survey research is to ensure anonymity of responses. However, WRAP is likely to be conducting this survey again in 2014. Would you be prepared to let us pass your information to them so that it can be used to plan for that survey and analysing year-on-year changes? IF YOU ANSWER NO, YOUR ANSWERS WILL ONLY BE USED ANONYMOUSLY

☐ Yes ☐ No

AD questionnaire (Instructions for the telephone surveyors are given in red.)

Annual Survey of the UK Organics Recycling Industry 2013

AD Site (EXCLUDING SEWAGE TREATMENTand MBT AD)

Check first that the site does NOT:
Process only sewage/water treatment
Process only mixed waste ('black bag' waste)
Both of these types of sites should be excluded – inform WRAP of any such sites on the list

Contact Details for Site

Name		Telephone	
E-mail		Title	
Company Name		Company Postcode	
Site Name		Site Postcode	

Type of Facility

SIMPLY CHECK THIS AGAINST ANSWERS TO PREVIOUS SURVEY – IF AVAILABLE

Q1. When did the site become operational? (Please write in MM/YYYY) ____/____

Q2a. Did this site operate under a permit or an exemption during 2013? Permitted ☐ Exempt ☐

IF SITE OPERATED UNDER A PERMIT IN 2013:

Q2b. In 2010 was this site operating under a permit or an exemption? Permitted ☐ Exempt ☐

Q3. How many people are employed on this AD plant? (expressed as FTEs) ____

Q4a. I understand that your permitted capacity was [*pre-complete*]. Is that correct?

IF NOT, NOTE CORRECT FIGURE, DO *NOT* OVERWRITE (MAKE DISCREPANCIES VISIBLE)

Q4b. According to the Biogas Map your operational capacity was [*pre-complete*]. Is that correct?

IF NOT, NOTE CORRECT FIGURE, DO *NOT* OVERWRITE (MAKE DISCREPANCIES VISIBLE)

Q4c. Taking into consideration planning, regulatory and physical constraints; what was the maximum working capacity of this site in 2013? _____ tonnes per year

Q5. According to the Biogas Map your energy generation capacity was [pre-complete]. Is that correct?

IF NOT, NOTE CORRECT FIGURE, DO *NOT* OVERWRITE (MAKE DISCREPANCIES VISIBLE)

Q6 What type of AD system was the site using during 2013?

(IF TWO OR MORE SYSTEMS OPERATING IN PARALLEL AT SITE, FILL IN SEPARATE Q'RE FOR EACH, TO ENSURE NO DOUBLE-COUNTING)

Q6a AD system type ☐ Single stage ☐ Two-stage

Q6b AD system type ☐ Continuous ☐ Batch ("Plug flow")

Q6c AD system type ☐ Wet ☐ Dry

Q6d AD system type ☐ Mesophilic ☐ Thermophilic

Q6e Hydraulic retention time _____ days

Q7. Were you using pasteurisation? ☐ Yes (Please go to Q7a) ☐ No (Please go to Q8)

Q7a. IF YES, was it...? ☐ Pre digestion ☐ Post digestion

Q8. Aside from pasteurisation, what types of pre-processing of feedstocks was carried out on this site in 2013? (Please tick all that apply)

☐ Screening ☐ Hand picking ☐ Pulping (e.g. screw or hydropulper)
☐ Shredding ☐ De-packaging* ☐ Blending / mixing
☐ Other (Please specify) _____

***INTERVIEWER NOTE: INCLUDES REMOVAL OF CADDY-LINERS, IF RELEVANT**

Q8a. Do you have anything in place to mitigate odours from your plant? ☐ Yes ☐ No

Feedstocks

Q9. How much of your feedstocks in 2013 were: READ OUT TYPE AND ENTER QUANTITY IN TONNES.
CONFIRM THAT THE SUM OF THE FIGURES GIVEN EQUALS THE TOTAL INPUT IN 2013

Q10. FOR ALL BUT THE FIRST 2 TYPES PROCESSED, ASK: What proportion of your (TYPE) feedstock came from each of the following sources: READ OUT SOURCE AND ENTER PERCENTAGE.

IF USING 'OTHER' ENSURE THAT YOU RECORD A DESCRIPTION OF WHAT 'OTHER' IS

		SOURCE (percentages)					
	QUANTITY (tonnes)	Local Authority collections	Agri-culture	Super-markets /Retail	Hospitality sector	Food manu-facturers/ processors	Other source (specify)
Purpose grown (energy) crops							
Manures/ slurries							
Food (solid)							
Liquids							
Mixed food and green material							
Other type of material (specify)							
TOTAL		**INTERVIEWER CHECK = TOTAL INPUT AT THIS SITE IN 2013**					

Q11a. What level of reject material do you typically find, per tonne? (INTERVIEWER: tick one)

Less than 1%	
1% - 5%	
6% - 10%	
Over 10%	

Q11b . Which of the sources of your feedstock was the main source of this contamination in 2013?

Local Authority collections	Agriculture	Supermarkets /Retail	Hospitality sector	Food manufacturers/ processors	Other source

Q12. In 2013, approximately what percentage of your feedstock was sourced…?

from the site at which the plant is located _____%

from other sites within the same business (or business group) _____%

from external sources _____%

Outputs - Solid & Liquid

Q13. What was the quantity of whole digestate produced in 2013?

INTERVIEWER: this relates to the overall quantity, prior to separation of liquid from fibre, if this is done.

Wet weight _____ tonnes (*interviewer: 1 m^3 = 1 tonne*)

Q14. Is the whole digestate processed further, after digestion?

☐ Yes *(Please go to Q14a)* ☐ No *(PLEASE GO TO Q19)*

Q14a. IF YES, how? (*Please tick all that apply***)**

☐ Screened to remove contaminants

☐ Composted

☐ Separated into fibre & liquor

☐ Pelletised

☐ Other (Please specify below)

_____

IF WHOLE DIGESTATE WAS NOT SEPARATED INTO FIBRE AND LIQUOR, PLEASE GO TO Q19

Q15. How was the digestate separated into fibre and liquor? (*Please tick all that apply***)**

☐ Centrifuged

☐ Press

☐ Other (Please specify below)

_____

Q16. What was the quantity of separated fibre produced in 2013?

Wet weight _____ tonnes

Q17. And what was the quantity of separated liquor? _____ tonnes

INTERVIEWER INSTRUCTION: If quantity of liquor is given in volume (cubic metres), assume 1m^3 = 1 tonne

Q18. Do you apply any further processing after separation ☐ Yes ☐ No

Q18a. IF YES, What? _____

Use of Products – whole digestate OR fibre and liquor

Q19. How much of the digestate that you produced in 2013 went to each of the following destinations?

	Whole	**OR**	**Fibre**	**and**	**Liquor**
Sold to users off –site	_____ tonnes		_____ tonnes		_____ tonnes/m3
Provided Free of Charge to users off-site (includes charged for transport but not product)	_____ tonnes		_____ tonnes		_____ tonnes/m3
Site operator paid user to remove	_____ tonnes		_____ tonnes		_____ tonnes/m3
Used by your own business	_____ tonnes		_____ tonnes		_____ tonnes/m3
Disposal to landfill	_____ tonnes		_____ tonnes		_____ tonnes/m3
Disposal to sewers	_____ tonnes		_____ tonnes		_____ tonnes/m3
Other (please specify _____)	_____ tonnes _____ TOTAL		_____ tonnes _____ TOTAL		_____ tonnes/m3 _____ TOTAL

Q20. Of the digestate that you produced in 2013 that was used (i.e. not disposed of to landfill or sewers), where was it applied?

	Whole	**OR**	**Fibre**	**and**	**Liquor**
Agriculture	_____ tonnes		_____ tonnes		_____ tonnes/m3
Field-grown horticulture	_____ tonnes		_____ tonnes		_____ tonnes/m3
Landscape development	_____ tonnes		_____ tonnes		_____ tonnes/m3
Landfill restoration	_____ tonnes		_____ tonnes		_____ tonnes/m3
Fuel for energy recovery	_____ tonnes		_____ tonnes		_____ tonnes/m3
Other (Please specify below)	_____ tonnes		_____ tonnes		_____ tonnes/m3

_____

Q21. Where the outputs produced in 2013 were applied, what was the average ex- works sale price for each use?

	Whole	**OR**	**Fibre**	**and**	**Liquor**
Agriculture	_____ £/T		_____ £/T		_____ £/T
Field-grown horticulture	_____ £/T		_____ £/T		_____ £/T
Landscape development	_____ £/T		_____ £/T		_____ £/T
Landfill restoration	_____ £/T		_____ £/T		_____ £/T
Fuel for energy recovery	_____ £/T		_____ £/T		_____ £/T
Other (Please specify below)	_____ £/T		_____ £/T		_____ £/T

_____

Outputs – Biogas

Q22a. What was the total biogas yield in 2013 (m3)? _____**m^3**

Q22b. Of the biogas that you produced in 2013, how much was used for: (WRITE IN %s)

Heat (boiler only)	____%
Heat & electricity (combined heat & power, on-site CHP)	____%
Direct injection of gas into national grid	____%
Vehicle fuel (e.g. RCV fleet)	____%
Other (Please specify below)	____%

_____

Q22c. What was the gross output of the site in 2013 (Biogas combustion on site)? _____ MWh/yr

Q22d. How much <u>electricity</u> was generated in 2013? _____ MWh

Q22e. How much electricity was exported? _____ % / MWh **INTERVIEWER DELETE AS APPLICABLE**

Q22f. Of all the heat that you generated in 2013, what proportion was exported off site? _____ **%**

Q22g. IF LESS THAN 100%: What was any remaining heat used for? INCLUDE WASTAGE/VENTING

_____

_____

Quality

Q23a. Are you <u>currently</u> producing digestate certified to PAS110? Yes ☐ No ☐

IFYES TO Q23a: Q23b. Do you intend to maintain your PAS certification? Yes ☐ No ☐

IF NO TO Q23a: Q23c. Do you intend to obtain PAS certification? Yes ☐ No ☐

IF NO TO EITHER Q23b OR Q23c: Q23d. Why is that?

_____

_____

IFYES TO Q23a:

Q24. Does the certification apply to all or only part of your output? All ☐ Part ☐

IF PART: To which part? (form, tonnage, destination)

"Have Your Say"

IF AN OPERATOR HAS MORE THAN ONE AD PLANT, THIS QUESTION SHOULD ONLY BE ASKED ONCE.

Q25. For each of the following business issues, please say the extent to which it affects your AD operation – great effect, some effect, little or no effect?

Issue	Great	Some	Little/ none	Don't know
Competition for feedstocks				
Making the best use of the heat produced				
Markets for digestate				
Storage for digestate				

Q25a. Have there been any RIDDOR accidents at your AD plant in 2013? ☐ Yes ☐ No

IF AN OPERATOR HAS MORE THAN ONE AD PLANT, THIS QUESTION SHOULD ONLY BE ASKED ONCE.

Q26. Do you have anything further you would like to add, in terms of opportunities or issues for your business?

RECORD WHETHER THE RESPONDENT REGARDS THE ISSUE AS NEGATIVE (A "THREAT") OR POSITIVE (AN "OPPORTUNITY")

Negative / Threats:	
Positive / Opportunities:	

READ OUT:

Normal practice in survey research is to ensure anonymity of responses. However, WRAP is likely to be conducting this survey again in 2015. Would you be prepared to let us pass your information to them so that it can be used to plan for that survey and analysing year-on-year changes? IF YOU ANSWER NO, YOU ANSWERS WILL ONLY BE USED ANONYMOUSLY

☐ Yes ☐ No

Would you be happy for WRAP to use the information you have provided on your feedstocks, tonnage capacity and energy capacity to update its other information such as the database which supports the AD map and the gate fees survey? This could reduce the requests for information which you get from WRAP.

☐ Yes ☐ No

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

Would you be happy for WRAP sector specialists to be able to review the information that you have provided, in its entirety, in order to be able to better understand the AD sector?

☐ Yes ☐ No

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS: