Report

April 2016

A survey of the organics reprocessing industry in Scotland in 2014

Ricardo Energy & Environment

Executive Summary

Background

The purpose of this study was to understand the organic recycling sector in Scotland and any notable changes in the sector since the 2013 survey. The study aimed to estimate the amount of organic material treated in 2014[1], the capacity of organic treatment facilities, the type and variation of organic processing infrastructure as well as the nature, volume and value of the markets available for the various outputs in Scotland.

The recycling and recovery of organic waste and by-products is an important part of the waste hierarchy and contributes towards Scotland's waste and resource targets. Zero Waste Scotland undertakes this work because the data collected in the survey is widely used by private and public sector bodies to better understand the development of the sector and inform decision making and policy intervention. The results help Zero Waste Scotland inform its own work and assess the extent to which it is meeting its objectives with respect to developing both waste processing capacity and markets for the outputs.

This study investigated the treatment of organic wastes and by-products in Scotland through the processes of composting and Anaerobic Digestion (AD). This study focused on the calendar year 2014. The results build on previous studies, and are compared with information and data from the 2013 survey where applicable.

Methodology

A structured telephone survey was conducted to gather the required information from composting, AD and Mechanical Biological Treatment (MBT) facilities in Scotland. A detailed methodology for data collection is presented in Appendix 2.

A survey population and contact list was compiled from previous survey information and new data from SEPA, the AD portal, the National Non-Food Crops Centre (NNFCC) and expert knowledge of the sector.

The survey questionnaire was designed to capture data pertaining to the organic recycling sector in Scotland. Individual surveys were developed for permitted composting sites, merchant-AD (waste from multiple sources), industrial AD sites (on site at an industrial food or drink processing facility digesting the material produced on the site) and farm-fed AD sites (situated on a farm and the input material is from the farm such as slurries, crop residues etc.). Separate, sector-specific questionnaires were collated to ensure the surveys were clear and concise for each target audience.

This study focused on the calendar year 2014 and largely replicated the approach taken in 2013, with one notable difference:

- The industrial AD site results were presented in a separate subsection of the report to the merchant and farm-fed AD sites. This was due to the current industrial AD sites treating large volumes of liquid.

The industrial AD sites are, at the time of this report, most commonly associated with drink manufacturers in Scotland and produce large volumes of effluent that are treated on site. Such AD sites do not accept inputs from external sources, and the AD process is not their main business activity. The input material is generally high volume liquid and would misrepresent the overall AD input totals, when grossing was applied, if they were added into the overall figures.

[1] Survey data was collected from site operator's tonnage records for 2014 January to December, rather than waiting for regulatory returns which are available 11- 15 months after the survey year.

In previous years and in 2014, MBT facilities have been contacted to complete the organic survey based on the biological treatment of the segregated fraction. However due to commercial sensitivities related to the sites in Scotland no data can be presented from this sector as part of the study.

Key findings

Organics Sector

In total it was identified that there were 29 active composting sites and 16 active AD (merchant, farm-fed and industrial) sites in Scotland in 2014. There was no change in the number of active composting sites between 2013 and 2014, however there was an increase in the number of active AD sites from 11 to 16 between 2013 and 2014 (8 merchant sites, 2 farm-fed sites and 6 industrial sites).

The grossed input tonnage increased by 30,000 tonnes since the last survey in 2013 and this increase is in-line with the Waste (Scotland) Regulations that came into force on the 1st January 2014. The regulations required food waste businesses producing over 50kg of food waste per week to present it for separate collections. It is also evidence of the continued growth of local authority separate food waste collections from households.

The total surveyed (those which completed a questionnaire) and grossed operational capacity decreased between 2013 and 2014 (-42,000 tonnes and -8,000 tonnes respectively). The 2014 survey also quantified both the permitted capacity and the operating capacity which can be, and often are, different. It was also found that some sites' Waste Management Licences (WMLs) and permits were updated between 2013 and 2014 reducing the overall operating capacity of sites. These factors have contributed to the overall decrease in the total surveyed and grossed site capacity and is discussed in detail in sections Size of Scottish Composting Sector3.2.2 for composting sites and section 0 for merchant and farm-fed AD sites.

Overall the composting and AD (merchant and farm-fed) sites showed an increase in the grossed output of 69,000 tonnes from 322,000 tonnes in 2013 to 391,000 tonnes in 2014, which is consistent with the increases in the input. It should be noted that the increase in outputs tonnages (surveyed and grossed) were greater than the increase in the input tonnages, however, output tonnages could be affected by feedstock accepted in 2013 remaining on site (processes can take up to 3 months) before being exported from the site as stabilised output. This can impact on the overall movement of output material and therefore influence the surveyed and grossed tonnages.

The FTE surveyed figures increased from 165 to 193 since the previous survey due to the number of overall facilities increasing, however the grossed figures showed a decrease of 5.5 FTE from 209 in 2013 to 203.5 in 2014 and this may be linked to the size of facility not requiring many staff to manage the work or current staff managing the facility as part of their other responsibilities.

Composting

- In 2014, 27 out of 29 active composting sites were surveyed and the remaining sites data was calculated by grossing up from the 27 surveyed sites. The grossing method is presented in section 2.1 and Appendix 1.

- There was a slight increase in the grossed input for all composting sites from 411,000 tonnes in 2013 to 416,000 tonnes in 2014, which represents a 1% increase compared to the 2013 survey. This is not considered a significant change in material throughput.

- The grossed operational capacity in 2014 was 512,000 tonnes compared to 598,000 tonnes in 2013, which represents a 14% decrease between surveys. However, in 2013 site operators were only asked their maximum working capacity and many sites reported their permitted

capacity. In 2014 sites were specifically asked their maximum working capacity and their permitted capacity. Given that a site's maximum operating capacity is generally lower than its permitted capacity this difference has potentially resulted in the decrease in site operational capacity figures between 2013 and 2014. A number of sites also updated their Waste Management Plans or Pollution Prevention Control permits which has led to a change in the permitted and operating capacity of some sites. The 2013 survey also included a large site that was not operational in 2014.

- There was a decrease from 203,000 grossed output tonnage in 2013 to 188,000 grossed outputs tonnes in 2014. The reduction in grossed operational capacity suggests that there was an increase in grossed capacity utilisation from 69% in 2013 to 81% in 2014.

- Local authorities remain the main source of feedstock to composting sites in Scotland and accounted for 85% of all input material in 2014. There was a decrease in the amount of feedstock sourced from food manufactures/ processors in 2014 compared to 2013, however this is consistent with increases in feedstock from this source in the AD sector suggesting a shift in the type of organic treatment.

- The majority of compost outputs are used in agricultural and field horticultural end markets. These markets also have the lowest ex works prices from the survey results (mean £2.00 per tonne).

- Markets such as horticultural/ growing media, turf and landscaping have smaller end markets, however, the mean ex works price per tonne is between £18.50, £13.50 and £14.00 respectively.

- Overall, the grossed value of the output market in 2014 was estimated at £871,000 compared to an estimated grossed value of £690,000 in the 2013 survey. These figures should be treated with caution and are based on the mean value from the operators that provided end market prices per tonne and the estimated grossed output tonnages.

Anaerobic Digestion

- There were 8 active merchant AD sites surveyed which represented all active merchant sites in Scotland in 2014 and which was an increase from 5 merchant AD sites active in 2013. There were only 2 farm-fed sites operational in 2014 and one site was surveyed. The surveyed farm-fed site was used to calculate the remaining farm-fed site. The grossing method is presented in section 2.1 and Appendix 1.

- The grossed input tonnage to merchant and farm-fed AD sites increased from 132,000 tonnes in 2013 to 185,000 tonnes in 2014. This was an increase of 19% between 2013 and 2014 (25,000 tonnes) and is in-line with the Waste (Scotland) Regulations that came into force on the 1st January 2014.

- The grossed operational capacity of the 8 merchant sites in 2014 was 246,000 tonnes compared to 168,000 tonnes in 2013 which was a 46% increase between surveys. There were 7 active AD (merchant and farm-fed) sites in 2013 compared to 8 active AD (merchant[2]) sites in 2014 resulting in an overall increase in the operating capacity.

- Grossed outputs increased from 119,000 tonnes in 2013 to 203,000 tonnes in 2014. This was a 71% increase in grossed outputs between 2013 and 2014 due to increased inputs. Outputs were greater than input materials which could be due to material being accepted in 2013 as businesses prepared for the change of regulations but with the resultant outputs having left the site in 2014.

[2] Operating capacity of farm-fed sites was not reported in 2014.

- Local authorities remain the largest single source of feedstock to AD sites in Scotland and accounted for 44% of all input material in 2014. There was an increase in the amount of grossed feedstock sourced from food manufactures/ processors from 35,000 tonnes in 2013 to 49,000 tonnes in 2014 (14,000 grossed input tonnage). This is consistent with decreases in feedstock from this source going into the composting sector suggesting a shift in the type of organic treatment.

- As seen in 2013, the majority of AD outputs are used in agricultural and field horticultural end markets. The majority of ex-works prices were at a cost to the operator (50%).

- Six merchant AD sites reported that the biogas is used on site for combined heat and power (CHP). In total the 6 merchant sites reported over 8,500,000m^3 of biogas yield in 2014. In 2014, 7 merchant sites reported production of a total of 21 GWh of electricity. An average of 86% of electricity was exported in 2014.

- An addition to the 2013 survey was the inclusion of industrial AD facilities. In 2014, there were 6 active industrial AD facilities in Scotland and 3 sites took part in the survey.

- The survey results indicate that more than 85,000 tonnes of by-products were utilised in industrial AD facilities in Scotland during 2014, generating over 3000 MWh of energy. However, on the basis of additional publicly-available information[3] we believe the tonnage of by-products utilised in this sector (from all 6 industrial sites) to actually exceed 500,000 tonnes which feeds the 17.1 MW of renewable generating capacity installed by Scotland's food and drink sector.

Conclusions

The results of the survey have shown there has been a growth in the amount of organic feedstock for treatment which has been driven by changes in the legislation and the targets contained in the '*Making Things Last* – a circular economy strategy for Scotland'[4].

The composting sector in Scotland is well established compared to the AD (merchant and farm-fed) sector and has continued to grow and develop since the previous survey in 2013.

Through the Waste (Scotland) Regulations 2012 and the requirement (from the 1st January 2016) that any food business producing 5kg of food waste per week segregate that waste, as well as the continued introduction of separate food waste collections to households, the amount of feedstock for treatment is expected to increase. This survey provides an indication of the overall organic treatment capacity available in Scotland and could be compared against the total projected organic material available in Scotland through market studies to understand any under or over capacity in the sector.

The main end market for compost and digestate remains the agricultural sector, however access to other end markets such as horticultural/ growing media, landscaping and turf could yield higher ex-works prices. The use of organic outputs from both composting and AD (merchant and farm-fed) could be incorporated into construction and development projects through the procurement stage. This could help develop higher value end markets for organic outputs as well as contribute towards recycling targets.

The available data from industrial sites suggest that the large sites are capable of generating up to 17.1 MW capacity. The large volumes of separated liquor that are disposed of to sewer or sea could have the potential to be used as a liquid fertiliser.

[3] Ofgem, Environmental Programmes, available from https://www.ofgem.gov.uk/environmental-programmes
[4] Making Things Last - A Circular Economy Strategy for Scotland - http://www.gov.scot/Publications/2016/02/1761

Glossary of terms

Aerated static pile composting	Organic waste is mixed together in one large pile instead of rows. To ensure adequate aeration, 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.
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 bacteria that convert the inputs to biogas and whole digestate.
Animal By-Products Regulations (ABPR)	The Animal By-Products Regulations (EC) 2009 (142/2011) indicate clearly what may or may not be done with any part of an animal or product of animal original not intended for human consumption. This is transposed into Scottish law through The Animal By-products (Enforcement) (Scotland) Regulations 2013. This controls the collection, transport, storage, handling, processing and use or disposal of animal by-products in Scotland, including catering wastes. Similar legislation applies in England and Wales.
Controlled waste	Controlled wastes are household, commercial and industrial wastes as defined in The Controlled Waste Regulations 1992 (as amended).
Digestate	Digestate is the residue resulting from the anaerobic digestion of biodegradable materials. See also Fibre digestate, Liquor digestate and Whole digestate.
Farm - fed AD Facility	Site which is both located on a farm and processes only material generated on-farm (such as energy crops and livestock slurries).
Fibre digestate	This is the solid fibrous fraction of the whole digestate that has been separated from the liquor fraction. Fibre digestate is a source of organic matter and nutrients.
Industrial AD Facility	A site which processes its own by-products, 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 compliance with ABPR requirements. Many IVC sites incorporate an element of windrow composting for maturation of the material following the sanitisation phase.
Liquor digestate	This is the liquid fraction of the whole digestate that has been separated from the solid fibre fraction. Liquor digestate is a source of nutrients.
Mechanical Biological Treatment (MBT)	A generic term for an integrated facility that includes mechanical separation and recovery of solid recyclable materials such as metals and glass, and an organic fraction that is treated by anaerobic digestion or composting.
Merchant 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.

Open air windrow (OAW)	Mechanically turned windrow located outdoors (in the open air), as opposed to under a cover or in a building.
Operating capacity	The capacity of material that the site can handle. This is commonly lower than the permitted capacity of the site.
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's specification for composted material.
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.
Permitted capacity	The capacity of material that the site has been permitted to treat. This figure can be higher than the actual amount of material treated by a site and represents the maximum amount that the site can treat per annum.
Permitted/exempt waste operation	A permitted waste operation is one which is subject to the granting of a Pollution Prevention Control permit. This is a permit is granted by the regulator allowing the operation of a regulated facility subject to certain conditions. Some activities are exempt from permitting or waste management licencing provided they meet certain conditions. Further information is available on the SEPA website: www.sepa.org.uk
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 fresh air is introduced 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
Windrow Under Cover (WUC)	Mechanically turned windrow located indoors where the moisture content, temperature and oxygen content can be controlled.

Whole digestate	Digestate before separation into liquor and fibre fractions. See also Digestate, Fibre digestate and Liquor digestate.

Acronyms

ADBA	Anaerobic Digestion and Bioresources Association.
AfOR	Association for Organics Recycling (now merged with REA – see ORG, below).
FTE	Full time equivalent.
NNFCC	The National Non-Food Crops Centre, www.nnfcc.co.uk.
ORG	The Organics Recycling Group. A section within the REA which represents the membership of the former AfOR.
REA	Renewable Energy Association.
SEPA	Scottish Environment Protection Agency.
WRAP	Waste and Resources Action Programme

Contents

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1 Introduction

1.1 Purpose of the study

The purpose of this study was to understand the state of the organic recycling sector in Scotland during 2014 and any notable changes in the sector since the 2013 survey. The study aimed to estimate the amount of organic waste treated in 2014[5], the capacity of organic treatment facilities, the type and variation of organic processing infrastructure as well as the nature, volume and value of the markets available for the various outputs in Scotland. This annual survey has been conducted since the mid-1990s and has come to be regarded as the most up to date and definitive source of data on the sector.

The recycling and recovery of organic waste and by-products is an important part of the waste hierarchy and contributes towards Scotland's waste and resource targets. Zero Waste Scotland supports this survey because the data are widely used by private and public sector bodies to better understand the development of the sector and inform decision making and policy intervention. The results also help Zero Waste Scotland inform its own work and assess the extent to which it is meeting its objectives with respect to developing both waste processing capacity and markets for the outputs.

1.2 Scope of the work

This study investigated the treatment of organic wastes and by-products in Scotland through the processes of composting and Anaerobic Digestion (AD). Source-segregated and mixed organic materials were both in scope. The study was undertaken primarily by means of telephone surveys with the site operators.

Composting sites included In-Vessel Composting (IVC) and Open Air Windrow (OAW) treatment facilities. The composting site population was based on that used for the 2013 survey, however further details were added by SEPA in combination with the sector-specific knowledge of the contractor conducting the surveys.

AD sites included merchant AD (waste from multiple sources), farm-fed AD (situated on a farm and the input material is from the farm such as slurries, crop residues etc.) and industrial treatment facilities (on site at an industrial food or drink processing facility digesting the material produced on the site). The 2013 survey population was used as the basis for the 2014 survey[6], with further information provided by the AD Portal[7], SEPA and NNFCC. The aim was to ensure that the survey population was comparable to the 2013 survey results and was comprehensive, covering all facilities in operation during 2014.

The industrial AD sites are, at the time of this report, most commonly associated with drink manufacturers in Scotland and produce large volumes of effluent that are treated on site. Such AD sites do not accept inputs from external sources, and the AD process is not their main business activity.

There is generally limited output material associated with these sites as only the separated fibre fraction needs to find a market (~5 - 10% of the whole digestate volume produced on site) and due to the differences detailed above they have been presented separately rather than in combination with the merchant and farm-fed sites.

[5] Survey data was collected from site operator's tonnage records for 2014 January to December, rather than waiting for regulatory returns which are available 11- 15 months after the survey year.
[6] Excluding waste water AD treatment plants.
[7] Available from here: http://www.biogas-info.co.uk/

Mechanical Biological Treatment (MBT) plants were also included in the survey although the data have not been presented within this report[8].

AD facilities used as part of waste water (sewage) treatment systems were excluded from the 2014 in line with the 2013 survey. Small community composting and micro AD schemes were also excluded from this study.

The 2014 surveyed input materials for both composting and AD included source-segregated and co-collected food and garden waste streams from private and public sources, consistent with the 2013 approach. The source of input material directly affects the quality of the final output and the potential end markets. The 2014 survey included questions to assess the number of sites working towards or achieving PAS certification for the recycled by-products.

The 2014 survey also assessed the outputs from the organic sector including compost and digestate (whole, fibre and liquor) as well as the biogas and energy generation where applicable.

This study focused on the calendar year 2014. The results build on previous studies, and are compared with information and data from the 2013 survey where applicable.

1.3 Background

An annual survey of the organic recycling industry has been conducted since the mid-1990s, originally by The Composting Association (with funding from the Environment Agency and then WRAP) and more recently by Zero Waste Scotland and WRAP with support from the Association for Organics Recycling (AfOR)[9], the Anaerobic Digestion and Bioresources Association (ADBA), the Renewable Energy Association (REA) and the Environmental Services Association (ESA). The Scotch Whisky Association and the National Non-Food Crops Centre (NNFCC) were sources of information used to inform this study.

Copies of the previous surveys are hosted by Zero Waste Scotland[10], WRAP[11] and ORG[12].

1.4 Context

The Scottish Government launched Scotland's first Zero Waste Plan[13] in June 2010 and more recently 'Making things Last – a circular economy strategy for Scotland'[14] in February 2016. This strategy sets out actions to build a more circular economy in Scotland in which materials are kept in high value use for as long as possible. Zero Waste Scotland is funded by the Scottish Government to support the delivery of this circular economy strategy and other low carbon and resource efficiency policies.

May 2012 saw the passing of the Waste (Scotland) Regulations[15] which represent the most significant development in recycling legislation that Scotland has seen. The regulations are designed to help Scotland realise the true value of resources currently being thrown away. This has the potential to boost Scotland's economy and create green jobs in the process. The Regulations also play a key role in helping Scotland reach its target of 70% recycling of all waste by 2025. In the context of organic waste, the role for Zero Waste Scotland is to provide support to deliver a sustainable organics treatment

[8] Both aerobic and anaerobic biological treatments were included in the study, however as there is only one organisation that has eligible MBTs in Scotland and due to commercial sensitivities, any data provided could not be presented within this report.
[9] In 2013, REA and AfOR merged and AfOR is now represented by the Organics Recycling Group (ORG) within REA.
[10] Scottish Surveys available from www.zerowastescotland.org.uk
[11] UK surveys available from www.wrap.org.uk
[12] Scottish surveys available from www.organics-recycling.org.uk
[13] www.gov.scot/Resource/Doc/314168/0099749.pdf
[14] http://www.gov.scot/Publications/2016/02/1761
[15] www.legislation.gov.uk/sdsi/2012/9780111016657/contents

industry in Scotland. It does this by providing support to organics treatment facilities to improve their efficiencies and the quality of their compost, digestate and biogas outputs; working to improve market confidence in compost and digestate products; and working with all sectors to encourage greater uptake of AD.

Since 1st January 2014, any food waste businesses producing over 50kg of food waste per week have been required to present it for separate collection. This has led to a large increase in the number of commercial food waste collections[16]. On 1st January 2016 the waste threshold was reduced to encompass businesses producing over 5kg of food waste per week.

In addition, since 1st January 2016, local authorities have been required to offer a household food waste recycling service in non-rural areas, leading to an increase in the number of food waste collections for households, helped by the Zero Waste Scotland Food Waste Collection Programme funding[17]. Prior to 2011, only 307,000 households had access to a food waste collection, representing only 13% of Scottish households. During 2014, there were 1.46 million households with access to a food waste collection in Scotland. This represented 62% of Scottish households with 25 of the 32 Scottish local authorities offering a food waste collection in at least part of their authority area. These figures were relevant for the survey period in 2014 and have continued to rise.

2 Methodology

2.1 Introduction

A structured telephone survey was conducted to gather the required information from composting, AD and MBT facilities in Scotland. A detailed methodology for data collection is presented in Appendix 2.

A survey population and contact list was compiled from previous survey information and new data from SEPA, the AD portal, NNFCC and expert knowledge of the sector.

The survey questionnaire was designed to capture data pertaining to the organic recycling sector in Scotland. Individual surveys were developed for permitted / licenced composting sites, merchant AD, industrial AD sites and farm-fed AD sites. Separate, sector-specific questionnaires were collated to ensure the surveys were clear and concise for each target audience.

All site operators were contacted by phone and the survey completed electronically before the data was analysed.

Sector trade bodies (including REA, SESA, Scotch Whisky Association and CIWM) were contacted and asked to publicise the survey to relevant members. A page was also hosted by the Zero Waste Scotland website which provided an overview of the project and served to validate the research for any contacts that required it. Taken together, this approach aided the survey process, since many site operators had prior knowledge of the survey and were then willing to take part.

This study focused on the calendar year 2014 and largely replicated the approach taken in 2013, with one notable difference:

- The industrial AD site results were presented in a separate subsection of the report to the merchant and farm-fed AD sites. This was due to industrial AD sites treating large volumes of liquid.

In previous years and in 2014, MBT facilities have been contacted to complete the organic survey based on the biological treatment of the segregated fraction. However due to commercial sensitivities related to the sites in Scotland no data can be presented from this sector as part of the study.

[16] www.news.scotland.gov.uk/News/Waste-regulations-extended-20d7.aspx
[17] www.zerowastescotland.org.uk/ProgrammeDeliveryPlan201415

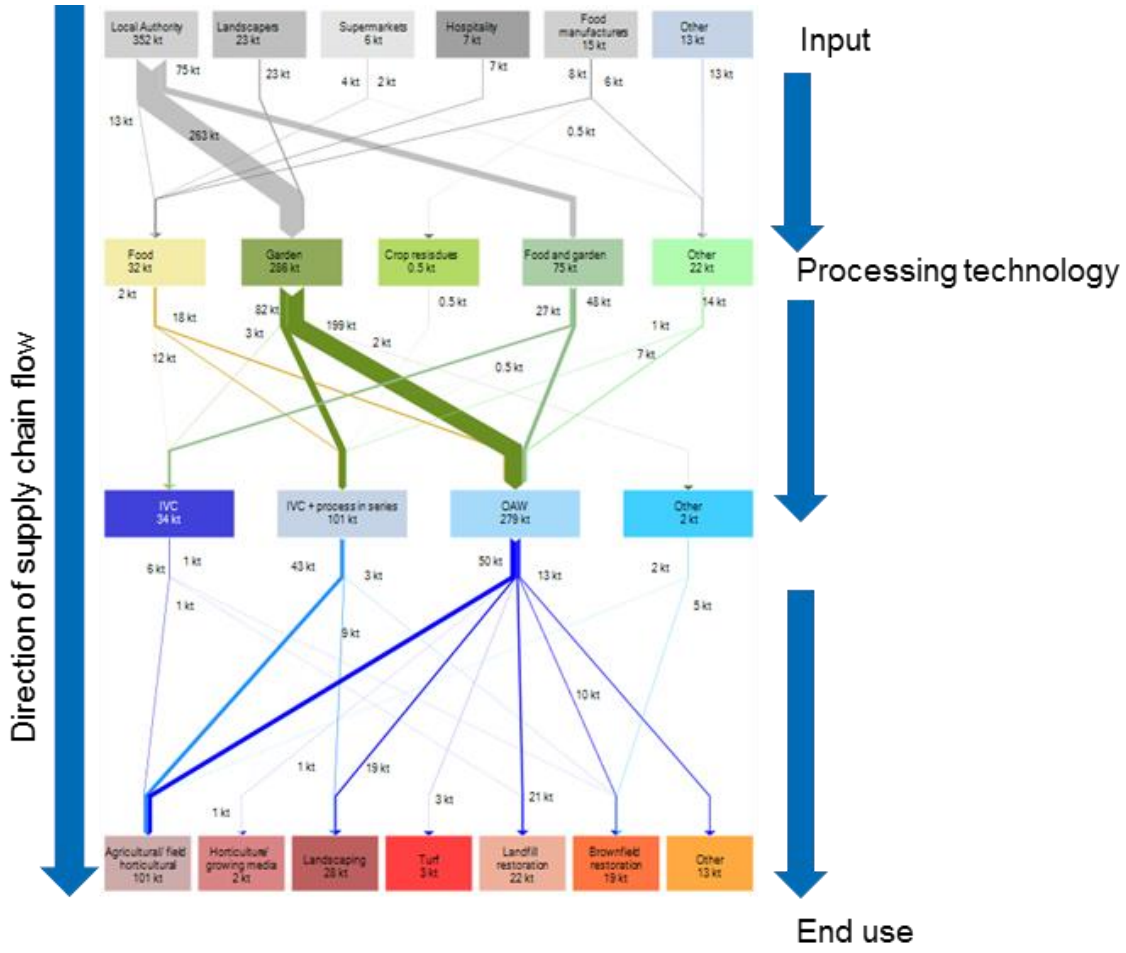
Where possible the results of the 2014 survey were compared with the results from 2013[18]. Specific comparisons between 2013 and 2104 results are highlighted throughout the report, as are any cautions associated with such comparisons. Factors that can impact the comparison in the 2014 and 2013 data include: changes to the survey questions, changes to the sites that completed previous surveys or limited responses preventing results from being presented.

2.2 Diagrammatic representation of the results

The results from the telephone survey for composting and AD have been presented in 'Sankey' flow diagrams. The Sankey diagrams 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.

An example of the Sankey diagrams used is presented in Figure 1. The width of the arrows is proportional to the quantity of material in tonnes flowing between the different process stages.

Figure 1: Example of Sankey diagram layout



[18] 2013 complete report available from http://www.wrap.org.uk/content/survey-uk-anaerobic-digestion-industry-2013

3 Results

This section outlines the results of the analysis of the survey responses, providing narrative where it is required to explain or enhance the results. This report aims to present the findings and facts of the surveys and does not interpret or discuss the wider impacts.

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 estimated, calculated by grossing up, from the survey responses. This makes allowance for the sites which did not respond to the survey. Such data are described as 'grossed tonnages'.

Other tonnages are data reported by the sample of sites which provided answers. These figures are described as 'surveyed tonnages'. The number of operators providing answers varies from question to question.

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

3.1 Overview of the organic recycling sector in Scotland

This section presents all composting and AD (merchant and farm-fed) estimated grossed figures from the 2014 survey to give a summary of the organic sector as a whole. The results are compared to the grossed figures presented in 2013.

In total it was identified that there were 29 active composting sites and 16 active AD (merchant, farm-fed and industrial) sites in Scotland in 2014. There was no change in the number of active composting sites between 2013 and 2014, however there was an increase in the number of active AD sites from 11 to 16 between 2013 and 2014 (merchant, farm-fed and industrial).

Table 1 presents the surveyed and grossed input tonnage, operating capacity, output capacity and full time employees for composting and AD (merchant and farm-fed) sites in Scotland. For detailed analysis of each sector please see Section 3.2 for composting and Section 3.3 for AD. The figures in Table 1 should be treated indicative only, since subsequent report sections discuss the robustness of the data based on the survey responses and the available information.

The surveyed and grossed input figures have increased since the last survey in 2013. The input survey tonnage increased from 480,000 tonnes in 2013 to 522,000 tonnes in 2014. The grossed input tonnage increased from 543,000 tonnes in 2013 to 573,000 tonnes in 2014. These increases correspond with the Waste (Scotland) Regulations that came into force on the 1st January 2014 as noted in Section 1.

The total surveyed and grossed operational capacity decreased between 2013 and 2014. The surveyed operational capacity decreased from 704,000 tonnes in 2013 to 662,000 tonnes in 2014. The grossed operational capacity decreased from 766,000 tonnes in 2013 to 758,000 tonnes in 2014[19]. The 2014 survey identified both the permitted capacity and the operating capacity which can be different. It was also found that some sites' Waste Management Licences were updated between 2013 and 2014 reducing the overall operating capacity of sites. These factors have contributed to the overall decrease

[19] Farm -fed sites were only asked their permitted capacity and therefore this figures only represents the operating capacity of the merchant AD sites and composting site in 2014. Therefore the grossed operating figures may underestimate the total grossed operating figures had farm-fed sites been included.

in the total surveyed and grossed site capacity and is discussed in detail in Section 3.2.2.3 for composting sites.

Overall the composting and AD (merchant and farm-fed) sites showed an increase in the surveyed and grossed outputs which is consistent with the increases in inputs. The surveyed outputs increased from 286,000 tonnes in 2013 to 375,000 tonnes in 2014 and the grossed outputs increased from 322,000 tonnes in 2013 to 391,000 tonnes in 2014. It should be noted that the increase in output tonnages (surveyed and grossed) were greater than the increase in the input tonnages. Output tonnages could have been affected by feedstock accepted in 2013 remaining on site (processes can take up to 3 months) before being exported from the site. This could impact on the overall movement of output material and therefore the surveyed and grossed tonnages.

The number of full time equivalents (FTE) surveyed figures increased from 165 to 193 since the previous survey due to the number of overall facilities increasing, however the grossed figures showed a decrease of 5.5 FTE from 209 in 2013 to 203.5 in 2014. The FTE surveyed figures increased since the previous survey due to the number of overall facilities increasing, however the grossed figures show a decrease and this may be linked to the size of facility not requiring many staff to manage the work or current staff managing the facility as part of their other responsibilities.

These figures present a summary of the sector and further details of factors affecting the results are presented in Section 3.2 for composting and Section 3.3 for AD.

Table 1 Summary of organic sector, composting and AD (merchant and farm-fed) in 2013 and 2014.

	2014	2013	Difference between 2013 and 2014
Total surveyed inputs (tonnes)	522,000	480,000	+42,000
Grossed inputs (tonnes)	573,000	543,000	+30,000
Surveyed site operational capacity (tonnes) (i)	662,000	704,000	-42,000
Grossed site operational capacity (tonnes)	758,000 (i)	766,000	-8,000
Total compost output surveyed (tonnes)	375,000	286,000	+89,000
Grossed compost output (tonnes)	391,000	322,000	+69,000
Total employees surveyed	193	165	+28
Grossed employees	203.5	209	-5.5

Notes to table:

(i) Farm-fed sites were only asked their permitted capacity and therefore this figures only represents the operating capacity of the merchant AD sites in 2014.

The 2014 survey aimed to understand the extent to which different business issues affect operators. As a whole the Waste (Scotland) Regulations have had an impact on the sector due to increased feedstock, although the AD sector saw a greater impact due to segregated food waste collections which is discussed in Section 3.3.

There was no significant impact from competition for feedstocks with only a few sites reporting that being on local authority frameworks could help increase their feedstocks. Operators reported that contamination in feedstocks remains a problem as identified in the previous survey. It was reported that the levels of contamination in the feedstock can impact on the quality of the compost or digestate output material and that some operators have taken measures to reduce this.

The number of sites with PAS certification is growing for both composting and AD (merchant and farm-fed) sites. The markets for outputs from the organic sector varies between composting and AD (merchant and farm-fed) sites and is discussed in detail in Sections 3.2.3.6 for composting and Section 3.3.7 for AD (merchant and farm-fed).

From the responses received, it appears that the impact on businesses as a result of complying with SEPA and APHA varies between sectors due to treatment process (composting or AD) specific issues and individual site concerns. These barriers and issues are presented in Sections 3.2.3.10 for composting and Section 3.3.11 for AD (merchant and farm-fed).

Industrial AD facilities were excluded from the merchant and farm-fed AD analysis as they treat large volumes of liquid by-products generated from the manufacture of food and drink products located on the same site. These sites commonly produce small volumes of 'sludge' and / or large volumes of liquid that are commonly discharged to sewer or sea. In 2014, there were 6 active industrial facilities in Scotland and 3 sites took part in the survey.

Results from the surveyed industrial sites indicate that more than 85,000 tonnes of by-products were utilised in industrial AD facilities in Scotland during 2014, generating over 3000 MWh of energy. However, on the basis of additional publicly-available information[20] covering the additional sites which did not respond to the survey, we believe the tonnage of by-products utilised in this sector (from all 6 industrial sites) exceeds 500,000 tonnes which feeds the 17.1 MW of renewable generating capacity installed by Scotland's food and drink sector.

3.2 Permitted composting

The following definitions have been used to report data on the composting sector:

'Site' – this is the physical composting location and may house more than one facility and more than one process.

'Facility' – is a single standalone process or combination of processes operating in series.

'Process' – is an individual composting technology, e.g. IVC or aerated static pile.

3.2.1 Survey performance and participation

A total of 27 composting sites were successfully contacted from an initial population of 35. Of the remainder, 6 of the original population were found to be non-operational during 2014, one could not be contacted and one site did not wish to participate. Figure 2: Distinguishing between sites, facilities and processes

Table 2 shows a breakdown of survey participation rates in 2014 compared to 2013, 2012 and 2010.

Of the 27 sites, one was operating under an exemption in 2014 and has not subsequently operated under a licence or permit. The remaining composting sites were operating under permits. Overall, the survey collected responses from 27 sites operating 31 different facilities and 35 separate processes. Figure 2 illustrates the various possible configurations.

[20] Ofgem, Environmental Programmes, available from https://www.ofgem.gov.uk/environmental-programmes

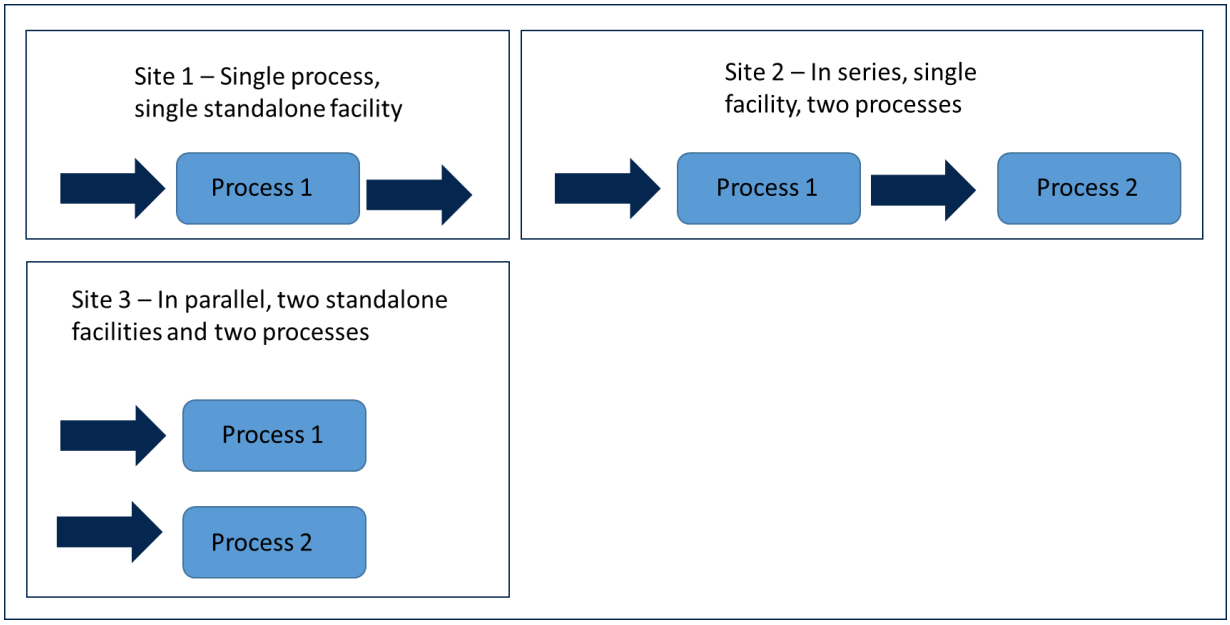


Figure 2: Distinguishing between sites, facilities and processes

Table 2: Scotland Composting site survey - participation rates

Participation	2014	2013	2012	2010
Sites listed [(i)]	35	35	37	36
Not operational [(ii)]	6	6	4	3
Refused	1	1	2	2
No conclusive contact [(iii)]	1	2	6	7
Sites surveyed	27	26	25	24
Active Sites	29	29	33	33
Proportion of Active Population Surveyed	93%	90%	76%	73%

Notes to table:

(i) Listed on the contact database, in 2014 this was developed based on information from previous surveys, Zero Waste Scotland's and the contractors' industry knowledge, and the publically available NNFCC database.

(ii) These are sites that responded that they were not operating.

(iii) These are sites where no contact was made with the site owner/operator. Numerous attempts were made to contact the site through different mediums with no response. For 2012, it included 5 sites that were operating in 2012, but were overlooked for the 2012 survey due to the way they have been previously categorised.

3.2.2 *Size of Scottish Composting Sector*

To understand the total inputs to and outputs from the composting sector in Scotland in 2014, the data collected from the 27 active sites were used to extrapolate data for all 29 operational sites within Scotland in 2014. Appendix 3 summaries the approach taken to extrapolate the data for the 29 operational sites. This method was also used for the previous organics surveys conducted in 2013, 2012 and 2010 and was performed following extensive quality checks on the raw data collected.

Table 3 presents the surveyed results and the grossed input and output calculations. The 2014 figures have been presented alongside the 2013 figures and the differences presented to facilitate comparison.

Table 3: Size of Scotland's composting sector 2014

	2014	2013	Difference between 2013 and 2014
Total surveyed inputs (tonnes)	387,000	369,000	5%
Grossed inputs (tonnes)	416,000	411,000	1%
Surveyed site operational capacity (tonnes) [(i)]	477,000	536,000	-11%
Grossed site operational capacity (tonnes)	512,000	598,000	-14%
Total compost output surveyed (tonnes)	175,000	182,000	-4%
Grossed compost output (tonnes)	188,000	203,000	-7%
Total employees surveyed	129.5	120	8%
Grossed employees	139	139	0%

Notes to table:

- *Tonnages rounded to the nearest 1,000. The percentage change between 2014 and 2013 grossed figures are calculated on unrounded figures.*

(i) Operators were asked for their operational capacity in 2014 on the sites, which is generally different from the permitted capacity of the site. In 2013 operators were asked only what the maximum working capacity was whereas 2014 asked for both permitted capacity and maximum working capacity

The results show that:

- There was a slight increase in the grossed input for all sites to 416,000 tonnes, a 1% increase compared to the 2013 survey.

- The grossed operational capacity in 2014 was 512,000 tonnes, 14% lower than in 2013. In 2013 site operators were only asked their maximum working capacity and many sites reported their permitted capacity. In 2014 sites were asked their maximum working capacity and their permitted capacity. A site's maximum operating capacity is generally lower than the permitted capacity. This change in question has potentially resulted in the recorded decrease in site operational capacity figures between 2013 and 2014. A number of sites also updated their Waste Management Plans or Pollution Prevention Control permits which has led to a change in

the permitted and operating capacity of some sites. The 2013 survey also included a large site that was not operational in 2014.

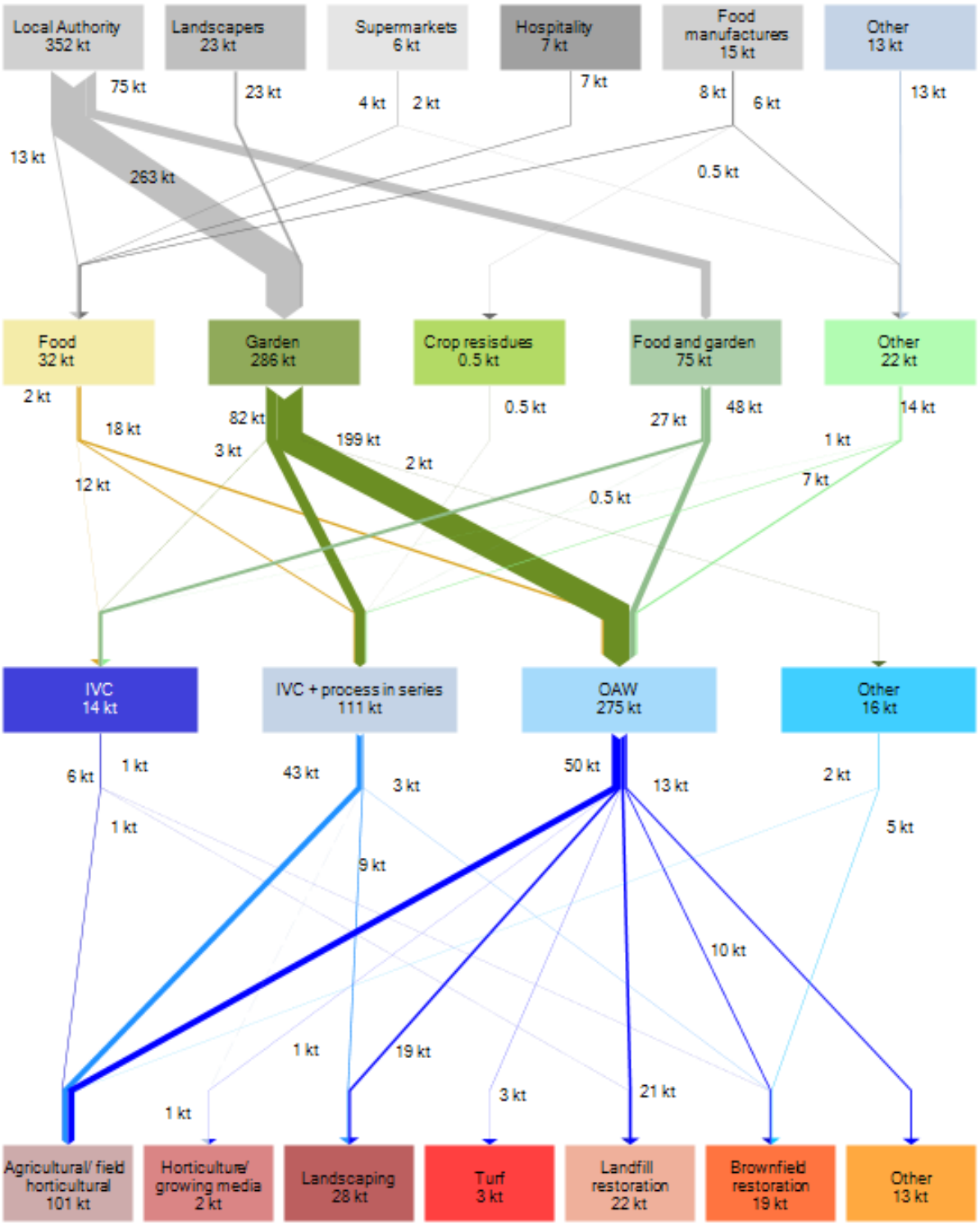
- The reduction in grossed operational capacity suggests that there was an increase in grossed capacity utilisation from 69% in 2013 to 81% in 2014.
- There was no change in the grossed Full Time Equivalent (FTE) staff employed in the Scottish composing industry between 2013 and 2014.
- The average annual input per site in 2014 was 14,000 tonnes, with a range of 320 tonnes to 41,000 tonnes.

3.2.2.1 Supply Chain Flow

As described in Section 2.2, Sankey diagrams are a useful tool for visually presenting complex data. Figure 3 presents the movement of organic material associated with the composting industry in Scotland in 2014. The movement of organic material as shown in the Sankey diagram in Figure 3 is discussed in the following sections.

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 2014 supply chain flow



Notes to figure:

- *Figures are rounded to the nearest thousand tonnes. The total output after composting treatment decreases due to losses during the composting process rather than gaps in the data.*
- *IVC – In-Vessel Composting. OAW – Open Air Windrow composting*
- *All terms and processes are explained in detail in the report.*

3.2.2.2 Structural changes in the composting sector

Since the last survey in 2013, there remains 29 active sites operating under permits and exemptions, (Figure 2) as presented in Table 4. There has been an overall increase in the number of composting processes on the same number of sites since the previous survey. There were 29 active composting sites in Scotland in 2014 and 2013, however different sites completed the 2014 survey compared to 2013 which could have affected the number and type of processes reported. There has also been a change in the frequency of IVC and other composting processes, and a decrease in Open Air Windrow (OAW) composting, whereas Windrow Under Cover (WUC) composting has remained the same. It should be highlighted that WUC has only been utilised by composting operators in Scotland since 2013 and the data from 2014 suggest there was no further uptake in WUC during 2014.

Table 4: Comparison of number of surveyed sites using different types of processes in 2013 and 2014

Type of facility	Instances of process type being used in 2014	Proportion of processes	Instances of process type being used in 2013	Proportion of processes	Difference
IVC	8	23%	7	21%	+1
Open Air Windrow	22	63%	23	68%	-
Windrow Under Cover	4	11%	4	12%	-
Other (i)	1	-	-	-	-
Total number of processes	**35**		**34**		

Notes to table:

- *Percentages (%) have been rounded and therefore do not total 100% in some cases.*
- *(i) These are all the facilities classified as 'other' that operated in 2014, however the results cannot be presented due to commercial sensitivities.*

As defined in section 3.2 there is more than one type of facility and/or process present on some sites[21].There were 2 sites with 3 different processes and 3 sites with 2 different processes operating. Figure 4 shows the proportion of facilities surveyed in 2014 compared to 2013. This suggests that OAW and IVC remain the dominant composting processes used in Scotland, accounting for 86% of all treatment processes.

[21] One site may have 1 facility that involves 2 processes in series, where as another site may have 2 facilities on site with 2 processes that run in parallel to each other.

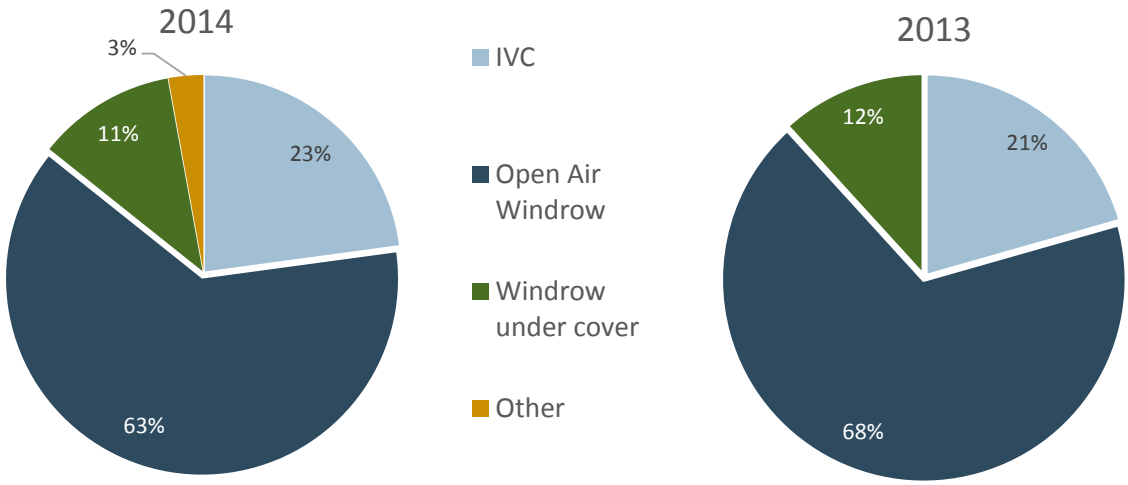


Figure 4: Proportion of each type of process surveyed (% of total processes) in 2014 and 2013

There were 31 different facilities surveyed in 2014, and **Error! Reference source not found.** presents a summary of the facilities surveyed in 2014 compared to 2013. There has been a slight decrease in the number of OAW standalone facilities compared to 2013 and an increase in the number of standalone IVC facilities. Facilities using IVC and WUC have decreased, however there was an increase in the use of IVC, OAW & WUC in combination since the previous survey. Of the combined treatment processes, 50% (3 facilities) were in series, 17% (1) were in parallel and 33% (2) were in series and parallel (Total responses = 6).

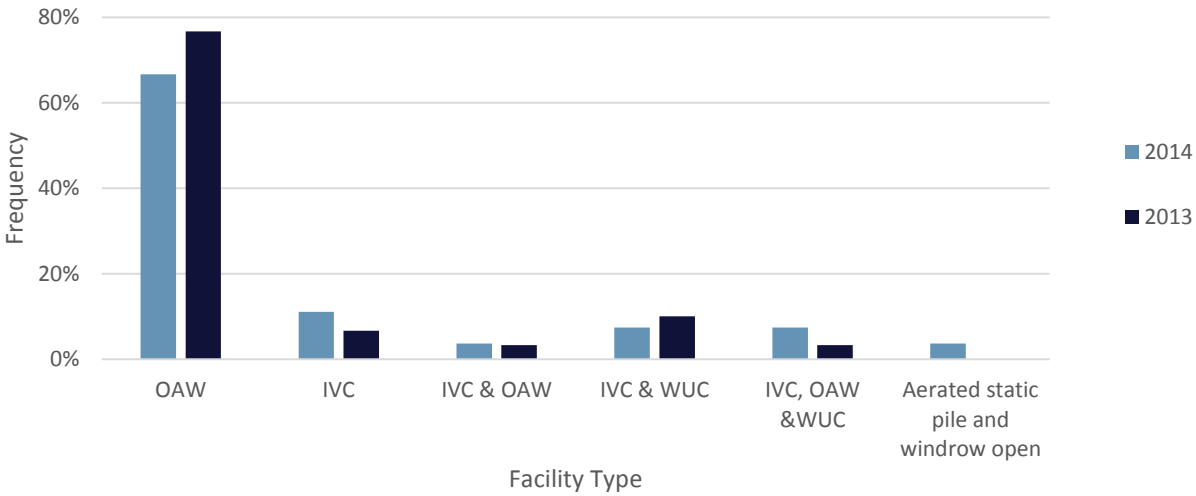


Figure 5: Different processes utilised, as % of all responses in 2014 and 2013

Notes to figure:

- *Where a process is listed on its own this refers to a standalone facility and process, where technologies are listed together these are facilities with processes that operate in either series, parallel or series & parallel.*

3.2.2.3 Operational Capacity

Sites were asked what their maximum operational capacity was in 2014. This refers to the maximum input material the site could physically process in 2014 and is often different from permitted capacity. The operating capacity for all sites surveyed (27) was grossed-up to account for all active composting sites across Scotland (29).

The grossed operational capacity estimated in 2014 was 512,000 tonnes compared to 598,000 tonnes in 2013, as shown in Table 5. This decrease in grossed operational capacity may be due to changes in the survey questions which gathered more detail in 2014 and changes to individual site capacities between the surveys.

In 2013, the survey asked for a site's maximum working capacity and many sites report the permitted capacity of the site. In 2014 the survey asked for the maximum working capacity and the permitted capacity. The permitted capacity is commonly higher than the maximum working capacity and therefore the reported change may be due to more accurate data collection from the more detailed questions.

It was also noted that a number of sites changed their WMP and PPC permits and overall 11 sites reported a decrease in the operational capacity and 5 sites an increase which may also have contributed to the overall decrease in operational capacity between 2013 and 2014. The grossed average capacity per site decreased from 21,000 tpa in 2013 to 18,000 tpa in 2014.

Table 5: Grossed capacity and utilisation of the main composting site types in Scotland in 2014 and 2013

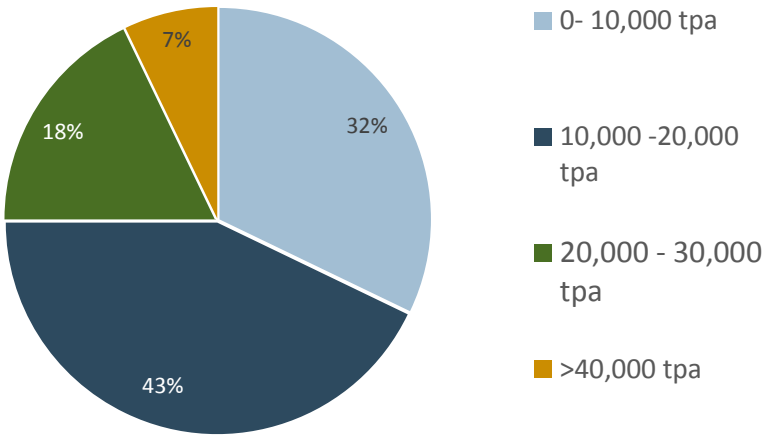
Grossed	2014			2013		
Type of Facility	Capacity	Utilisation	Spare Capacity	Capacity	Utilisation	Spare Capacity
IVC operating as stand alone or in series	21,000	67%	7,000	143,000	86%	20,000
Standalone OAW	286,000	96%	11,000	344,000	60%	138,000
IVC and OAW in series	185,000	60%	74,000	112,000	74%	29,000
Total	**512,000**	**81%**	**97,000**	**598,000**	**69%**	**187,000**

Notes to table:

- *Tonnages are rounded to the nearest 1,000. The percentage figures are calculated on the unrounded figures.*
- *Details of 'other' facility types have been suppressed to avoid disclosure of individual site information.*

In 2013, 73% of sites had an estimated grossed annual operating capacity of 20,000 tonnes or less which was a decrease from 74% in 2012. In 2014, 75% (23 sites) of composting sites had an estimated grossed operating capacity of 20,000 tonnes or less. These figures suggest there has been little change in the individual capacity of sites. Figure 6 presents a summary of site operating capacities in 2014.

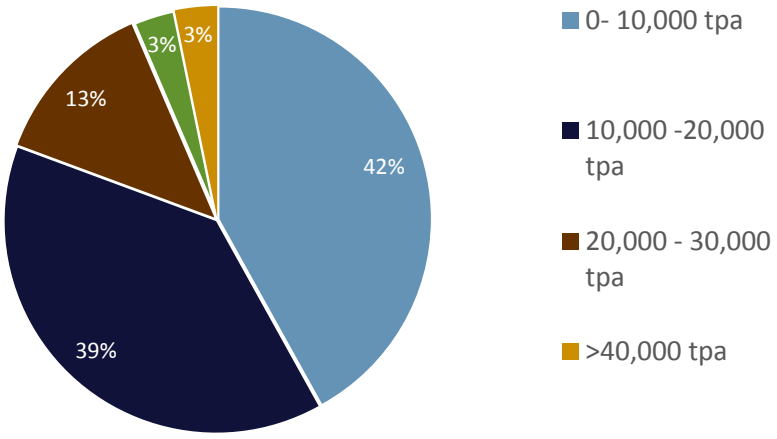
Figure 6: Percentage of sites reporting different annual operating capacities, as percentage of all sites responding in 2014



3.2.2.4 Site throughput

In 2014, survey responses suggested that 81% (25 sites) of composting sites processed 20,000 tonnes or less input material compared to 89% in 2013 and 79% in 2012. The input tonnage is the actual material accepted onto site and treated, this figure can be lower than the maximum operating capacity as the maximum operating capacity represents the maximum input that the site could process if available. Figure 7 shows a summary of the input ranges identified in 2014. As identified in 2013, the survey responses demonstrate that capacity is being under-utilised.

Figure 7: Surveyed input tonnage per composting facility, as % of all responses in 2014 (Total 31 responses)



3.2.2.5 Process types and inputs

In 2014, standalone OAW processes accounted for 66% of all grossed input tonnage (275,000 tonnes) compared to 60% in 2013 and 59% in 2012.

IVC is commonly designed to ensure Animal By-Product Regulations (ABPR) requirements are met. IVC accounted for 23% (8 sites) of all processes[22] surveyed in 2014. Eight sites utilise IVC technology:

[22] 35 individual processes within 31 facilities across 27 sites. See Figure 2 for description of processes, facilities and sites.

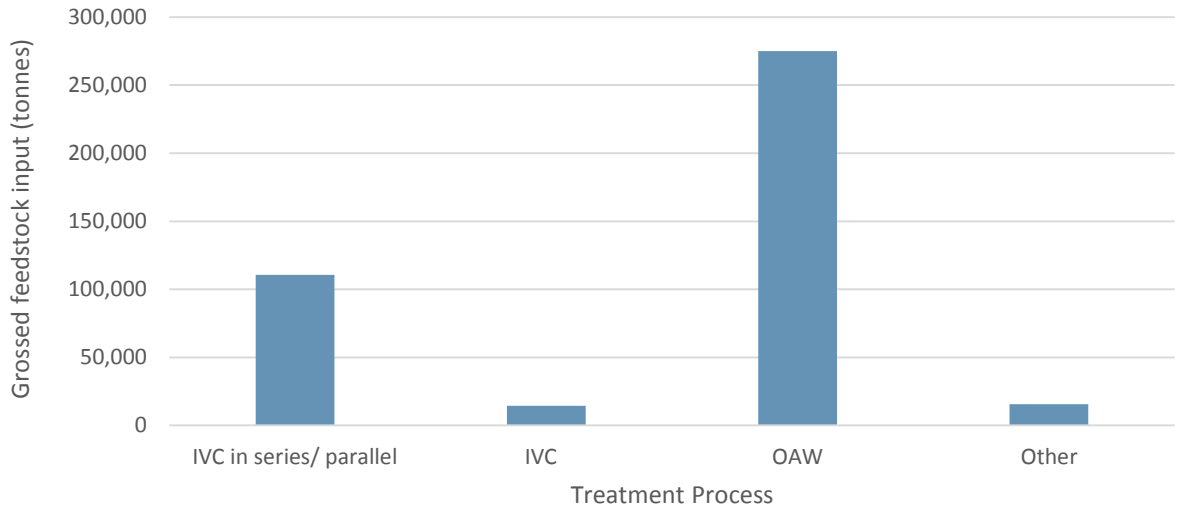
3 utilise IVC processing only and the remaining 5 sites used IVC treatment with other processes[23]. IVC is used with OAW at 2 sites, with WUC at 2 sites and with both OAW and WUC at one site. The different use of processes by composting operators is dependent on the input material, the space available, the market and existing logistics. Organic material is commonly matured after the initial biological treatment and therefore sites have reported a number of processes based on the individual site approach.

The 2014 survey identified a decrease in the use of IVC as a standalone treatment, leading to a decrease in the amount of feedstock treated by IVC only to 3% (14,000 tonnes) compared with 4% in 2013. In 2014, 27% of grossed input tonnage (111,000 tonnes) feedstock was treated by IVC with another process, a decrease from 37% in 2013.

The survey results suggest there have been slight changes in the composting processes although this does not have a significant impact on the amount of organic material that is processed. However, it highlights the fact that OAW remains the most common process method used in Scotland in 2014.

Figure 8 presents a summary of the grossed input feedstock quantities treated by each type of facility in Scotland in 2014.

Figure 8: Input quantities for each type of facility in 2014



Note to figure:

- *Windrow under cover is not represented separately because in all instances it is operated in series with IVC. Therefore, IVC in series/ parallel facilities include any other treatment processes conducted in series/ parallel.*

3.2.3 Feedstock

3.2.3.1 Waste feedstock sources

Table 6 presents a summary of feedstock sources and the associated grossed figures based on 29 active sites across Scotland. All surveyed sites reported that feedstock was sourced from outside the site's own business group.

There was a slight increase in the amount of waste sourced from local authorities to 85% (352,000 tonnes) in 2014 compared to 83% (340,000 tonnes) in 2013, however this is not considered a significant change.

There was evidence of an estimated 23,000 tonne decrease in the amount of feedstock sourced from food manufacturers/ processers from grossed 38,000 tonnes in 2013 to grossed 15,000 tonnes in 2014. Previously there was a large increase from 2,000 tonnes in 2012 to 38,000 tonnes in 2013. In the last

[23] Other processes in either series or parallel or in both series and parallel

survey this was attributed to businesses changing their food waste practices, in advance of the legislation that was due to take effect on 1st January 2014 as noted previously. The decrease in 2014 suggests that since the legislation has been introduced the food manufacturing/ processing industry could have diverted their waste streams from composting processes to other treatment methods, such as AD. This is supported by increases in the AD sector which is discussed in Section 3.3.4.

The amount of material sourced from supermarkets/ retail and hospitality has more than tripled since 2013, from 4,000 tonnes to 13,000 tonnes in 2014. This could also be a result of the Waste (Scotland) Regulations requiring all food businesses to segregate food waste[24]. In 2013, 'Other' sources of input material was mainly identified as 'other waste companies' and 'landscapers'. However in 2014, landscapers were added as a new category due to the increases in tonnages from the landscaping sector. As a result the landscaping sector in 2013 appears as zero as the 2013 data could not be separated out.

Table 6: Source of material input to sites (Grossed figures) for 2014 and 2013

Source	2014 Quantity (tonnes)	2014 Proportion	2013 Quantity (tonnes)	2013 Proportion
Local Authority	352,000	85%	340,000	83%
Food manufacturers/ Processors	15,000	4%	38,000	9%
Supermarkets/ retail	6,000	1%	3,000	<1%
Hospitality	7,000	2%	1,000	<1%
Landscapers	23,000	5%	-	-
Other Source (i)	13,000	3%	29,000	7%
Total	**416,000**	**100%**	**411,000**	**100%**

Notes to table:

- *Tonnages are rounded to the nearest 1,000 tonnes. The percentage figures are calculated on the unrounded figures.*

(i) In 2013, 'Other' was mainly identified as 'other waste companies' and 'landscapers'. In 2014, landscapers were added as a new category.

Figure 9 presents a summary of the grossed waste stream inputs in 2013 and 2014. There was an increase in the amount of food waste from 5% in 2013 to 8% (32,000 tonnes) in 2014 which may be linked to the introduction of new food waste legislation. There were slight decreases in green waste and mixed green & food waste since the last survey, however these were not significant and could be natural variations that commonly occur year to year.

Other waste streams include waste from agricultural sources, wood/ paper waste and industrial streams such as brewer by-products and fish offal. There was a decrease in the grossed waste inputs within the 'other' category due to landscapers being added as a separate category in 2014, compared to 2013 in which landscapers were included in the 'other' figures.

[24] http://www.resourceefficientscotland.com/regulations

Figure 9 shows the flow of different waste streams and the source of the material and can be compared to Figure 3 to show that the majority of green waste is sourced from local authorities.

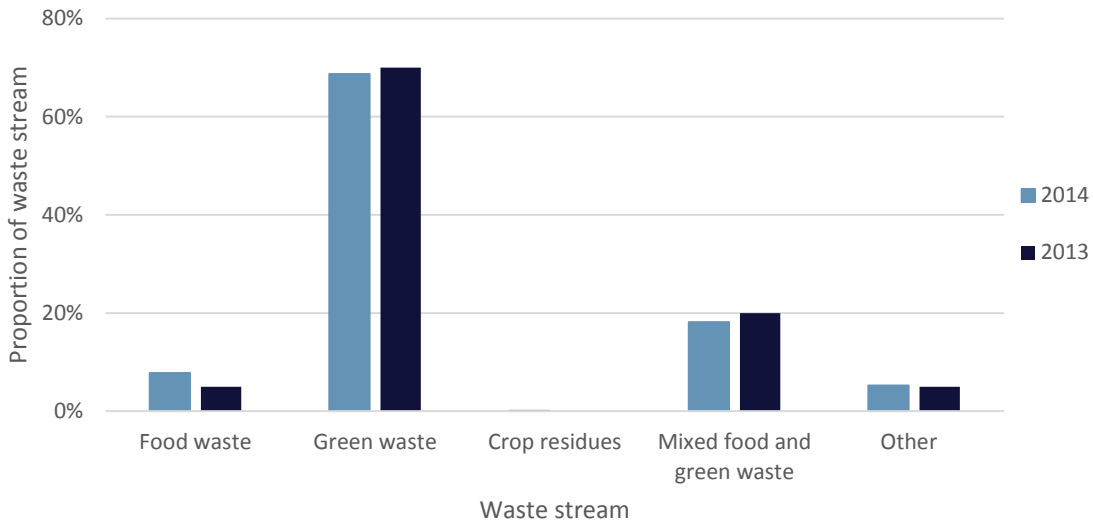


Figure 9: Type of material grossed inputs to sites proportioned by weight (% of total) in 2014 and 2013

3.2.3.2 Facility type and inputs

Table 7 shows a summary of facility type and waste inputs. The survey results showed that 100% of mixed food and green waste was processed by IVC with another process as also seen in 2013. There was an increase in the amount of separated food waste treated by IVC[25] from 90% in 2013 to 96% (31,000 tonnes grossed) in 2014. As a result of more separated food waste being treated by IVC there was a decrease in the amount of separated food being treated by OAW as a single process from 10% in 2013 to 4% (1,000 tonnes grossed) in 2014[26]. 91% (261,000 tonnes grossed) of separated green waste was treated using OAW in 2014, which was an increase from 80% in 2013. The 2014 survey results suggest there has been a shift in the treatment of the separated food and separated green waste since the last survey, however the difference may be explained by improved data capture for this question in the 2014 survey: all sites surveyed in 2014 provided feedstock input data, whereas in 2013 the number of sites reporting input data for separated and mixed food and green waste was small and therefore percentage figures should be considered indicative rather than definitive.

[25] Single standalone process and in series/ parallel with other processes.
[26] Separated food waste (animal-based waste and any food waste from household collections) can be treated using IVC or AD. Food waste that is vegetable only waste and not an animal by-product can be treated using OAW.

Table 7: Proportion of the grossed waste types processed by each facility type (% of total weight) in 2014 and 2013

Source	2014 Separated Food	2014 Separated Green	2014 Mixed food & green	2013 Separated Food	2013 Separated Green	2013 Mixed food & green
IVC with another technology (i)	78%	3%	100%	50%	18%	100%
IVC	18%	2%	-	40%	2%	-
Open Air Windrow	4%	91%	-	10%	80%	-
Other (ii)	-	-	4%	-	-	None surveyed

Notes to table:

- *All sites surveyed in 2014 provided feedstock input data. In 2013 the number of sites reporting input data for separated and mixed food and green waste was small and therefore percentage figures should be considered indicative rather than definitive.*
- *Treatment methods for 'Crop residue' and 'other' waste streams are not presented. In 2014 these grossed waste streams accounted for 1% and 5% respectively. In 2013, 'other waste' streams not presented accounted for 5% of grossed waste streams.*
- *The 'Separate 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 process 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 in 2014.

3.2.3.3 Pre-processing

When waste is received at a composting site it is subjected to pre-processing to prepare the material for composting and to remove potential contaminants. Contaminants can include plastic and packaging, stones and metal. These are removed to ensure the organic material is composted fully and to improve the final quality of the output material.

In 2013 and 2014 all sites surveyed reported using one or more types of pre-processing. In 2013, all sites reported shredding as a pre-process and therefore it was assumed, rather than asked via the survey, that all sites in 2014 included shredding as a standard pre-processing treatment. Table 8 shows a summary of the other pre-processing reported in 2014 and 2013. In 2014, 4% of sites reported using screening whereas in 2013 no sites reported using screening. This suggests some sites have added additional pre-treatment since the previous survey.

In 2013 89% of sites reported handpicking, however in 2014, this question to split into floor picking and line picking to gauge what this process actually involved. There is little evidence that this has changed much over the year. There were similar proportions of sites reporting de-packaging in 2014 as in 2013.

Other pre-processing included magnetic separation and visual inspections.

In 2014, 35% (11 sites out of 27) of sites surveyed had more than 1 type of pre-processing (excluding shredding) before composting, compared to 43% of sites in 2013 (excluding shredding)[27]. Table 8 shows a breakdown of the types of pre-treatment undertaken by different facilities. The data cannot be

[27] Including shredding as a pre-processing in 2013, 92% of sites had more than one type of pre-processing.

presented based on sites because there were some pre-treatments associated with one facility but different pre-treatment associated with other facilities on the same site.

Table 8: Proportion of facilities undertaking pre-processing activities in 2014

Types of pre-processing	2014 Proportion (%)	2014 Number of facilities
Handpicking (i)	23%	7
Floor picking	90%	28
De- packing	16%	5
Screening	6%	2
Other (ii)	26%	8

Notes to table:

- *Proportion percentages do not add up to 100%, since some facilities utilise more than one type of pre-processing. Pre-processing proportions are based on the number of facilities (31 in 2014 and not the number of sites as pre-treatment varied on site based on the facilities).*

(i) Handpicking in 2013, handpicking and line picking in 2014.

(ii) Other pre-processing was mainly magnetic separation and visual inspections in 2014 (Individual processes at different facilities).

3.2.3.4 Contamination

Sites were asked to estimate the level of contamination they typically found per tonne of feedstock. Contamination was interpreted as materials that could not be treated as part of their process. Table 8 presents a summary of the 2014 and 2013 responses. These are broadly similar, although 2 sites stated that their contamination levels were typically greater than 10% in 2014, whilst none reported this level of contamination in 2013.

The estimated levels of contamination data were either based on operators estimates of the percentage of reject material or were based on exact tonnage rejected depending on the data available during the survey. The survey did not specify if operators had contracts to conduct de-packaging as part of the service. Sites that conduct de-packaging as part of the service contract are likely to have greater rejected materials compared to sites that do not offer de-packaging as part of the service. This is due to the fact they specifically allow packaged organics materials to enter the site which then has to be de-packaged as part of the process, thereby increasing the quantity of reject material. The levels of contamination presented in Table 9 should be reviewed with caution as the survey results do not take these factors into consideration.

The 2 sites that had contamination levels over 10% have different input sources and identified highest contaminations from local authority sources and from supermarkets/ hospitality sector.

Table 9: Estimated levels of contamination in feedstock reported by surveyed facilities in 2014 and 2013

Contamination Level	2014 Responses	Proportion	2013 Responses	Proportion
Less than 1%	15	48%	13	46%
1% - 5%	12	39%	11	39%
6% - 10%	2	6%	4	14%
Greater than 10%	2	6%	0	0
Total responses	31	-	28	-

Note to table:

- *Responses were based on the number of facilities at a site. There were 27 sites that had 31 facilities.*

In 2013, sites were asked to identify the main sources of contamination. 76% (22 responses out of 29) identified local authority collected waste as the main source of contamination. Food manufacturers, supermarkets and others accounted for 7% each (2 respondents each) and the hospitality sector 3% (1 respondent) in 2013.

To take account of some sites receiving feedstock from more than one source, in 2014, sites were asked to rank the sources of feedstock contamination. As seen in the 2013 survey, local authority collections were ranked as a high source of contamination, however they are also the main source of feedstock for all composting sites in Scotland. Given this, it is likely that respondents considered frequency in addition to quality when answering.

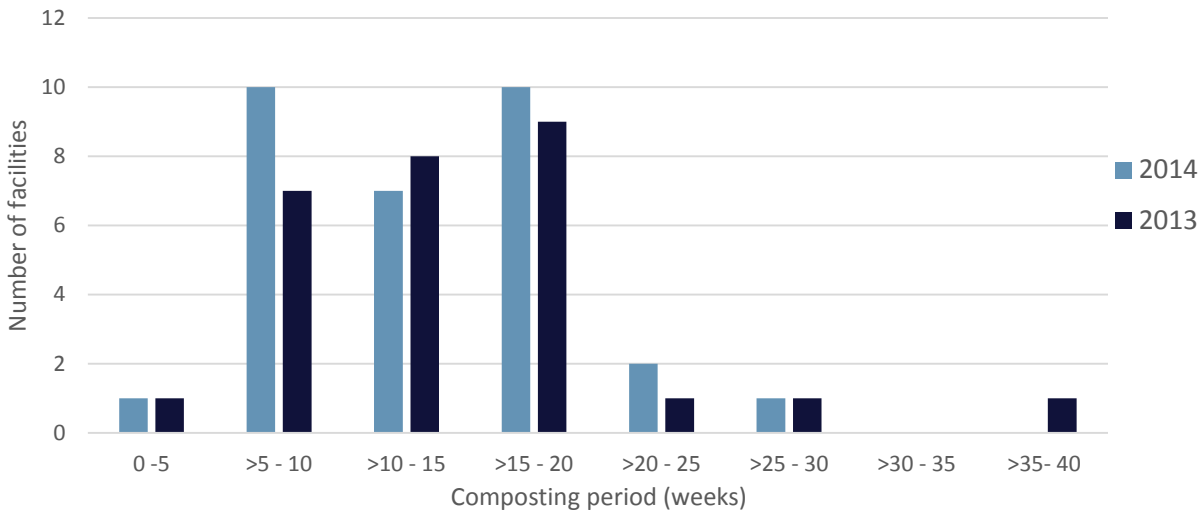
For example, OAW sites processing only green waste sourced material from both local authorities and landscapers and it was the local authority material that was more contaminated than material from landscapers. With sites that accept food waste (separate and co-mingled) the feedstock is mainly from local authority collections only. Sites that accepted feedstock from commercial and local authority sources generally identified the commercial sources as having greater contamination, however there are fewer sites that accept commercial waste. During the survey, items such as plastic bags, balls, litter, household waste, clothing, stones, plastic packaging and cardboard were identified by site operators as common contaminants. The impact of contamination on businesses is discussed in Section 3.2.3.10.

3.2.3.5 Composting period

In 2014, sites were asked for the composting period of the facilities they operate including the sanitisation, stabilisation and maturation stages. Based on the 31 surveyed facilities from the 27 sites, the average composting period was 14 weeks, compared to 15 weeks in 2013.

OAW composting period ranged between 8 and 26 weeks compared to IVC which ranged between 9 and 12 weeks. Figure 10 shows the frequency of composting periods reported from each facility in 2014.

Figure 10: Composting period - distribution of responses per surveyed facility in 2014 and 2013



The compost period can also be shown by process type as presented in Table 10.

Table 10: Composting period - distribution of responses by facility type in 2014

Facility Type	Mean	Max	Min	Number of facilities
IVC stand alone	9	9	8	3
IVC in series	12	26	5	5
OAW stand alone	15	24	8	22
Other facilities	-	-	-	-

Note to table:

- *Other sites' figures have not been provided to avoid disclosure of individual site information.*

3.2.3.6 Compost outputs

After organic material is composted, the volume of the original material is commonly reduced by approximately 50%[28] due to losses of carbon dioxide gas and water vapour. The total grossed output from composting sites in Scotland in 2014 was 188,000 tonnes compared to 203,000 tonnes in 2013. There has been a gradual change in the amount of compost output products since the 2012 survey (233,000 tonnes). In 2014, the survey results showed that there was an input to output ratio of 45% compared to 48% in 2013.

It is important to consider the movement of organic material into and out of the site and the time taken to treat the material onsite. Composting takes between 5 and 40 weeks. As a result material could have been accepted into the site in 2014 which did not leave the site until 2015. The reporting period for this study was from January 2014 until December 2014. Factors such as losses during the composting

[28] http://cwmi.css.cornell.edu/aerobiccomposting.pdf

period as well as the movement of material from the site can result in variations between the grossed input and grossed output figures.

The surveyed output information from the 27 sites (31 facilities) was used to calculate the estimated grossed output from 29 sites and is presented in Table 11 with the 2013 data.

Table 11: Estimated grossed output to destination market sectors for compost in Scotland in 2014 and 2013

Output Market	Tonnes 2014	Proportion 2014	Tonnes 2013	Proportion 2013	Difference Tonnes	Difference Proportion
Agriculture & field horticulture	101,000	53%	111,000	55%	-10,000	-2%
Horticulture/ growing media	2,000	1%	6,000	3%	-4,000	-2%
Landscaping/ landscaping development	28,000	15%	32,000	16%	-4,000	-1%
Turf	3,000	2%	9,000	5%	-6,000	-3%
Landfill Restoration	22,000	12%	13,000	6%	+9,000	+6%
Fuel for energy recovery (i)	0	0	5,000	2%	-5,000	-2%
Other market (ii)	32,000	17%	28,000	14%	+4,000	+3%
Total	188,000		203,000			

Notes to table:

- *Tonnages are rounded to the nearest 1,000 so columns may not total the figure shown. The percentage change calculated is based on the unrounded figures.*

(i) '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.

(ii) 'Other markets' include material used for the restoration of other brownfield sites, or bagged compost that is available to local communities (8,000 grossed tonnes) or the manufacture of topsoil (5,000 grossed tonnes).

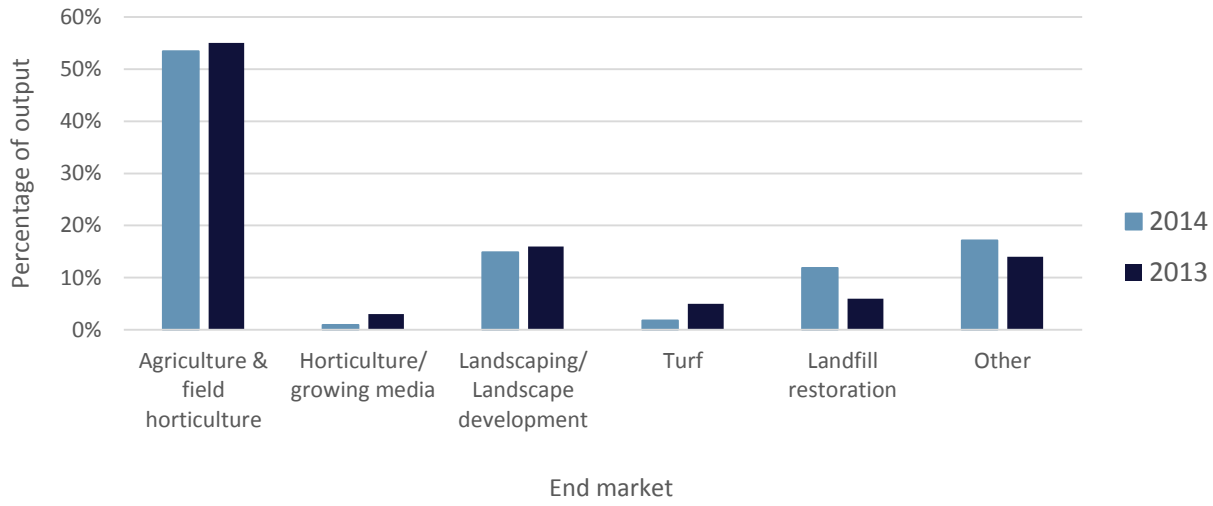
Landfill restoration accounted for 6% (13,000 tonnes) of compost end markets in 2013 however this doubled in 2014 to 12% (22,000 tonnes). The increase in the amount of output material used for landfill restoration is potentially due to landfills closing in Scotland. Use of compost for final landfill restoration can be reported as recycling.

Small decreases in other markets such as horticultural, turf and fuel for energy could be due to natural variations and these markets represent a small proportion of the total material available. There were previous trials of compost in the horticultural markets which may have exaggerated the previous output tonnages and any decreases are tonnages returning to the baseline figure for that market.

Some of the operators provided estimates for the outputs as the detailed data was not available at the time of the survey and could have impacted the final figures particularly in the smaller markets. The end markets for grossed compost tonnage in Scotland in 2014 are presented in Figure 11. Although there

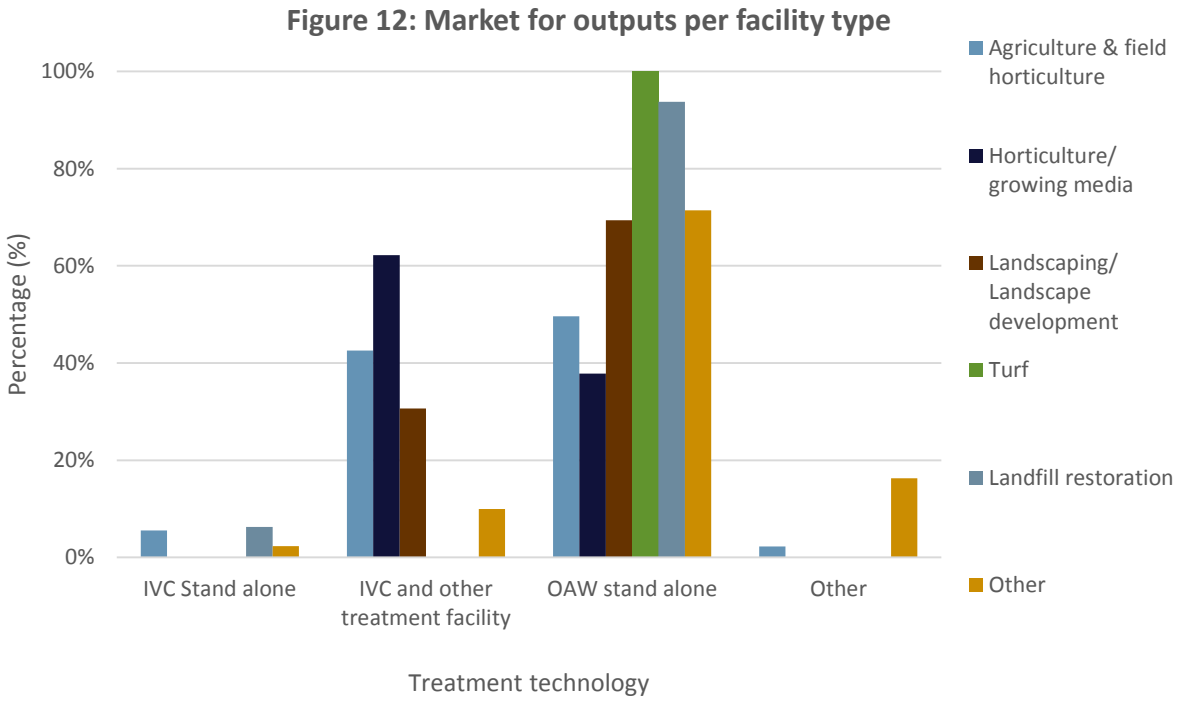
was a 2% (10,000 tonnes) decrease in the amount of compost used in Agriculture & field horticulture since 2013 it remains the largest market for compost products in Scotland.

Figure 11: End markets for grossed compost outputs, as % of total Scottish market by weight in 2014



The proportion of compost outputs from each type of facility end markets in 2014 is presented in Figure 12.

Figure 12: Market for outputs per treatment technology



Sites were asked to provide details on the grades of compost being produced in 2014, and these are presented in Table 12. The results suggest that there was a slight changes the narrowest and broadest grades (0 - 10mm and 0 - 40mm) between 2013 and 2014, with a decrease in the 0 - 20mm fraction.

Table 12: Proportion of each grade of compost in total produced in 2014 and 2013

Grade	0 – 10mm	0 – 20mm	0 – 40mm	Other	'Oversized'
2014	17%	25%	50%	8%	(i)
2013	14%	30%	47%	7%	2%

Notes to table:

- *Compost classified as 'other' was a mixture of grades not fitting the categories, for example between 0 -60mm or 0-25mm in both 2014 and 2013.*

(i) 'Oversized' figures from 2013 report. In 2014 only 9 sites could give approximate figures for the oversized fraction and were excluded from the total compost produced figures (175,000 tonnes). This fraction accounted for approximately 11,000 tonnes in 2014.

3.2.3.7 Sale prices

The survey asked sites what their average sales price was in 2014 for compost sold to different end markets. Table 13 presents the ex-works sales prices, i.e. the financial transactions on 'at the gate' exchange which excludes costs for transport and any spreading of material. Data from 2013 are included for comparison. The negative prices represent the site paying to have the material taken away.

As with previous years, the results for 2014 suggest that there is a variation in ex-works prices depending on the end market. The most common end market, agriculture & field horticulture, had a mean price of £2.00 per tonne compared to £2.09 in 2013.

A higher price per tonne was evident in the horticultural/ growing media, landscaping and turf markets. As discussed in Section 3.2.3.6 these are the smallest end markets.

Table 13: Analysis of sale prices by end-use markets in 2014 and 2013 (prices are ex-works in £/tonne)

Market	2014					2013	
	(n)	Max Price	Min Price [(i)]	Mean Price	Mode[(ii)]	Max/Min	Mean/Mode
Agriculture & field horticulture	16	£10	-£5	£2	£2	£6.00/ -£5.00	£2.09/ £0.00
Horticulture/ growing media	2	(iii)	(iii)	£18.50	(iii)	(iii)	(iii)
Landscaping/ landscaping development	11	£30	£2.50	£14	£25	£10.00/ £0.00	£3.75/ £0.00
Turf	2	(iii)	(iii)	£13.50	(iii)	(iii)	£15.00/ -
Landfill Restoration	4	£0.25	£0	£0.25	£0	£0.00/ £0.00	£0.00/ £0.00
Fuel for energy recovery	-	-	-	-	-	(iii)	£2.50/ £2.50
Other market (ii)	17	£50	£0	£6	£0	£20.00/ £0.00	£4.80/ £0.00

Notes to table:

(i) Negative prices indicate fee charged by end users to take the compost away.

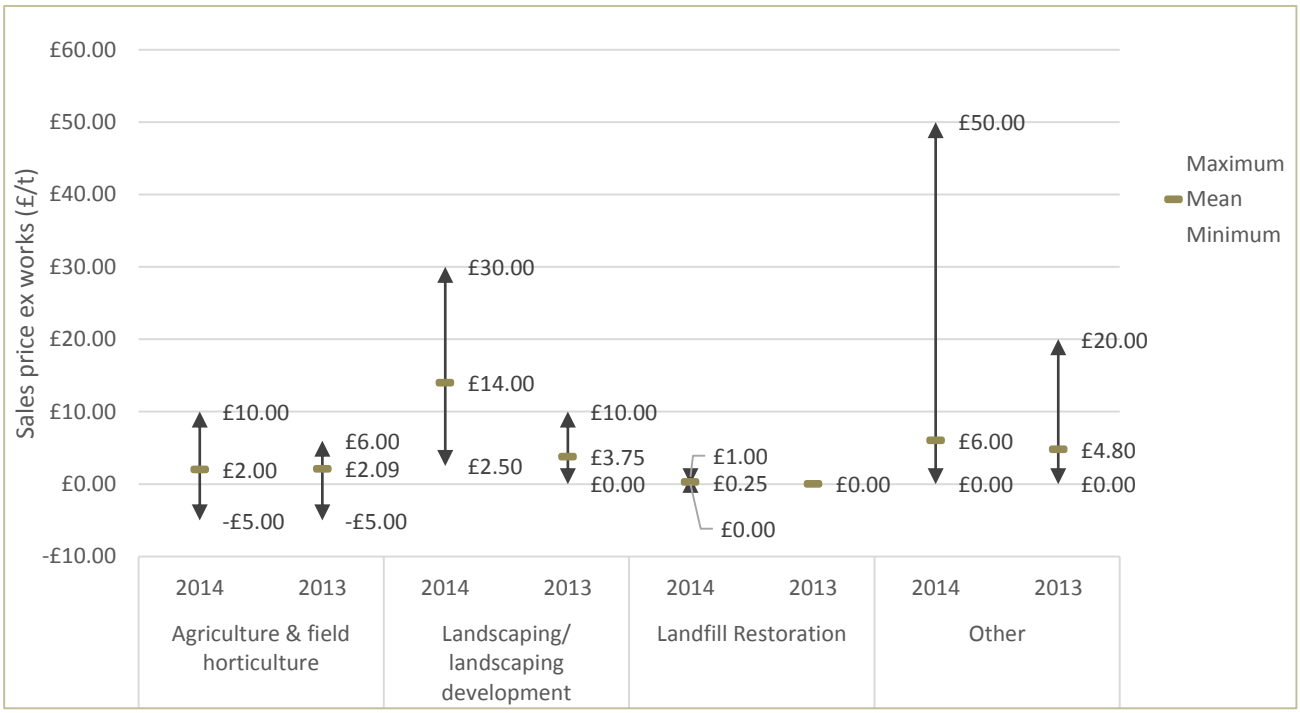
(ii) The mode is the data point (or points) that occurs most frequently in a dataset.

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

Reported prices varied considerably, with large differences between the minimum and maximum for a number of different markets, as shown in

Figure 13.

Figure 13: Maximum, minimum and mean compost sale prices (in £/t) by end use application



Notes to figure:

- *Figures in brackets show the number of responses*
- *There is no comparison for horticulture/growing media and turf because there were too few responses.*

The value of the end markets has also been estimated based on the grossed output in 2014 and 2013 (Table 14). These values were calculated by multiplying the mean prices per tonne for that market with the estimated grossed quantity of compost going to that market in the relevant year.

Overall, the grossed value of the output market in 2014 was estimated at £871,000 compared to an estimated grossed value of £690,000 in the 2013 survey. These figures should be treated with caution

since they are based on the mean value from the operators that provided end market prices per tonnes and the estimated grossed output tonnages.

Table 14: Compost market values for 2014 and 2013

Market	2014			2013		
	Mean Price/ tonne	Grossed Market size (tonnes)	Market Value [(i)]	Mean Price/ tonne	Grossed Market size (tonnes)	Market Value [(i)]
Agriculture & field horticulture	£2	101,000	£201,000	£2.09	111,000	£231,000
Horticulture/ growing media	£18.50	2,000	£32,000	(ii)	6,000	n/a
Landscaping/ landscaping development	£14	28,000	£393,000	£3.75	32,000	£120,000
Turf	£13.50	3,000	£45,000	£15.00	9,000	£137,000
Landfill Restoration	£0.25	22,000	£6,000	£0.00	13,000	£0
Fuel for energy recovery	-	-	-	(ii)	5,000	n/a
Other market	£6	32,000	£94,000	£4.80	28,000	£133,000
Total	**-**	**188,000**	**£871,000**	**-**	**203,000**	**£690,000**

Notes to table:

- *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 were calculated and added to the total market value but are not shown separately to avoid disclosure of individual site information.

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

In 2013 and 2014, a reported price of £0.00 was found to relate to either the compost being given away for free or the compost being used on the producer's own land. In line with past surveys, tTable 15 presents the sales price of compost with the £0.00 figures removed because £0.00 does not reflect the actual value to the operator. Further detail can be found in Appendix 2. The usable prices are shown in Table 15.

Table 15: Analysis of sales price by end-use market where non-zero prices of £0.00 have been removed for 2014 (prices are ex-works in £/tonne)

Market	Base	Max Price	Min Price	Mean Price	Mode
Agriculture & field horticulture	12	£10.00	-£5.00	£2.67	£2.00
Horticulture/ growing media	2	(ii)	(ii)	£18.50	(ii)
Landscaping/ landscaping development	11	£30.00	£2.50	£14.00	£25.00
Turf	2	(ii)	(ii)	£13.50	(ii)
Landfill Restoration	1	(ii)	(ii)	(ii)	(ii)
Other market	6	£50.00	£1.00	£17.00	£10.00
Total	**34**	**£50.00**	**-£5.00**	**£10.38**	**£2.00**

Notes to table:

- *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 were 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.

Table 16 shows the market value when prices of £0.00 have been removed using the method described in Appendix 2 and in line with previous surveys. The proportion of surveyed with a value of £0.00 was removed from total figures before estimated grossed figures were calculated. The grossed tonnes of material with a value of £0.00 that have been removed from the data are also presented for each market under Table 16.

Table 16: Compost market values where non-zero prices of £0.00 have been removed, 2014

Market	2014		
	Mean Price/ tonne	**Grossed Market size (tonnes)**	**Market Value [(i)]**
Agriculture & field horticulture	£2.67	75,000	£201,000
Horticulture/ growing media	£18.50	2,000	£32,000
Landscaping/ landscaping development	£14	28,000	£393,000
Turf	£13.50	3,000	£45,000
Landfill Restoration	(i)	(i)	(i)
Other market	£17.00	7,000	£125,000
Total		**123,000**	**£804,000**

Notes to table:

- *Due to rounding, columns may not add up to totals and market values may not be an exact results of mean x market size.*

(i) Quantities (tonnes) removed from markets are as follows:

Agriculture & field horticulture – 25,000 tonnes, decreased of 25%

Landfill Restoration – 15,000 tonnes, decrease of 69%

Other markets – 25,000, decrease of 77%.

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

On this basis, we can say that the estimated gross value of the Scottish composting market was 'at least' £804,000 in 2014 compared to £705,000 in 2013.

3.2.3.8 PAS 100 Quality standard

Of the 27 surveyed composting sites, 25 stated that they were producing PAS 100 certified compost in 2014, whilst 2 were not. This compares to 22 stating that they were producing PAS 100 certified compost in 2013, with 4 not. In 2014, one of the 25 sites had more than one facility on site, and stated that for one facility, part of their input was not suitable for PAS 100 certification so some output material was not certified and some was certified.

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% (25) of sites stated that all of their outputs from certified facilities were PAS 100 certified.

Where sites were producing compost with PAS 100 certification, 24 sites (96%) stated that they intended to maintain the certification. One site that was producing PAS certified material in 2014 stated that it did not intend to maintain the certification beyond 2014 because they had stopped composting processes in 2015 and therefore it is no longer applicable. Of the 2 sites not producing PAS 100 certified compost,

one stated that investment in new infrastructure was required and one stated that the cost was too high for the tonnage of compost that they produced.

For the sites that were producing PAS 100 certified compost, some of the benefits reported for the certification included:

- They were required to have PAS 100 certification in order to win local authority contracts so that the materials could contribute towards local authority recycling figures and targets;
- By having PAS 100 certification it made it easier for sites to achieve End of waste classification; and
- Easier to market material.

Many respondents reported more than one of the above reasons, with local authority contract requirements being the most common.

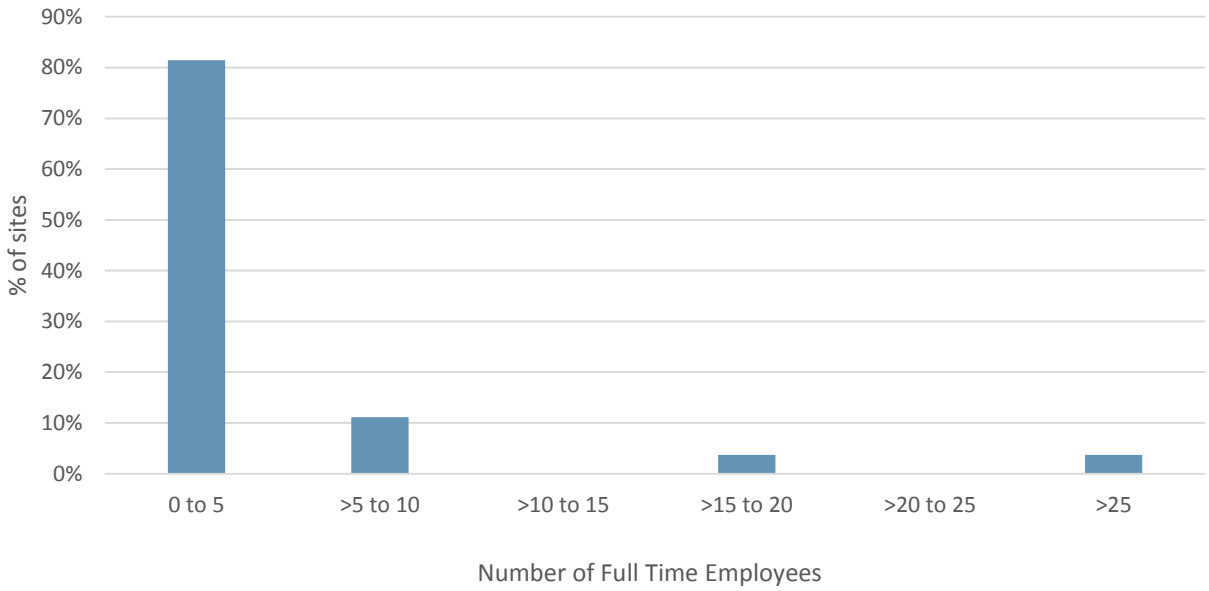
3.2.3.9 Site employees

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

The data identified 129.5 staff employed at the sites surveyed in 2014. Grossing these figures for the Scottish composting industry as a whole gave a total employment figure of 139 which was the same as the grossed figure in 2013.

Analysing individual site data, as presented in Figure 14 showed that the majority of composting sites surveyed employ between 1 and 5 FTE employees (81% of the sites surveyed) and that the situation was similar in 2013 (81%) and 2012 (80%).

Figure 14: Number of FTE for Scotland composting sites, as a % of all responses in 2014



3.2.3.10 Business Issues

Respondents to the survey were asked the extent to which 6 potential issues affected their composting operations. Each site operator was asked to rate the business issues on a scale of 1 to 5 (1 highly negative impact – 5 highly positive impact, 3 = no impact). The percentages for each response are shown in Figure 15.

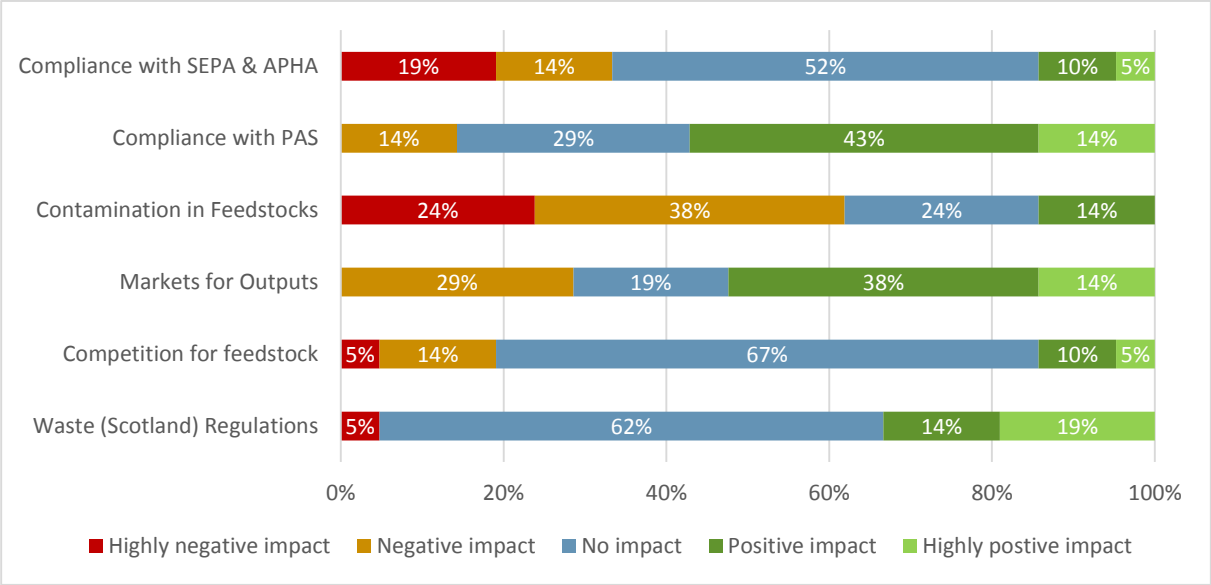


Figure 15: The extent to which specified business issues affect composting operations in 2014

Notes to figure:

- *All N/A (not applicable) responses have been removed from the responses and therefore the total responses to each question varied.*

The issue which operators most commonly reported as having an impact on their business in 2014 was contamination in feedstocks. In 2014, 62% (13 sites) stated that the contamination in feedstock had a negative or highly negative impact on their composting operations. In 2013, contamination in feedstock was also most commonly reported as having an impact on composting operations, with 35% of sites stating that this affected them greatly and 35% that this had an impact on their business[29]. As previously discussed in section 3.2.3.4 the levels of contamination in feedstock continues to be a significant concern for operators that can potentially impact the composting process and the final compost quality. In 2014, respondents reported that additional time and costs were the main business impacts from contaminated feedstock. However, 2 sites reported taking action to support clients to reduce contamination.

The majority (62% or 13 sites) of responses reported no impact on their composting operations from the Waste (Scotland) Regulations. Of those surveyed, 33% (8 sites) thought there was a highly positive or positive impact from the regulations due to increased feedstock. The remaining 5% (1 site) reported a highly negative impact and their feedback included that due to their geographical location there may be limited impact from the Waste (Scotland) Regulations and potential changes to feedstock. In 2013, 27% reported that the regulatory environment had some or a great impact. It should be noted that surveys prior to 2014 asked about regulatory environment as a whole without specifying any particular regulations. The impact of the Waste (Scotland) Regulations could impact individual sites differently based on specific contractual circumstances, which may be why feedback has ranged from positive to negative.

There were 7 sites or 33% of sites that reported compliance with SEPA and APHA requirements had a highly negative or negative impact on the business. Sites that identified a highly negative or negative impact commented this was linked to the 75 tonne per day limit being introduced, changes to permits as a result of amendments at EU level and odour issues experienced by sites. A total of 11 sites (52%) reported no impact, and 3 sites reported a positive or highly positive working relationship with SEPA.

[29] 'Have your say' questions in 2013 were ranked as great, some, little/none or don't know where as in 2014 they were ranked between 1 and 5 , 1 being highly negative impact, 2, negative impact, 3 no impact, 4 positive impact and 5, highly positive impact.

In 2014, over 50% (12 sites) of responses identified compliance with PAS certification and markets for feedstock as having a highly positive or positive impact on their composting operations. Specific comments received on the negative impact related to the additional cost to achieve PAS certification, although others stated that certification was necessary for market requirements, for winning feedstock contracts and to help sell outputs.

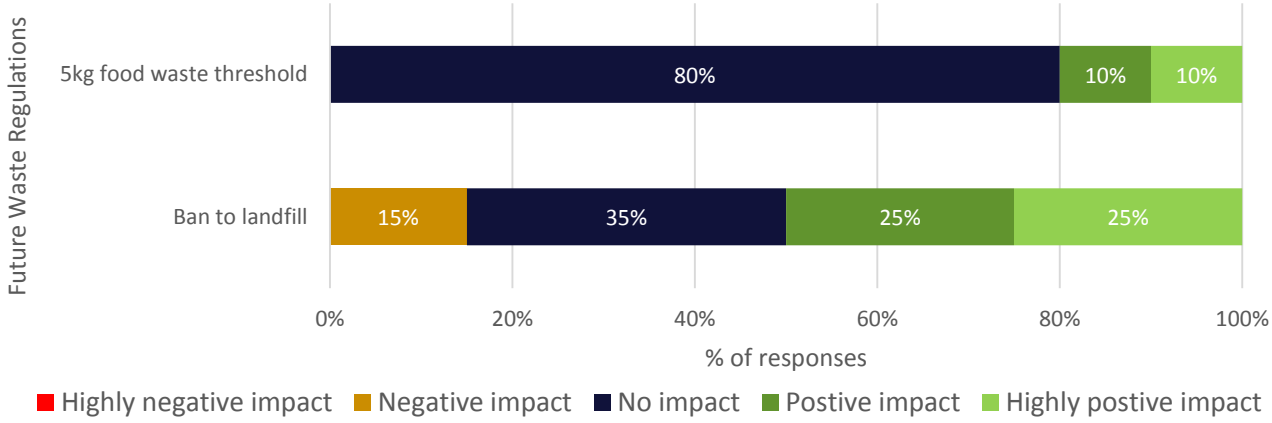
There were 67% (14 sites) of respondents that reported that competition for feedstock had no impact on the business, while 19% (4 sites) stated that competition had a highly negative impact or negative impact. Conversely 15% (3 sites) reported that competition for feedstock had a highly positive or positive impact.

Operators were also asked what impact they thought the future Waste (Scotland) Regulations would have (5kg food waste threshold requiring source segregation from 1st January 2016 and the ban of organic material to landfill in 2021) on their operations. Figure 16 presents the responses.

In 2014, 50% (10 sites) of responses reported the landfill ban would have a highly positive or positive impact, while 35% (7 sites) thought there would be no impact and 15% (3 sites) thought there would be a negative impact. Some respondents thought that the landfill ban would present a good opportunity for their organisation through increased feedstock availability, while others stated that more resources (personnel, budget and equipment) may be needed although they may not be readily available.

The majority of surveyed composting operators (16 sites, 80%) stated that they would expect no impact from the 5kg food waste threshold as the majority of sites do not accept segregated food waste. The remaining 20% (4 sites) thought that it could have a highly positive or positive impact on their operations due to potential increases in feedstock and that this change was likely to impact the AD sector more than composting.

Figure 16: Expected impact on composting operations of future waste regulations



Respondents were also given an opportunity to state any other positive opportunities and negative threats to their operations. Site operators identified positive opportunities for the sector to consider such as improving food waste packaging to minimise contamination which could in turn improve output quality. Opportunities for developing markets for outputs was important for site operators as well as considering timescales for the introduction of new legislation. Operators also identified areas they considered to be negative to the sector such as permit limitations and the associated costs of permits, contamination from supermarkets and retailers affecting the quality of their output. It was also identified that any changes to free green waste collections by LA could reduce the amount of feedstock and have a negative impact on the compost operators.

Overall site operators identified areas related to regulatory changes and the impact on their operations and factors that can affect the overall quality of the output and the end markets. Their comments are listed in Table 17.

Table 17: Responses to questions asking about positive opportunities for the sector and potential negative threats to the sector in the future

Positive/ Opportunities for sector	Negative/ Threats to sector
Introduction of legislation on 1st February rather than 1st January to help operators.	Costs of permits compared to exemptions
Opportunities developing for market outputs	Permit limitations and restrictions from SEPA
Conducting survey for financial year rather than calendar year could aid operators.	Contamination from Supermarkets/ retail
Further improvements to food waste packaging to help minimise contamination.	Changes to SEPA charges
Focus on input quality to ensure product meets quality standards	Cost of food collections are expensive and participation can be low. Stopping free green waste collections could impact composting organisations

3.2.4 Conclusion

Surveys of 27 composting sites in Scotland were conducted for 2014 from an active population of 29 sites; this compared with 26 surveys for 2013 from an active population of 29. The overall number of sites has remained the same since the last survey, however one site that participated in the 2013 survey did not in the 2014 survey and 2 sites that did not participate in the 2013 did in 2014. There was no survey conducted across any other nations of the UK for 2014 at the time that this report was prepared and so no comparison can be made with wider UK data.

Data from the 27 surveyed sites was grossed-up to provide an estimate of material processed by the entire population of 29 Scottish composting sites, which was an estimated gross of 416,000 tonnes in 2014, compared with estimated gross of 411,000 tonnes in 2013. Estimated grossed site operational capacity has decreased from 598,000 tonnes in 2013 to 512,000 tonnes in 2014 which is equivalent to 14%. This suggests there has been an increase in capacity utilisation from 69% in 2013 to 81% in 2014.

The change in the input may be linked to legislation changes, however the change in site operational capacity is a result of changes to sites' WML and permits, as well as the 2014 survey asking more detailed questions on the permitted and maximum working capacities.

There was an overall decrease (7%) in the amount of grossed compost output from 203,000 tonnes in 2013 to 188,000 tonnes in 2014.

The number of OAW processes operating in 2014 decreased by 1 compared with 2013 to 22, and this technology accounted for 63% of all processes in 2014 compared with 68% in 2013. The number of IVC processes increased to 8 in 2014 from 7 in 2013. There were 4 instances of WUC in both 2013 and 2014, and one site with 'other' processes. In 2014, there were 27 sites surveyed which reported having 31 facilities as some sites have more than 1 facility. Within the facilities there can be more than one process in either series or parallel (Figure 2). From the 2014 survey there was a total of 35 individual processes within the facilities.

As seen in the previous surveys, the majority of organic waste processed at composting sites in 2014 was in OAW (66% compared to 60% in 2013). The remaining waste was processed by IVC sites operating as standalone (8% compared to 4% in 2013) or in series with another process (24%).

The proportion of feedstocks received from local authority sources was 85% (grossed 352,000 tonnes) by weight in 2014 (83% or grossed 340,000 tonnes in 2013), which represents an increase of 12,000

tonnes. There was evidence of an estimated 23,000 tonne decrease in the amount of feedstock sourced from food manufacturers/ processers from grossed 38,000 tonnes in 2013 to grossed 15,000 tonnes in 2014. The decrease suggests that since the legislation has been introduced the food manufacturing/ processing industry have diverted their waste streams from composting processes to other treatment methods since the amount of AD capacity grew in 2014 (Section 3.3.4).

The main feedstock of the 416,000 tonnes input material, was green waste at 69% (grossed 286,000 tonnes) of total inputs (70% in 2013), with mixed food & green waste at 18% (20% in 2013), separate food waste at 8% (grossed 32,000 tonnes) (5% in 2013) and 'other' materials accounting for 5% (grossed 22,000 tonnes) (5% in 2013). The results suggest there has been a decrease in inputs of mixed food & green waste due to increases in use of separate food waste collections offered by local authorities. During 2014, there were 1.46 million households with access to a food waste collection in Scotland. This represented 62% of households with 25 of the 32 local authorities offering a food waste collection in at least part of their authority area. These figures were relevant for the survey period in 2014 and have continued to rise since the 2014 survey period. However only 7 sites accepted food-only waste from all feedstock sources.

Sites were asked to estimate the level of contamination they typically found per tonne of feedstock, and it was identified that contamination is still a significant issue for many sites due to the cost associated with removing contaminates, the negative impact on equipment as well as the impact on the final compost output quality. Many sites identified local authorities as the main source of contamination however local authority sourced feedstock accounts for 85% (grossed 352,000 tonnes) of all input and therefore levels of contamination will be higher overall.

During 2014, 188,000 grossed tonnes of compost were produced with a decrease in all end markets, excluding landfill restoration and 'other' markets which saw increases compared to the 2013 survey. Although there was a 2% decrease from 111,000 tonnes in 2013 to 101,000 tonnes in 2014 (10,000 tonnes) in the amount of compost used in agriculture & field horticulture, this remains the main end market for composting outputs and accounts for 53% (101,000 tonnes) of all outputs as seen in the previous survey in 2013. Landfill restoration accounted for 6% (grossed 13,000 tonnes) of the compost market in 2013 however this proportion doubled in 2014 to 12% (22,000 tonnes). The results suggest that the use of compost for landfill restoration could have increased due to landfills closing and being restored as they reach capacity and residual waste decreases.

Some sites provided information on prices obtained for compost in different markets. The ex works per tonne shows a large variation between end markets. Agricultural and field horticulture had a mean ex-works price of £2.09 in 2014 compared to £2.00 in 2013. Horticultural/ growing media, landscaping and turf end markets had the highest ex-works prices, however these are the smaller end markets with less than 19% (grossed 33,000 tonnes) of all outputs going to these end markets in 2014.

From the mean ex-works price for each end market and the grossed output tonnage in 2014, the estimated market value for compost produced in Scotland in 2014 was £871,000 compared to £690,000 in 2013.

Of the surveyed composting sites, 25 (22 in 2013) stated that they were producing PAS 100 certified compost and 2 sites were not (4 in 2013). Of the sites that were producing compost with PAS 100 certification, 24 (96%) stated that they intended to maintain the certification. One site that was producing PAS certified material in 2014 stated that it did not intend to maintain the certification beyond 2014 because they had stopped composting processes in 2015 and therefore it is no longer applicable. Of the 2 sites not producing PAS 100 certified compost, one stated that investment in new infrastructure was required and one stated that the cost was too high for the tonnage of compost produced.

Operators were asked about the impact of specific issues on their businesses. Contamination in feedstock remained the most cited issue with highly negative or negative impacts reported.

The majority (62%) of responses reported no impact on composting operations from the Waste (Scotland) Regulations, while 33% thought there was a highly positive and positive impact and the remaining 5% reported a highly negative impact.

3.3 Anaerobic Digestion

3.3.1 Survey Performance and Participation

All sites from an initial list of 16 in Scotland were contacted by telephone, compared with 13 sites in 2013. For 2014, farm-fed and merchant survey results are discussed together, while results for industrial sites are discussed separately, in Section 3.4.

Twelve surveys were successfully completed, of a population of 16 sites. There was no conclusive contact made with 1, and 3 did not wish to complete the survey (Table 18).

In 2014, there were 8 merchant sites, which was an increased from 6 in the 2013 survey. In 2014, only 1 active farm-fed site completed the survey and this farm did not previously complete the survey in 2013[30].

Of the farm-fed sites that were surveyed in 2013, one was re-classified as a merchant facility in 2014, whilst the other 3 were no longer active (Table 18). In 2013, 4 industrial sites complete the survey compared to 6 industrial sites in 2014. The industrial site data is presented separately in section 3.4.

Table 18: Scotland anaerobic digestion site survey - 2014 and 2013 participation rates

	2014				2013
Outcome	Farm-Fed	Merchant	Industrial On site	Total	All sites
Sites listed	2	8	6	16	13
Not operational/ not relevant	0	0	1	1	2
Refused	0	0	2	2	2
No conclusive contact	1	0	1	2	1
Survey completed	1	8	3	12	8
Active population(i)	2	8	6	16	11
Proportion of active sites surveyed	50%	100%	50%	75%	73%

Notes to table:

(i) Active population comprises all sites that were surveyed or refused to participate in the survey, in addition to sites where no conclusive contact was made. It is assumed the sites that could not be contacted were operational in 2014.

A categorisation of operational AD sites in 2013 and 2014 in Scotland is presented in Table 19.

[30] Site in construction and commissioning in 2013.

Table 19: Operational and Surveyed AD sites in Scotland in 2014 and 2013

Classification	2014[(i)]	2013
Farm -fed	2	2
Merchant	8	5 [(ii)]
Industrial on-site	6	4
Total Active	16	11
Total Surveyed	12	8 [(iii)]

Notes to table:

(i) In 2014, sites were classified based on the material they accepted

- *Merchant site: Taking material including food waste from different sources*
- *Industrial on-site: Taking food &/ or drink production residues only from their own business processes, no external input.*
- *Farm- fed: Processing only agricultural waste, i.e. pre farm gate material such as manures, purpose grown crops and crop residues.*
- *If a site was a combination they were classified based on the main feedstock source.*

(ii) In 2013, commercial/merchant sites were classified as: sites which accept waste from off-site, on a commercial basis (i.e. for a gate fee). May be a farm based enterprise. For comparison with 2014, these have been classified as merchant sites

(iii) In 2013, 5 commercial/ merchant sites, 2 industrial sites and one farm-fed site completed the 2013 survey.

The data suggest that there was an increase in the number of merchant sites and industrial on site AD between 2013 and 2014. Whilst there were fewer active farm-fed sites in 2014 than previous years, it should be noted that there were a total of 5 farm-fed AD sites in construction/ commissioning during 2014. The years that sites started operating are presented in Figure 17 which shows the changes in different type of AD site since 2004.

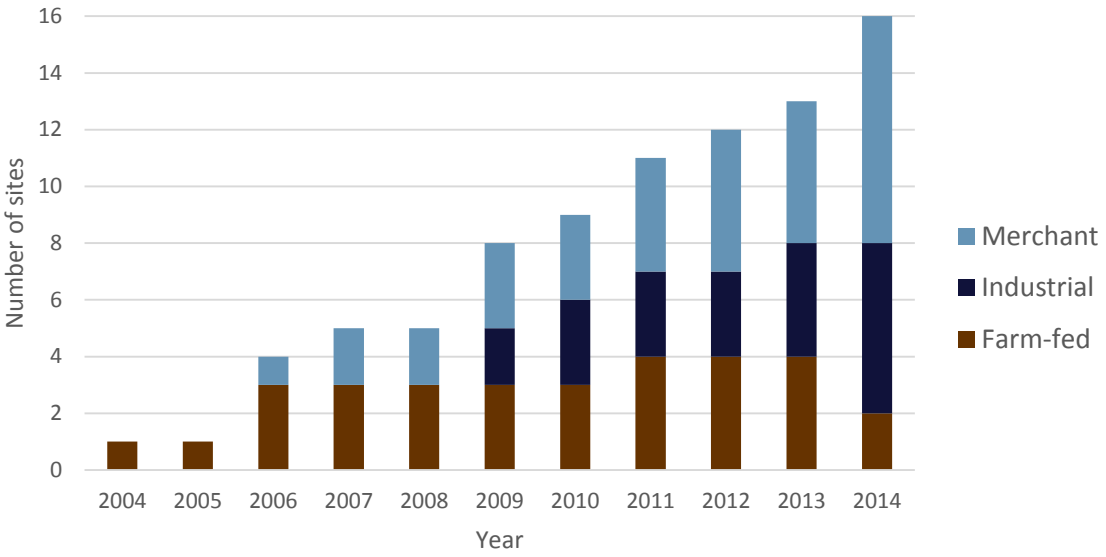


Figure 17: Year AD facilities started operation - cumulative number of facilities

3.3.2 Size of the Scottish AD sector

Table 20 summarises the surveyed and grossed input, operating capacity, and output material tonnage (whole digestate) as well as the number of employees for the Scottish AD sector in 2014. The grossed figures have been calculated based on type of AD site and then summed, for example farm-fed AD survey data was grossed and the merchant survey data was grossed and both grossed figures were added to calculate the total estimated grossed figures. This approach is intended to reduce over-estimates for farm-fed AD plants which are commonly smaller than merchant AD plants. The same approach has been used as in 2013, which is summarised in Appendix 3.

Results for the industrial AD sites (those co-located with drinks manufacturers, breweries and distilleries which process large volumes of liquid) are excluded from the data presented in Table 20 and are instead discussed in Section 3.4 and represented separately.

Table 19 shows that in 2014 there were 8 active merchant AD sites compared to 5 merchant sites in 2013 which is reflected in the 46% increase in the estimated grossed operating capacity from 168,000 to 246,000 tonnes in 2014[31] as illustrated in table 20.

The grossed data for whole digestate showed a 71% increase in 2014 compared to 2013, which is equivalent to an estimated 84,000 tonnes. The grossed figures show that there has been a substantial increase in the size of the digestate end market in Scotland in line with the increase in the number of commercial and farm-fed AD facilities.

[31] 2014 grossed figures includes a new merchant site that was active in 2014 but not 2013 and a merchant site that was classified as farm fed in 2013.

Table 20: Size of the Scottish AD sector in 2014 and 2013 (excluding data for industrial AD facilities)

	2014	2013	Change (%)
Input Surveyed (tonnes)	135,000	111,000	+22%
Input Grossed (tonnes)	157,000	132,000	+19%
Operating Surveyed (tonnes)	185,000	168,000 (i)	+10%
Operating Grossed (tonnes)	246,000 (ii)	168,000 (i)	+46%
Whole digestate Surveyed (tonnes)	200,000	104,000	+92%
Whole digestate Grossed (tonnes)	203,000	119,000	+71%
Employees Surveyed (FTE)	63.5	45	+41%
Employees Grossed (FTE)	64.5	70	-8%

Notes:

- *Tonnages are rounded to the nearest 1,000 tonnes.*
- *Plant operators were asked for the maximum operational capacity of their sites, which can differ significantly from the permitted capacity.*

(i) In 2013, while 6 out of 7 non-industrial sites in Scotland gave a full survey response, operating capacities were available for all 7 sites.

(ii) Farm -fed sites were only asked their permitted capacity and therefore this figures only represents the operating capacity of the merchant AD sites in 2014.

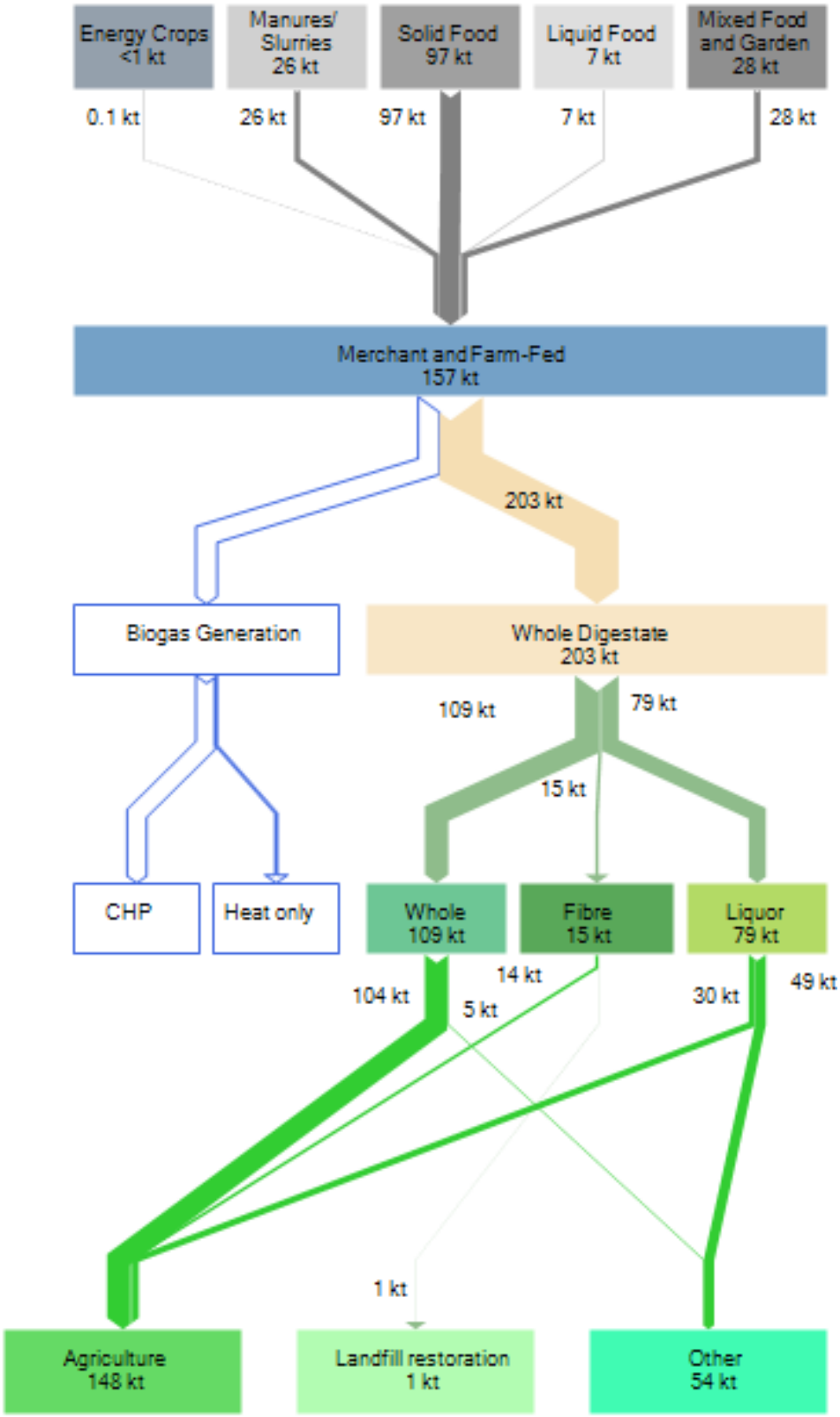
3.3.3 Supply Chain Flow (excluding industrial AD facilities)

As described in Section 2.2, Sankey diagrams are a useful tool for visually presenting complex data. Figure 18 is the Sankey diagram for AD flows, excluding industrial AD sites. Merchant and farm fed sites have been combined to avoid disclosing data for the single farm fed site which participated in the 2014 survey.

The input feedstocks for each type of facility were grossed-up to account for the total active population as a proportion of the sites surveyed. Grossed figures are used in the Sankey diagram whereas survey results are noted elsewhere in the report.

The Sankey flow diagram of organic material in the AD sector (merchant and farm-fed only) show that the main input source is solid food waste and that the main output of whole digestate is to agricultural markets. The movement of material is discussed in detail in the following sections.

Figure 18: Scottish AD 2014 supply chain flow (excluding industrial AD facilities)



Notes to figure:

Biogas Generation for CHP and heat are presented for illustration purposed only and detailed results are presented in Section 3.3.7.

3.3.4 *Feedstocks (excluding industrial AD facilities)*

3.3.4.1 Sources

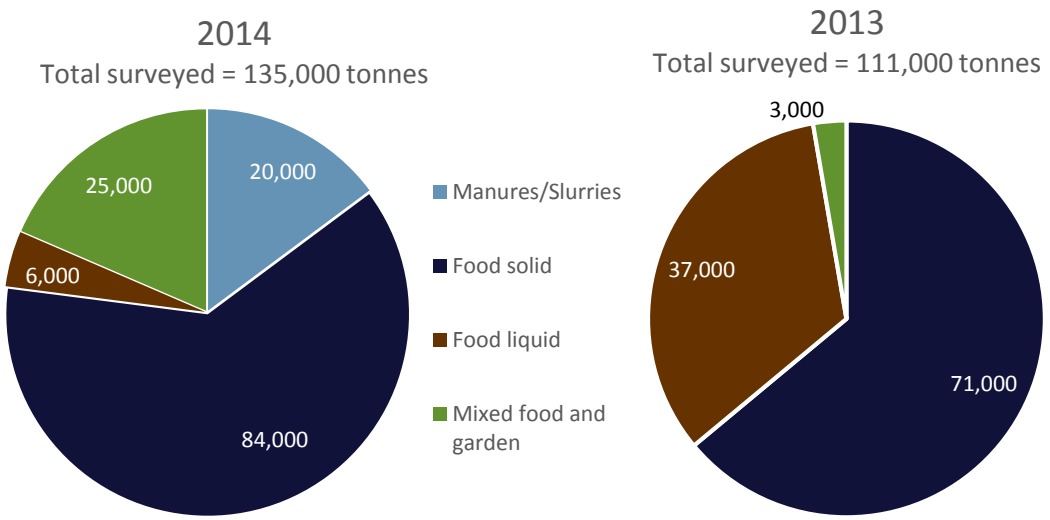
Operators were asked to quantify their feedstock inputs by material type and to identify the sources as a percentage of each type. There were 8 merchant and farm-fed sites that provided feedstock tonnage figures totalling 135,000 tonnes (surveyed) compared to 5 sites in 2013 with 111,000 tonnes of surveyed feedstock in 2013[32].

Figure 19 presents the survey results for the quantities of each feedstock type reported by sites in 2014 and 2013. In 2014 and 2013 the main feedstock was solid food; however there was an increase in the amount of mixed food and garden waste, and manure feedstocks in 2014 compared to 2013, and a decrease in the amount of liquid food waste. Mixed food and garden waste accounted for 3% of the total feedstock in 2013 but this increased to 19% of total feedstock in 2014. There was no significant decrease in the amount of mixed food and garden waste accepted by composting facilities in 2014 (Section 3.2.3). It should be noted that there was a decrease in the amount of feedstock sourced from food manufacturers/ processers in the composting sector. The decrease suggests that since the legislation has been introduced the food manufacturing/ processing industry have diverted their waste streams from composting processes to other treatment methods. This is further supported by the fact that AD capacity grew in 2014 (Section 3.2.3).

An apparent reduction in acceptance of liquid food waste may be due to 2 sites that participated in the survey in 2013 not accepting liquid wastes in 2014. Purpose-grown crops comprised less than 1% (50 tonnes) of feedstock in 2014.

Surveyed manures tonnages accounted for < 0.1% (<1,000 tonnes) in 2013 and therefore are not presented in Figure 19, however surveyed manure/slurry tonnages accounted for 15% (surveyed 20,000 tonnes) of feedstocks in 2014.

Figure 19: Quantity of feedstock type (surveyed) in Scotland, 2014 and 2013 (excluding industrial AD facilities)



Note to figure:

- *Due to rounding, 2014 input total does not match the total presented in Table 21.*

[32] The input feedstock has changed for a number of sites between 2013 and 2014 and the figures should be interpreted with some caution.

Operators were asked to identify the sources of feedstocks. Table 21 presents the surveyed results by reported weight for both merchant and farm-fed AD sites, while Figure 20 presents the grossed figures of feedstock sources for 2014 and 2013.

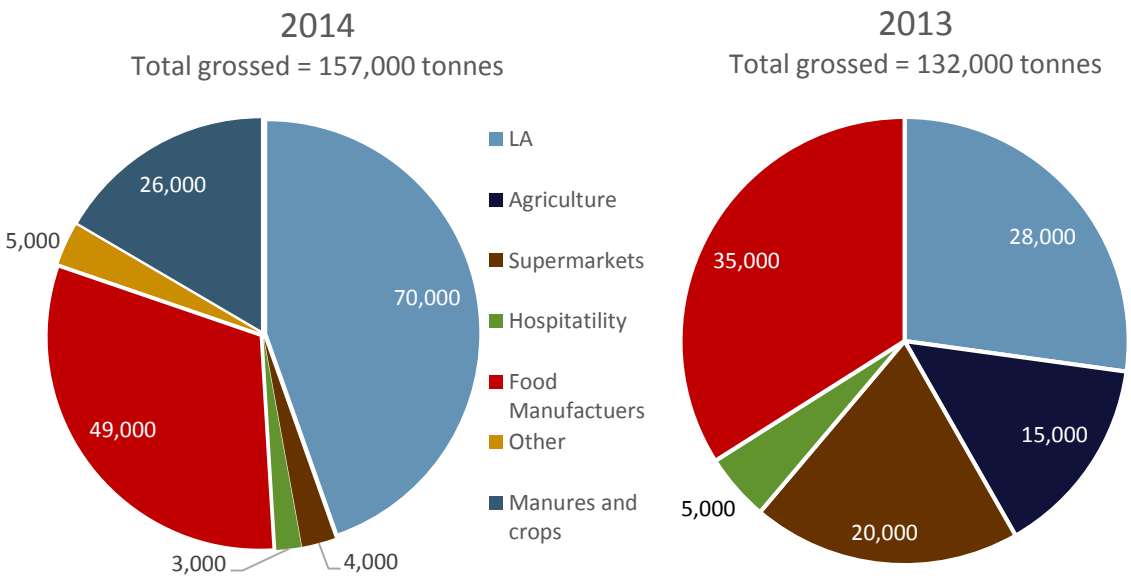
Table 21: Feedstock sources by feedstock type (surveyed) in 2014 (excludes industrial AD facilities) (tonnes)

	Local Authority	Agriculture	Supermarkets	Hospitality	Food Manufacturers	Other
Food solid	36,000	<1000	3,000	3,000	37,000	5,000
Food liquid	0	0	0	0	6,000	0
Mixed food and garden	25,000	0	0	0	0	0
Manures/ Slurries and Crops	0	20,000	0	0	0	0
Total	61,000	20,000	3,000	3,000	43,000	5,000

Notes to table:

- *Due to rounding, column totals do not add up.*
- *This table showed surveyed figures, while grossed figures are presented in Figure 20*

Figure 20: Estimated grossed figures of sources of waste based on feedstocks in 2014 and 2013 (excludes industrial AD facilities)



Notes to figure:

(i) Less than 1000 tonnes of food waste from agricultural sources. There were no 'other' inputs in 2013 ('other' inputs were decribed as small catering outlets).

- *Figures are grossed estimates for both 2014 and 2013.*
- *Manures and crop residues accounted for less than 0.1% (<1,000 tonnes) in 2013 and therefore are not presented.*

The grossed estimate for LA-sourced feedstock more than doubled in 2014 (70,000 tonnes) compared to 2013 (28,000 tonnes) which may be a result of changes to food waste legislation as noted above and the continued expansion of household collections. This situation is also supported by data showing increases in the grossed estimates for food waste from food manufactuers from 35,000 tonnes in 2013 to 49,000 tonnes in 2014. The amount of material collected from supermarkets has decreased, from estimated gross 20,000 tonnes in 2013 to a grossed estimate of 4,000 tonnes in 2014. It should be noted that there were limited responses to this part of the survey due to commercial sensitivities, so any estimates should be treated with caution. Feedstock from the hospitality sector has decreased slightly.

Respondents were asked if their feedstocks were sourced on or off site. In 2014, 79% of feedstock by surveyed weight was from only external sources, compared to 97% in 2013. Only 3% of feedstock by surveyed weight was from both external and internal sources. A total of 8% of feedstock by surveyed weight was from the same site as the AD operators in 2014 compared to 3% in 2013. The remaining 10% was not identified within the survey. This data is consistent with the type of AD facitlies, as the majority of AD sites in Scotland are merchant sites that accept feedstock from external sources.

3.3.5 Contamination (excluding industrial and farm-fed AD facilities)

In 2014, operators were asked to state the level of reject material they typically found within their feedstock materials. This was interpreted as material contained within the organic feedstocks that the operator had to dispose as waste. The level of rejected material can commonly vary between feedstock loads as well as between sources.

Table 22 compares the 2014 and 2013 contamination results for those AD sites that provided responses.

Data on levels of contamination was based on a combination of operator estimates and exact tonnages, depending on the data available during the survey. The survey did not query whether operators had contracts to conduct de-packaging as part of the service. Sites that conduct de-packaging as part of the service contract are likely to have greater rejected materials compared to sites that do not. The levels of contamination presented in Table 22 should be viewed with caution as the survey results do not take these factors into consideration.

There was a range of comments relating to contamination with some respondents stating specifically that certain feedstocks were more contaminated than others based on the source of material. A number of responses stated that sites no longer accepted feedstock from some commercial sources due to the increased levels of contamination and the risk to equipment and operations. Common rejects included plastic packaging, rubble, catering equipment, glass and even gas canisters. The greatest sources of contamination were from local authorities and supermarkets/ retailers based on comments from the AD sites surveyed. It should be noted that local authorities are the main sources of feedstock for many operators and it is likely that respondents considered frequency in addition to quality when answering.

Table 22: Number of sites that reported contamination levels in feedstock, 2014 and 2013. Excludes industrial and farm-fed AD facilities

Contamination level	2014(i)	2013(ii)
Less than 1%	3	2
1% - 5%	2	0
6% - 10%	0	1
Greater than 10%	1	2

Notes to table:

- *The percentage figures relate to the level of reject material (by fresh weight) per tonne as presented in the AD questionnaire in Appendix 4.*

  (i) 2014 data only presents the level of contamination identified by merchant sites as this question was not on the farm-fed AD survey in 2014.

  (ii) 2013 raw data has been updated to exclude farm-fed survey results to allow comparison with the 2014 survey results.

3.3.6 Process and Technology (excluding industrial and farm-fed AD facilities)

The survey collected information on the type of AD processes and technology used in merchant AD facilities. This question was not asked of the farm-fed AD facilities. The survey results for industrial AD facilities are presented in Section 3.4.

In the 2013 survey, merchant, farm-fed and industrial AD facilities were all asked this question. The 2013 data has therefore been re-analysed to present only those data submitted by merchant AD sites, facilitating comparison with 2014 data.

3.3.6.1 Process technology

In total 6 merchant sites[33] provided responses to this question in 2014[34]. Four sites reported having a single stage[35] process with the remaining 2 sites using a two-stage process. Four sites had batch[36] processes and 2 sites had continuous flow processes in 2014. Of the 6 merchant sites that responded to this question, 5 sites operated a wet AD process with one site operating a dry process in 2014.

[33] Process technology, operating conditions and pasteurisation questions only asked to merchant AD sites and therefore 6 responses out of eight merchant sites that participated in the 2014 survey.
[34] The 2013 survey asked farm fed sites their process technology whereas the process technology question was only asked to merchant sites in 2014. Due to the differences in data, the 2014 data has not been compared to the 2013 results.
[35] A single stage system is defined as one which utilises just one sealed reactor and a two stage system utilises two.
[36] Batch processing is a system where the process has to be stopped to allow more waste to be introduced; with a continuous processing systems, waste can be continually added and removed without stopping the system.

3.3.6.2 Operating Conditions

In 2014, the majority (5 out of 6 merchant sites[33]) of the AD facilities reported using a mesophilic[37] process, with the remaining site using a higher temperature thermophilic process[38].

Of the 6 merchant sites that provided AD process information, only 5 provided hydraulic retention times. In 2014, the hydraulic retention time ranged between 20 days and 120 days. The mean hydraulic retention time for merchant sites in 2014 was 60 days.

3.3.6.3 Pasteurisation

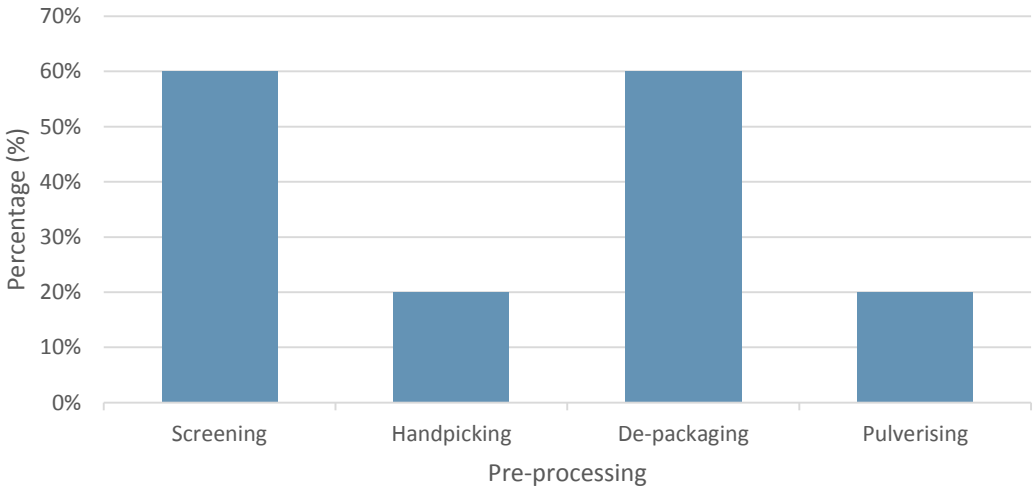
Of the 6 merchant sites that responded to this section of the survey[33], 4 included a pasteurisation step, with 2 of these sites stating pasteurisation took place before digestion and 2 sites stating that pasteurisation took place after digestion. The remaining 2 sites did not have a pasteurisation step.

3.3.6.4 Pre-processing

When feedstock is received by an AD facility, it can be subjected to pre-processing to prepare the material before it is added to the digester.

In 2014, it was assumed that all merchant AD sites have shredding as part of the pre-processing and this specific question was excluded from the survey. Five merchant AD sites reported having a form of pre-processing (excluding shredding) in 2014. Some sites had more than one pre-treatment process and therefore there were 8 different pre-treatment processes associated with 5 merchant AD facilities. The proportions using each method are summarised in Figure 21.

Figure 21: Pre-processing, % of responses (multiple responses possible) (merchant sites only)



Note to figure:

- *The 2014 percentage figures are based on 5 merchant sites that responded to this question with some sites having more than one pre-processing treatment method.*

[37] Mesophilic anaerobic digestion operates at temperatures between 20°C and about 40°C, typically 37°C. Thermophilic digesters operate at temperature above 50°C.
[38] The 2013 survey asked farm fed sites their operating conditions whereas the operating conditions question was only asked to merchant sites in 2014. Due to the differences in data, the 2014 data has not been compared to the 2013 results.

3.3.7 Outputs (excluding industrial AD facilities)

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

3.3.7.1 Biogas and Heat

In 2014, 6 merchant sites provided biogas yield information[39]. In total the 6 merchant sites reported over 8,500,000m^3 of biogas yield in 2014. The biogas yield from the industrial AD sites has been presented separately in Section 3.4. Relatively few AD operators provided complete information on the biogas and heat generation, and this survey cannot therefore provide a robust estimate of the energy outputs produced by AD in Scotland in 2014.

Five merchant sites reported that the biogas is used on site for combined heat and power (CHP). One other site used biogas for both heat only (boiler) and CHP. Heat was reported as being used to heat site facilities and to dry outputs and 1% of biogas was flared. No sites reported exporting biomethane to the national grid or using biogas/ biomethane for vehicle fuel in 2014.

3.3.7.2 Electricity

In 2014, 7 merchant sites reported production of a total of 21 GWh of electricity. An average of 86% of electricity was exported[40].

Some operators provided exact figures and other sites provided estimates. Given these factors, this survey cannot provide a robust estimate of the total electricity generated by AD sites in Scotland in 2014.

3.3.7.3 Digestate

In 2014, 9 merchant and farm-fed AD sites provided data on digestate[41]. A total of 200,000 tonnes of digestate (whole, fibre and liquor) was reported from these facilities compared to 104,000 tonnes in 2013. This has been grossed to provide an estimate of 203,000 tonnes of digestate in 2014. Output from industrial AD facilities has been excluded for both 2013 and 2014 results (Section 3.4).

3.3.7.4 Processing of digestate

Of the 9 merchant and farm-fed AD sites that provided data on digestate, 6 sites further process the whole digestate. All 6 sites separate the whole digestate into fibre and liquor fractions; 4 sites used centrifuges while 2 sites used presses. Three of the 6 sites further processed the fibre fraction via composting, pasteurisation or drying.

3.3.7.5 End use of products

Respondents were asked about the final destination for digestate. Table 23 and **Error! Reference source not found.** shows a summary of the survey data.

Surveyed digestate quantities have increased, with 200,000 tonnes reported in 2014 compared with 70,000 tonnes in 2013.

In 2013, no digestate was reported as being sold to users off-site, however 6,000 tonnes were sold to off-site users in 2014. The amount of liquor digestate provided free of charge or disposed to sewer increased from less than 1,000 tonnes in 2013 to 40,000 tonnes in 2014.

No digestate was disposed of in landfills in 2014 compared to 2,000 tonnes in 2013, and the amount of digestate used by own businesses has decreased from approximately 15,000 tonnes in 2013 to 6,000 tonnes in 2014.

[39] Biogas and heat generation was asked within the farm-fed survey however not all questions were answered and to ensure anonymity the results cannot be presented.
[40] In 2013, 41 GWh was reported from 4 AD sites however this figure included 2 large industrial AD facilities and therefore the 2013 data has not been directly compared to the 2014 survey data. This question.
[41] Eight merchant AD sites and one farm-fed site

Although the amount of digestate has increased since the last survey, the amount of digestate that operators paid users to remove suggests there is still a limited market in which operators can be paid for AD outputs instead of being a cost to operators. Factors such as moisture content of AD outputs can have a significant impact on the cost of transporting AD outputs to suitable markets.

Table 23: Surveyed destination of merchant and farm-fed AD outputs

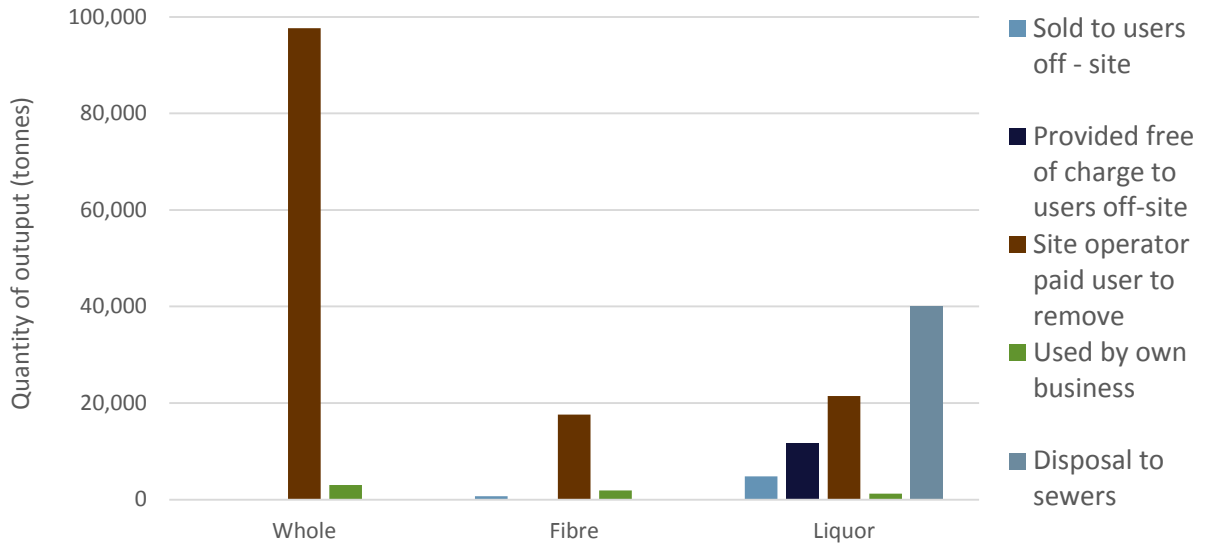
	2014			2013		
Destination	Whole digestate	Fibre	Liquor	Whole digestate	Fibre	Liquor
Number of sites reporting	5	4	5	2	3	3
Sold to users off-site	0	1,000 (3%)	5,000 (6%)	0	0	0
Operator paid user to remove	98,000 (97%)	18,000 (87%)	21,000 (27%)	39,000 (73%)	<1,000 (19%)	6,000 (38%)
Used by own business	3,000 (3%)	2,000 (9%)	1,000 (2%)	14,000 (26%)	0	<1,000 (3%)
Provided free of charge to user- off site	0	0	12,000 (15%)	0	0	8,000 (55%)
Disposal to sewer	0	0	40,000 (50%)	0	0	<1,000 (4%)
Disposal to landfill	0	0	0	0	2,000 (81%)	0
Total	101,000	20,000	79,000	53,000	2,000	15,000

Notes to table:

- *Figures in brackets are percentages of the column totals. Percentages are based on pre-rounded figures.*
- *All figures are rounded to the nearest 1,000 tonnes so column totals may not sum as shown.*
- *In 2014, 9 sites responded but some sites reported more than one digestate destination.*

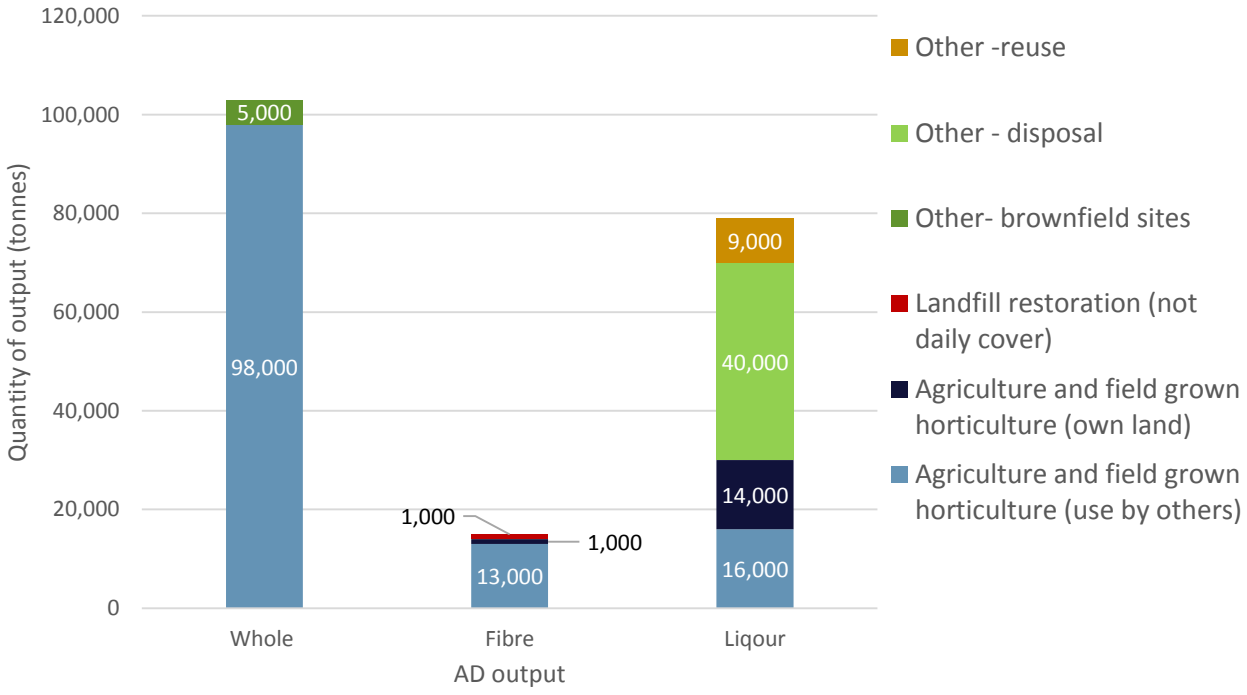
Figure 22 presents a summary of the destination of the whole, fibre and liquor outputs from merchant and farm-fed AD sites in Scotland in 2014.

Figure 22: Surveyed product end destination by product type from merchant and farm-fed sites



Of the surveyed 200,000 tonnes of AD output, 142,000 tonnes (71%) was applied to agricultural land (Figure 23). In 2013, 99% of 50,000 tonnes was applied to agriculture and 1% (Liquor) was re-introduced to the AD process.

Figure 23: Markets for merchant and farm-fed digestates



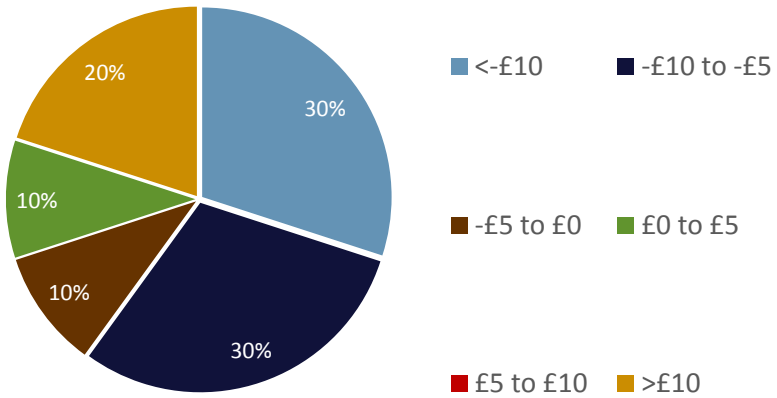
Notes to figure:

- *Other – reuse, includes recycling back into the AD process or water effluent treatment.*
- *Other – disposal, disposed to sewers.*
- *Other - brownfield sites, applied to restore brownfield sites.*

3.3.8 Prices (excluding industrial AD facilities)

In 2014, operators were asked for the average ex-works price of the different fractions of digestate. Six merchant sites provided ex-works prices, of which 3 identified different values for different digestate types. The one farm-fed site did not provide any price data. Figure 24 therefore presents a summary of the ex-works prices surveyed in 2014 from the merchant AD sites only. The majority of ex-works prices were at a cost to the operator (60%).

Figure 24: Summary of ex works prices surveyed from merchant AD sites only



3.3.9 PAS 110 (excluding industrial and farm-fed AD facilities)

Merchant sites were asked if digestates were certified under BSI PAS 110 (as offered by the Biofertiliser Certification Scheme). This question was not asked of farm-fed sites.

Of the 8 merchant sites surveyed, 7 responded; 2 sites produced PAS 110 certified material in 2014 and 5 did not, however they intended to obtain PAS 110 certification in the future. The 5 sites that intended to become certified stated that it was a requirement of local authority contracts and that it would help market the outputs and gain a higher market price.

3.3.10 Employment (excluding industrial AD facilities)

Sites contacted were asked for the total number of FTE employees involved in the AD operations. In 2013, 45 FTE employees were working at surveyed merchant and farm-fed AD sites which was grossed to 70. In 2014, 63.5 FTE employees were employed by surveyed sites which was grossed to 64.5 on all merchant and farm-fed sites.

3.3.11 *Business Issues (excluding industrial AD facilities)*

In 2014, the survey aimed to understand the extent to which the following business issues affected operators;-

- The Waste (Scotland) Regulations 2012;
- Competition for feedstock;
- Markets for outputs;
- Contamination in feedstocks;
- Compliance with PAS certification;
- Compliance with SEPA & APHA requirements.

In addition, the 2014 survey also asked operators their opinions on the impact of future business issues such within the Waste (Scotland) Regulations 2012 (ban to landfill in 2021 and the 5kg food waste threshold in 2016)[42].

Figure 25 presents a summary of the feedback received from merchant and farm-fed AD operators in 2014. In 2014, 4 out of 6 (67%) respondents reported that compliance with SEPA and APHA had no impact on their organisation. A number of sites stated that they had good working relationships with SEPA and that compliance was relatively straight forward.

Negative or highly negative impacts from contamination were reported by 3 out of 8 responses (38%), compared to 4 responses (50%) that reported no impact[43]. Some sites stated that they had stopped accepting waste from some commercial sources due to previous operational issues with high levels of contamination. Other sites reported that high levels of contamination were the greatest challenge and had knock-on impacts on digestate achieving PAS certification.

Three out of 5 (60%) of respondents reported that compliance with PAS was having a negative or strongly negative impact on their organisation. The high levels of contamination and the associated time and cost associated with removing contamination as well as the general time and costs of setting up and maintaining PAS certification were identified as issues by a number of sites.

There were mixed responses from operators about markets for digestate with 5 out of 7 (71%) stating that this issue had no impact on their organisation while one respondent (14%) stated that there were highly positive impacts and one respondent stated that it had a negative impact. Some sites reported having long term contracts for the AD outputs, whilst other sites stated that they had struggled to achieve certification and find markets for their digestate.

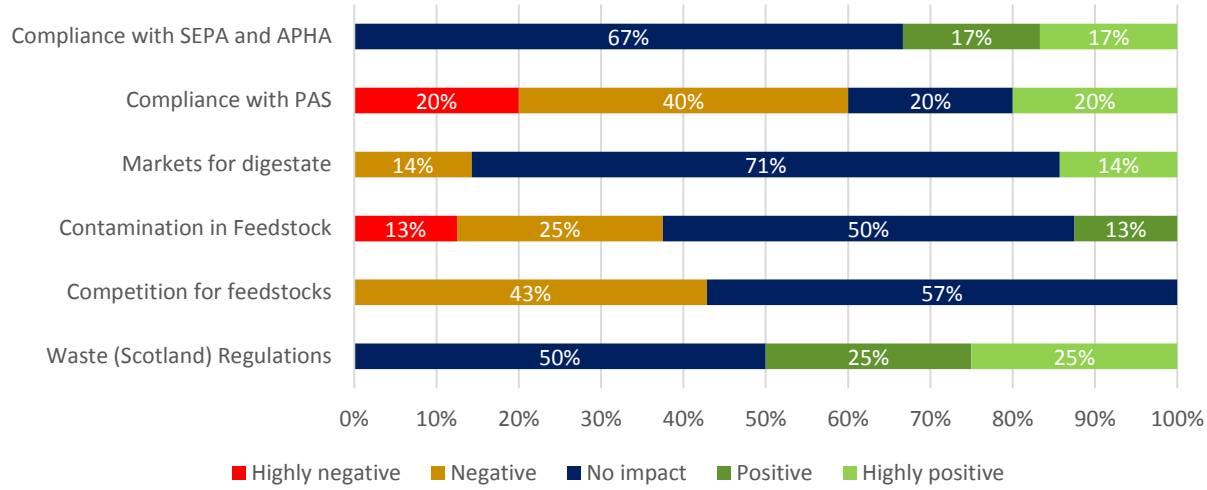
Competition for feedstocks was reported as having a negative impact by 3 out of 7 (43%) site operators with all other sites reporting no impact. Site operators stated not being on frameworks, as well as short contracts, as having a negative impact on their business.

In 2014, 4 out of 8 responses (50%) reported that the Waste (Scotland) Regulations 2012 had a positive or highly positive impact on their organisation, with some sites reporting an increase in the available feedstock.

[42] More information available from https://www.sepa.org.uk/environment/waste/zero-waste/

[43] One site reported the contamination no longer has a negative impact on their business because the site has taken measures to remove contamination which means they cannot accept feedstock with contamination without it having a negative impact on their operations.

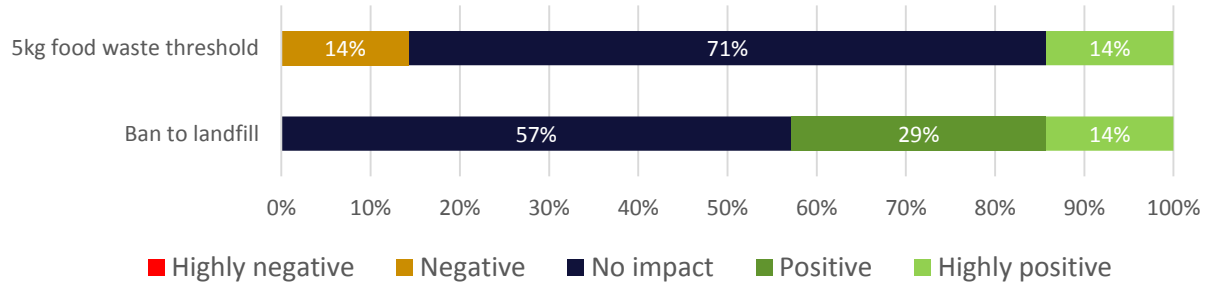
Figure 25: The extent to which specific business issues have affected merchant and farm-fed AD sites in Scotland, 2014



Merchant and farm-fed AD sites were also asked how future issues might impact their organisation, and a summary of their feedback is presented in Figure 26. There were 5 out of 7 responses (71%) that did not think there would be an impact once the Waste (Scotland) Regulations 5kg food waste threshold was introduced, compared to one respondent (14%) that thought there would be a highly positive impact and one respondent (14%) that said there would be a negative impact. Some sites thought there would be more feedstock available and one site even said they were considering extending the plant to take more feedstock. Other sites said they were concerned about the increase in contamination that can be associated with some feedstock sources.

There were 3 out of 7 responses (43%) that considered the ban to landfill to have a positive or highly positive impact on their organisations due to increased feedstock availability, helping to maintain pricing structures and reduce environmental impacts from landfilling. The remaining 4 respondents (57%) felt there would be no direct impact on their organisation.

Figure 26: Feedback on potential impacts of future issues



3.4 Industrial AD Facilities

In 2013, there were 4 industrial AD sites in Scotland and 2 participated in the survey. In 2014, there were 6 active industrial AD sites in Scotland and 3 took part in the survey.

The sites surveyed treat different types of feedstock, meaning that not all of the survey questions were directly applicable to all sites. This limited the survey responses and their potential for interpretation.

Increasing numbers of food and drink businesses, particularly distilleries, have invested in AD as a way of generating value from their by-products and reducing carbon emissions.

3.4.1 2014 survey results

The survey results indicate that more than 85,000 tonnes of by-products were utilised in industrial AD facilities in Scotland during 2014. This is based on survey responses from 3 of the 6 industrial AD facilities known to be operational in 2014. However, on the basis of additional publicly-available information[44] we believe the quantity of by-products utilised in this sector to exceed 500,000 tonnes which feeds the 17.1 MW of renewable generating capacity installed across the 6 sites by Scotland's food and drink sector.

The survey responses stated that biogas use in this sector was for electricity production and / or heat on site, either via CHP or boilers. Producing and using renewable energy from by-products allowed Scotland's food and drink sector to reduce carbon emissions by as much as 62,215 t CO_{2e} in 2014 (based on 17.1 MW of renewable generating installed capacity). Table 24 in Appendix 4 provides the estimates and assumptions used to calculate this figure. The digestate produced is being used as an agricultural fertiliser (whole and separated fibre digestate), separated liquor is being discharged to sewer or sea, or after further treatment discharged to river.

3.5 Conclusions

In 2014 there were 10 active merchant and farm-fed AD sites in Scotland, one fewer than in 2013. Whilst there was an increase in the number of merchant sites since the last survey, this was countered with a decrease in the number of active farm-fed sites (although it should be noted that there were 5 farm-fed AD sites in construction/ commissioning during 2014). There were 8 active merchant sites surveyed and one out of 2 active farm-fed AD sites surveyed in 2014.

The increase in the number of merchant AD sites between 2013 and 2014 was reflected in the increased operating capacity, feedstock quantity and whole digestate figures. The grossed feedstock quantity processed in 2014 was 157,000 tonnes compared to 132,000 tonnes in 2013.

The grossed operating capacity in 2014 was 78,000 tonnes higher than in 2013, while grossed digestate outputs were 203,000 tonnes in 2014, compared with 119,000 tonnes in 2013.

As in 2013, solid food waste was the largest feedstock reported in 2014, which may be a result of changes to the collection of commercial food waste introduced in January 2014 via the Waste (Scotland) Regulations 2012. Local authorities were the main source of feedstock, increasing from 28,000 tonnes (in 2013) to 73,000 tonnes in 2014.

Feedstock contamination was again identified as an operational issue, with some waste sites reporting that they no longer accepted feedstocks from some sources due to the high levels of contamination. Common rejects included plastic packaging, rubble, catering equipment, glass and even gas canisters.

In total the 6 merchant sites reported over 8,500,000m^3 of biogas yield in 2014. As with previous surveys, relatively few operators provided complete information on biogas and heat generation, meaning that this survey cannot provide a robust estimate of these outputs. Survey responses on electricity generation were more numerous, with 7 sites reporting a combined total of 21 GWh electrical, an average of 86% of which was exported.

The grossed digestate tonnages have increased since the 2013 survey, with 203,000 tonnes in 2014 compared to 119,000 in 2013. The majority of digestate was used on agricultural land. The ex-works digestate price varied between sites, however the majority (60%) of operators stated negative ex-works digestate prices.

In 2014 there were 2 PAS 110 certified facilities, while 5 sites stated their intention to obtain certification. Sites identified various benefits of certification, including increased opportunity to obtain LA feedstock contracts and increased market value for digestate.

[44] Ofgem, Environmental Programmes, available from https://www.ofgem.gov.uk/environmental-programmes

In 2014, merchant and farm-fed sites were asked their views on the extent of which different issues impacted their operations. Contamination of feedstock, competition for feedstocks and compliance with PAS certification were identified as having negative impacts.

Negative or highly negative impacts from contamination were reported by 3 out of 8 responses (38%), compared to 4 responses (50%) that reported no impact[45]. Some sites stated that they had stopped accepting waste from some commercial sources due to previous operational issues with high levels of contamination. Other sites reported that high levels of contamination were the greatest challenge and had knock-on impacts on digestate achieving PAS certification.

Three out of 5 respondents (60%) reported that compliance with PAS was having a negative or strongly negative impact on their organisation. The high levels of contamination and the associated time and cost with removing contamination as well as the general time and costs of setting up and maintaining PAS certification were identified by a number of sites.

Competition for feedstocks was reported as having a negative impact by 3 out of 7 site operators (43%) with all other sites reporting no impact. Site operators stated not being on local authority frameworks, as well as short contracts, as having a negative impact on their business.

Merchant and farm-fed AD sites were also asked how future issues might impact their organisation, and a summary of their feedback is presented in Figure 26. There were 5 out of 7 responses (71%) that did not think there would be an impact once the Waste (Scotland) Regulations 2012, 5kg food waste threshold was introduced, compared to one respondent (14%) that thought there would be a highly positive impact and one respondent (14%) that said there would be a negative impact. Some sites thought there would be more feedstock available and one site even said they were considering extending the plant to take more feedstock. Other sites said they were concerned about the increase in contamination that can be associated with some feedstock sources.

There were 3 out of 7 responses (43%) that considered the ban to landfill to have a positive or highly positive impact on their organisations due to increased feedstock availability, helping to maintain pricing structures and reduce environmental impacts from landfilling. The remaining 4 respondents (57%) felt there would be no direct impact on their organisation.

The 2014 survey also surveyed industrial AD facilities that are associated with food and drink manufacturing which currently is primarily distilleries. The available data from industrial sites suggest that the large sites are capable of generating up to 17.1 MW.

[45] One site reported the contamination no longer has a negative impact on their business because the site has taken measures to remove contamination which means they cannot accept feedstock with contamination without it having a negative impact on their operations.

4 Appendices

Appendix 1 – Survey Methodology

This research focuses on the calendar year 2014 and follows on from the 2013 and 2012 survey. Previous surveys conducted in 2009 and 2010 (delivered in 2011 and 2012) used an approach which relied on regulatory returns for input data which only becomes available 11- 15 months after the year in question.

Preview of previous survey and impact on employed methodology

The 2014 survey used the same core delivery methodology as that delivered in 2013 and 2012 so that the successful results could be reproduced and built on, and so that data from 2013 and 2014 could be directly compared.

The questionnaires used for this survey were based upon those employed in 2013, although they were updated based on lessons learnt and sector changes with Zero Waste Scotland. The survey of composting operations was delivered by Jenny Grant who has extensive knowledge and experience of composting in Scotland and who was involved in the previous surveys. The survey of AD operations was delivered by Ricardo Energy & Environment which has experience of conducting surveys and the AD sector.

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 was collated from the AD Information Portal map (http://www.biogas-info.co.uk/index.php/ad-map.html), Zero Waste Scotland sector knowledge, The Scottish Whisky Association and NNFCC. All AD waste water treatment was excluded from the contact list.

Marketing

A communications strategy was developed to widely publicise the survey and encourage operators to take part and thereby help to achieve high participation rates. There were several key communications channels used:

- Introductory and reminder emails to all relevant, identified operators.
- A dedicated webpage hosted on the Zero Waste Scotland website.
- Direct contact with trade associations including SWA and REA, encouraging them to promote the survey and participation in it, to their relevant members.
- REA e-newsletter.

As well as ad hoc awareness raising at several key events including RWM, biogas meetings and events attended by Jenny Grant and the CIWM business group.

Questionnaire development

In 2014, three separate questionnaires were developed; one for composting sites, one for merchant and industrial AD sites and one for farm-fed AD sites. Separate questionnaires were required to ensure the required information was gathered from each specific organic sector and to ensure the surveys were clear and concise for the target audience.

The previous questionnaire from the 2013 survey was used as a basis with some questions updated with Zero Waste Scotland to ensure the questions were up to date and relevant to both the target audience and the needs of Zero Waste Scotland. 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 interview;
- 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 appropriate personnel for review and feedback and comments incorporated.

Site Survey

The final versions of the questionnaires were provided to the surveyors as Word documents. The questionnaires were reproduced 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 15th October 2015 and 5th January 2016.

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 2 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 assurance

The Ricardo Energy & Environment surveyor responsible for the AD data collection, checked data as it was returned, and some anomalies were referred back to the respondents during the fieldwork period. The same was done by Jenny Grant for the composting survey results and any anomalies were checked.

During data analysis, any items that appeared anomalous were identified (e.g. sense checked against other data collected and against the 2013 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 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 survey. The methodology used is presented in Appendix 2, and was the same as that employed in the 2013 and 2012 surveys to that results could be compared.
- Distribution plots were produced to represent the spread of responses to questions such as the 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. For 2013, where a reported price of £0.00 was found to relate to either compost being used on the producer's own land, or given back to the local authority as part on contracts; it has been excluded from the analysis because £0.00 does not reflect the actual value to the operator. This approach was also followed for the 2014 survey.

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. This process has resulted in the removal of 17 prices of £0.00 (some from the same site but different end uses), 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.
- Landfill restoration;
- Other Brownfield restoration; and
- Other.

Appendix 2 – Grossing Methodology

This survey has adopted the same grossing methodologies as the previous 2013 survey for site inputs, capacities, outputs and employee numbers as described below. This enables the results for 2013 and 2014 to be directly compared.

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 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.

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.

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 2014 during the survey so that only those sites that were active in 2014 were used in the grossing process.

The proportion of sites with data in each category (input, output, and 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.

It should be noted that 8 out of 8 merchant AD sites took part in the survey, and only where answers were not provided were figures grossed. One farm-fed site out of 2 active in 2014 was surveyed and

this site was used to gross for the other active farm-fed AD. There were 27 compost sites surveyed from an active population of 29 in 2014.

Appendix 3 – Estimated carbon dioxide offset

Table 24 presents a summary of the estimated carbon dioxide offset values from the industrial facilities in Scotland in 2014.

Table 24: Summary of the estimated carbon dioxide offset values from the industrial facilities in Scotland in 2014

	Electrical CO_2 offset (tonnes)	Heating energy CO_2 offset (tonnes)			
		Hard coal	Oil	Natural Gas	LPG
Distilleries	22,729	39,486	27,809	15,637	18,890

Appendix 4 – Questionnaires used in the 2014 organics survey

Annual Survey of the Scottish Organics Recycling Industry 2014

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 2014 was this site operating under an exemption, rather than a licence or permit? Yes ☐ No ☐

Q2a. IF YES: Has your site subsequently operated under a license or permit? Yes ☐ No ☐

Q2b. If YES: When did you obtain your license or permit? (MM/YYYY) __/____

If answer to Q2 is yes (the site was operating under an exemption in 2014), no survey to be completed.

Q3. How many people were employed at this site? (Expressed as FTEs) _____

Q4a. What was your permitted capacity in 2014?

Q4b. Taking into consideration planning, regulatory and physical constraints; what was the maximum working capacity of this site in 2014? _____ tonnes per year

Q4c. how much of this throughput could potentially be food waste? _____% per year [note to interviewer: this should be the absolute max they would put through]

Q5. What type or types of process was the site operating in 2014?

(*Please select all the options that apply)*

☐ IVC
☐ Aerated static pile
☐ Windrow open
☐ Continuous block composting
☐ Windrow under cover
☐ 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, during 2014?

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-Q15 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 2014 in order to remove contamination?

(*Please select all the options that apply)*

☐ Screening
☐ Mechanical de-packaging**
☐ picking line
☐ Floor picking
☐ magnetic separation
☐ windsifting
☐ manual depackaging**
☐ Other - please specify _____

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

** splitting open bags by hand to remove contents before they go for contamination removal e.g. floor picking or picking line

Feedstocks

Q8. How much of your feedstocks in 2014 were: READ OUT TYPE AND ENTER QUANTITY IN TONNES. CONFIRM THAT THE SUM OF THE FIGURES GIVEN EQUALS THE TOTAL THROUGHPUT IN 2014

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

		SOURCE (percentages)					
	QUANTITY (tonnes)	LA sources	Landscapers	Super-markets /Retail	Hospitality sector	Food manu-facturers/ processors	Other (inc. agriculture)
Food (separated) Incld packaged food							
Green/ garden material (separated)							
Crop residues direct from farm from food production (eg waste potatoes or carrots)							
Mixed food and green material							
- Of which, approximate food content (%							

fresh weight) - 0-5 - 5-10 - 10-15 - 15+							
Other (specify)							
TOTAL		**INTERVIEWER CHECK = TOTAL THROUGHPUT AT THIS SITE IN 2014**					

Q10a. What level of contamination (by weight) do you typically find, per tonne? (INTERVIEWER: tick one)

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

Q10b. What are the main sources of this contamination, rank top 5 (1 highest, 5 lowest)? (INTERVIEWER: Please list)

Local Authority collections	
Agriculture (own material)	
Agriculture (external sources)	
Supermarkets /Retail*	
Hospitality sector	
Food/drink manufacturers/ processors (own material)	
Food/drink manufacturers/ processors (external sources)	
Landscapers	
Other	

*** Including primary packaging from food waste even if accepted**

10c. what makes up the contamination? Eg garden ornaments, plastic bags, accepted primary packaging

10d. does the contamination present a problem for you?

Operationally? Y/N [accepted primary packaging should be captured as "no"]

In terms of output quality (if contamination was not removed) Y/N

In terms of output quality (e.g. Y if you are you unable to remove enough contamination with existing mechanisms?) Y/N [accepted primary packaging should be captured as "no"]

Outputs of Compost

Q11a. What was the total quantity of compost produced in 2014? _____ tonnes

Q11b. Please give the quantity of the compost you produced in each grade, in 2014?

Grade

0-10mm _____ tonnes

0-20mm _____ tonnes

0- 40mm _____tonnes

Mulch _____tonnes

Other – please specify _____tonnes

_____ _____ **INTERVIEWER: CHECK SUM = TOTAL OUTPUT**

Note – 'other' does not include oversize, for which there are separate questions

11c. how many tonnes of "oversize" material do you produce

11d. What do you do with your oversize.

_____

11e. does "oversize" material represent an income stream, a cost or is it cost neutral?

Destination of Compost

Q12. Where was the compost that you produced in 2014 applied? (IN TONNES - WRITE IN FIRST COLUMN BELOW)

Q13. What was the average ex-works sale price)? WRITE IN SECOND COLUMN BELOW

	TONNES	Average ex-works sales price	
Agriculture and field horticulture (own use)	_____		
Agriculture and field horticulture (use by others)	_____	_____	£/T
Horticulture /growing media	_____	_____	£/T
Landscaping/landscape development	_____	_____	£/T
Turf	_____	_____	£/T
Landfill restoration [not daily cover]	_____	_____	£/T
Other brownfield restoration	_____	_____	£/T
Fuel for energy recovery	_____	_____	£/T
Other e.g. bagged compost for local sales, forestry (Please specify below)	_____	_____	£/kg or £/T INTERVIEWER DELETE AS APPLICABLE

_____

Q14. Do you pay for the material to be delivered to users and / or spread on their land?

Q15. Why are you using compost on your own land? Would you still do this if there was a suitable market available?

Quality

Q16a. In 2014 were you producing compost certified to PAS100? Yes ☐ No ☐
IF YES TO Q16a: Q16b: are you still producing compost certified to PAS100 Yes ☐ No ☐
IF YES TO Q16a: Q16c. Do you intend to keep your PAS certification? Yes ☐ No ☐
IF NO TO Q16a: Q16d. Do you intend to obtain PAS certification? Yes ☐ No ☐
IF NO TO EITHER Q16b OR Q16c: Q16e Why is that?

_____

If YES to Q16c and Q16d. Q16f What do you perceive to be the value of certification.

Requirement of LA contract ☐

Requirement of merchant contracts ☐

Product is easier to market (as certification = end of waste) ☐

Product commands a higher value ☐

Other

_____

IF YES TO Q16a:
Q16g. Does the certification apply to all or only part of your compost?
All ☐ Part ☐
IF PART: Q16h To which part? (grades, process)

_____

Q16i. how many tonnes of non-certified material do you produce _____ tonnes

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

<<repeat of questions above>>

Ask the following questions once per site rather than once per 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 how it affects your composting operation and the (overall) extent to which is affects your operation (1 highly negative impact – 5 highly positive impact, 3 = no impact)

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

Issue	1	2	3	4	5
Waste (Scotland) Regulations					
• how has this affected your business?					
• Extent					
Competition for feedstocks					
• how has this affected your business?					
• Extent					
Markets for outputs					
• how has this affected your business?					
• Extent					

• What markets would you like to access but are currently unable to?					
• If 1 or 2: what could be done to improve marketability of products?					
Contamination in feedstocks					
• how has this affected your business?					
• Extent					
Compliance with PAS					
• how has this affected your business?					
• Extent					
Compliance with SEPA & APHA					
• how has this affected your business?					
• Extent					

Q17a. Potential future impacts.

To what extent do you expect the following issues to impact upon your composting operation (1 high negative impact – 5 high positive impact):

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

Issue	1	2	3	4	5
Waste (Scotland) Regulations - ban to landfill					
• how will this affect your business?					
Waste (Scotland) Regulations – 5kg food waste threshold					
• how will this affect your business?					

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

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

Interviewer to prompt on the basis of the information gathered through the survey so far.

Negative / Threats:	
Positive / Opportunities:	

PERMISSIONS - READ OUT:

Responses from this research will be used to generate an aggregate picture of the sector in Scotland, and this will never be published or shared in a way that would enable the identification of individual sites.

However, Zero Waste Scotland would like to have access to your individual response to aid their understanding of the sector. This data will still be treated in strict confidentiality.

Are you happy to waive your anonymity:

a) in regards to quantitative data (e.g. figures) in your response and

b) in regards to qualitative feedback (e.g. comments) provided?

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

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

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

SEPA data team will be conducting a site capacity survey in 2016. This will duplicate questions 4a, 4b, 4c. If you are happy for your responses to these questions to be collected in the current survey, plus your site identity, to be shared with SEPA, they will not contact you as part of that study. Are you happy for this specific information to be shared with SEPA for this purpose? All data will be treated by SEPA as confidential, and only aggregated national data will be published.

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

WRAP may also be conducting a UK wide site survey covering 2014. This will duplicate several questions. If you are happy for your responses to these questions in the current survey, plus your site identity, to be shared with WRAP, they may not contact you as part of that study. Are you happy for this specific information to be shared with WRAP for this purpose? All data will be treated by WRAP as confidential, and only aggregated national data will be published.

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

Annual Survey of the Organics Recycling Industry 2014 (carried out 2015)

AD Site (EXCLUDING SEWAGE TREATMENT and MBT AD)

Check first that the site does NOT:

Process sewage/urban waste water treatment

Process mixed waste ('black bag' waste)

Both of these types of sites should be excluded – inform Zero Waste Scotland 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. What type of facility do you operate?

Merchant site – taking in material including food waste, from different sources

Industrial site – processing food &/or drink processing material only from your own site only with no external input

On farm site – processing only agricultural i.e. pre farm gate material such as manures, purpose grown crops and crop residues. [If yes, ask only the agreed "farm fed" questions. If no, continue with full survey]

Other – please specify _____.

Q2. When did the site become operational? (Please write in MM/YYYY) _____/_____

Q3. Did this site operate under a permit or an exemption during 2014? Permitted ☐ Exempt ☐

Q3a. IF YES: Has your site subsequently operated under a license or permit? Yes ☐ No ☐

Q3b. If YES: When did you obtain your license or permit? (MM/YYYY) __/____

If answer to Q3 is yes (the site was operating under an exemption in 2014), no survey to be completed.

Q4. How many people are employed on this AD plant? (expressed as FTEs) _____

Q5a. What was your permitted capacity in 2014?

Q5b. Taking into consideration planning, logistical, regulatory and physical constraints; what was the maximum working capacity of this site in 2014? _____ tonnes per year

Q5c. how much of this throughput could potentially be food waste? _____% per year [note to interviewer: this should be the absolute max they would put through]

Q6. During 2014, what was your:

a) Heat (energy) generation capacity?

b) Electrical (energy) generation capacity

Q7 What type of AD system was the site using during 2014?

(IF 2 OR MORE SYSTEMS OPERATING IN PARALLEL AT SITE, FILL IN SEPARATE Q'RE FOR EACH, TO ENSURE NO DOUBLE-COUNTING)

Q7a	**AD system type**	☐ Single stage	☐ Two-stage
Q7b	**AD system type**	☐ Continuous	☐ Batch ("Plug flow")
Q7c	**AD system type**	☐ Wet	☐ Dry
Q7d	**AD system type**	☐ Mesophilic	☐ Thermophilic
Q7e	**Hydraulic retention time**	_____ days	

Q8. Were you using pasteurisation? ☐ Yes ☐ No

Q8a. IF YES, was it...? ☐ Pre digestion ☐ Post digestion

Q9. What types of pre-processing of feedstocks did you carry out in 2014 in order to remove contamination? (Please tick all that apply)

☐ Screening ☐ Hand picking

☐ De-packaging/de-bagging*

☐ Other (Please specify) _____

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

Feedstocks

Q10a. How much of your feedstocks in 2014 were: READ OUT TYPE AND ENTER QUANTITY IN TONNES.
CONFIRM THAT THE SUM OF THE FIGURES GIVEN EQUALS THE TOTAL THROUGHPUT IN 2014

Q10b. 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	Agriculture	Super-markets /Retail	Hospitality sector	Food manu-facturers/ processors	Other (specify)
Purpose grown (energy) crops							
Manures/ Slurries							
Crop residues direct from farm from food production (eg waste potatoes or carrots)							
Food (solid), food residues, or organic by-products of manufacture (e.g. draff and sludges)							
Food (liquids) and drinks manufacturing residues incld washings (e.g. pot ale)							
Mixed food and green material (Dry AD only) - Of which approximate food content (%)(% fresh weight) - 0-10 - 10-20 - 20-30 - 30-40 - 40-50 - 50-60 - 60-70							

- 70-80 - 80-90 - 90-100							
Other (specify)							
TOTAL		**INTERVIEWER CHECK = TOTAL THROUGHPUT AT THIS SITE IN 2014**					

Q11a. What level of reject material (by fresh weight) 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 are the main source of this contamination, rank top 5 (1 highest, 5 lowest)?

Local Authority collections	
Agriculture (own material)	
Agriculture (external sources)	
Supermarkets /Retail*	
Hospitality sector	
Food/drink manufacturers/ processors (own material)	
Food/drink manufacturers/ processors (external sources)	
Other	

*** Including primary packaging from food waste even if accepted**

Q11c . What does this contamination normally consist of? Eg garden ornaments, plastic bags, accepted primary packaging

Q11d. does the contamination present a problem for you?

Operationally? Y/N [accepted primary packaging should be captured as "no"]

In terms of output quality (if contamination was not removed) Y/N

In terms of output quality (e.g. Y if you are you unable to remove enough contamination with existing mechanisms?) Y/N [accepted primary packaging should be captured as "no"]

Q12. In 2014, 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 2014?

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 Q20)*

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

☐ Screened to remove contaminants
☐ Composted
☐ Separated into fibre & liquor fractions
☐ 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 2014?

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 to liquor after separation ☐ Yes ☐ No

Q18a. IF YES, What?

☐ Screened to remove contaminants
☐ aerobic filtration process
☐ Other (Please specify below)
_____

Q19. Do you apply any further processing to digestate fibre after separation ☐ Yes ☐ No

Q19a. IF YES, What?

☐ Screened to remove contaminants
☐ Composted
☐ Pelletised
☐ Other (Please specify below)
_____

Use of Products – whole digestate OR fibre and liquor

Q20. How much of the digestate that you produced in 2014 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 charges for transport and/or spreading 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 sea outflow	_____ tonnes	_____ tonnes	_____ tonnes/m3
Disposal to sewers	_____ tonnes	_____ tonnes	_____ tonnes/m3
Other (please specify _____)	_____ tonnes _____ TOTAL	_____ tonnes _____ TOTAL	_____ tonnes/m3 _____ TOTAL

Q21. Of the digestate that you produced in 2014 that was used (i.e. not disposed of to landfill, sewers, or sea outflow), where was it applied?

	Whole	**OR**	**Fibre**	**and**	**Liquor**	
Agriculture and field grown horticulture (own land)	_____	tonnes	_____	tonnes	_____	tonnes/m3
Agriculture and field grown horticulture (use by others)	_____	tonnes	_____	tonnes	_____	tonnes/m3
Landscaping "ornamental"	_____	tonnes	_____	tonnes	_____	tonnes/m3
Landfill restoration (not daily cover)	_____	tonnes	_____	tonnes	_____	tonnes/m3
Fuel for energy recovery	_____	tonnes	_____	tonnes	_____	tonnes/m3
Other (e.g. other brownfield restoration) (Please specify below)	_____	tonnes	_____	tonnes	_____	tonnes/m3

_____

Q21 a. [If some/all material is used on own land]: If there was a suitable market available, would you still use the output on your own land?

Q22. Where the outputs produced in 2014 were applied, what was the average ex- works sale price band for each use?

Read out the different bands (apply per tonne) (negative indicates that the operator pays for the output material to be taken away and/or spreading costs and/or disposal to sewer costs)

<-£10

-£10 to -£5

-£5 to £0

£0 to £5

£5 to £10

>£10

	Whole	OR	Fibre	and	Liquor	
Agriculture and field grown horticulture	_____	£/T	_____	£/T	_____	£/T
Landscaping - ornamental	_____	£/T	_____	£/T	_____	£/T
Landfill restoration	_____	£/T	_____	£/T	_____	£/T
Fuel for energy recovery	_____	£/T	_____	£/T	_____	£/T
Disposal of liquor to sewer					_____	£/T
Other (Please specify below)	_____	£/T	_____	£/T	_____	£/T

_____

Q23. Do you pay for the material to be delivered and / or spread

Y/N

Outputs – Biogas

Q24a. What was the total biogas yield in 2014 (m3)? _____m^3

Q24b. Of the biogas that you produced in 2014, 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)	____%

_____

Q24c. What was the gross output of the site in 2014 (Biogas combustion on site)? _____ MWh/yr

Q24d. How much electricity was generated in 2014? _____ MWh

Q24e. How much electricity was exported? _____ % / MWh **INTERVIEWER DELETE AS APPLICABLE**

Q24f. Of all the heat that you generated in 2014, what proportion was exported off site? _____ %

Q24g. IF LESS THAN 100%: What was any remaining heat used for? INCLUDE WASTAGE/VENTING

_____

_____

Quality

Q25a. In 2014, were you producing digestate certified to PAS110? Yes ☐ No ☐

IF YES TO Q25a: Q25b: are you still producing compost certified to PAS100 Yes ☐ No ☐

IF YES TO Q25a: Q25c. Do you intend to maintain your PAS certification? Yes ☐ No ☐

IF NO TO Q25a: Q25d. Do you intend to obtain PAS certification? Yes ☐ No ☐
IF NO TO EITHER Q25b OR Q25c: Q25e. Why is that?

_____

Q 25e. If YES to a and b What do you perceive to be the value of certification.

Requirement of LA contract ☐

Requirement of merchant contracts ☐

Product is easier to market ☐

Product commands a higher value ☐

Other

_____

IF YES TO Q25a:

Q26. Does the certification apply to all or only part of your output? All ☐ Part ☐
IF PART: To which part? (form, destination)

Q26a. how many tonnes of non-certified material do you produce

Q26b. What do you do with your non-certified material

_____

SECOND PARALLEL PROCESS.

<<repeat of questions above>>

"Have Your Say"

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

Q27.

For each of the following business issues, please say please say how it affects your AD operation and the (overall) extent to which is affects your operation (1 highly negative impact – 5 highly positive impact, 3 = no impact)

For each of the following business issues, please say how it affects your composting operation and the

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

Issue	**1**	**2**	**3**	**4**	**5**
Waste (Scotland) Regulations					
• how has this affected your business?					
• extent					
Competition for feedstocks					
• how has this affected your business?					
• extent					
Markets for outputs					
• how has this affected your business?					
• extent					

• What markets would you like to access but are currently unable to?					
• If 1 or 2: what could be done to improve marketability of products?					
Contamination in feedstocks					
• how has this affected your business?					
• extent					
Compliance with PAS					
• how has this affected your business?					
• extent					
Compliance with SEPA & APHA					
• how has this affected your business?					
• extent					

Q27a. Potential future impacts.

To what extent do you expect the following issues to impact upon your composting operation (1 high negative impact – 5 high positive impact):

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

Issue	1	2	3	4	5
Waste (Scotland) Regulations - ban to landfill					
• how will this affect your business?					
Waste (Scotland) Regulations – 5kg food waste threshold					
• how will this affect your business?					

Q28. Do you have anything further you would like to add, in terms of issues for your business?

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

Interviewer to prompt on the basis of the information gathered through the survey so far.

Negative / Threats:	
Positive / Opportunities:	

PERMISSIONS - READ OUT:

Responses from this research will be used to generate an aggregate picture of the sector in Scotland, and this will never be published or shared in a way that would enable the identification of individual sites.

However, Zero Waste Scotland would like to have access to your individual response to aid their understanding of the sector. This data will still be treated in strict confidentiality.

Are you happy to waive your anonymity:

a) in regards to quantitative data (e.g. figures) in your response and

b) in regards to qualitative feedback (e.g. comments) provided?

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

Would you be happy for Zero Waste Scotland 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 Zero Waste Scotland.

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

SEPA data team will be conducting a site capacity survey in 2016. This will duplicate questions 5a, 5b and 5c. If you are happy for your responses to these questions to be collected in the current survey, plus your site identity, to be shared with SEPA, they will not contact you as part of that study. Are you happy for this specific information to be shared with SEPA for this purpose? All data will be treated by SEPA as confidential, and only aggregated national data will be published.

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

WRAP may also be conducting a UK wide site survey covering 2014. This will duplicate several questions. If you are happy for your responses to these questions in the current survey, plus your site identity, to be shared with WRAP, they may not contact you as part of that study. Are you happy for this specific information to be shared with WRAP for this purpose? All data will be treated by WRAP as confidential, and only aggregated national data will be published.

INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

On-farm AD Site (EXCLUDING SEWAGE TREATMENT and MBT AD)

This survey is to be used where the answer to this question from the AD survey is "on-farm":

Q1. What type of facility do you operate?

Merchant site – taking in material including food waste, from different sources

Industrial site – processing food &/or drink processing material only from your own site only with no external input

On farm site – processing only agricultural i.e. pre farm gate material such as manures, purpose grown crops and crop residues. [If yes, ask only the agreed "farm fed" questions. If no, continue with full survey]

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. What type of facility do you operate?

Merchant site – taking in material including food waste, from different sources [if yes, continue with main AD survey]

Industrial site – processing food &/or drink processing material only from your own site only with no external input [if yes, continue with main AD survey]

On farm site – processing only agricultural i.e. pre farm gate material such as manures, purpose grown crops and crop residues. [If yes, continue with THIS survey]

Other – please specify _____. [if yes, continue with main AD survey]

Q2. When did the site become operational? (Please write in MM/YYYY) _____/_____

Q3. Did this site operate under a permit or an exemption during 2014? Permitted ☐ Exempt ☐

Q3a. IF YES: Has your site subsequently operated under a license or permit? Yes ☐ No ☐

Q3b. If YES: When did you obtain your license or permit? (MM/YYYY) __/____

Survey to be completed for both exempt and licenced on-farm sites

Q4. What was your permitted capacity in 2014?

Feedstocks

Q5a. How much of your feedstocks in 2014 were: READ OUT TYPE AND ENTER QUANTITY IN TONNES.

CONFIRM THAT THE SUM OF THE FIGURES GIVEN EQUALS THE TOTAL THROUGHPUT IN 2014

Q5b. 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	Agriculture	Super-markets /Retail	Hospitality sector	Food manu-facturers/ processors	Other (specify)
Purpose grown (energy) crops							
Manures/ slurries							
Crop residues direct from farm from food production (eg waste potatoes or carrots)							

Food (solid), food residues, or organic by-products of manufacture (e.g. draff and sludges)							
Food (liquids) and drinks manufacturing residues incld washings (e.g. pot ale)							
Mixed food and green material (Dry AD only) - Of which approximate food content (%)(% fresh weight) - 0-10 - 10-20 - 20-30 - 30-40 - 40-50 - 50-60 - 60-70 - 70-80 - 80-90 - 90-100							
Other (specify)							
TOTAL		**INTERVIEWER CHECK = TOTAL THROUGHPUT AT THIS SITE IN 2014**					

Q6. In 2014, 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

Q7. What was the quantity of whole digestate produced in 2014?

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*)

Q8. Is the whole digestate processed further, after digestion?

☐ Yes ☐ No

Q9. If yes, what was the quantity of separated fibre produced in 2014?

Wet weight _____ tonnes

Q10. 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

Use of Products – whole digestate OR fibre and liquor

Q11. How much of the digestate that you produced in 2014 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 charges for transport and/or spreading 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 sea outflow	_____ tonnes		_____ tonnes		_____ tonnes/m3
Disposal to sewers	_____ tonnes		_____ tonnes		_____ tonnes/m3
Other (please specify _____)	_____ tonnes _____ TOTAL		_____ tonnes _____ TOTAL		_____ tonnes/m3 _____ TOTAL

Q12. Of the digestate that you produced in 2014 that was used (i.e. not disposed of to landfill, sewers, or sea outflow), where was it applied?

	Whole	**OR**	**Fibre**	**and**	**Liquor**
Agriculture and field grown horticulture (own land)	_____ tonnes		_____ tonnes		_____ tonnes/m3
Agriculture and field grown horticulture (use by others)					
Landscaping "ornamental"	_____ tonnes		_____ tonnes		_____ tonnes/m3
Landfill restoration (not daily cover)	_____ tonnes		_____ tonnes		_____ tonnes/m3
Fuel for energy recovery	_____ tonnes		_____ tonnes		_____ tonnes/m3
Other (e.g. other brownfield restoration) (Please specify below)	_____ tonnes		_____ tonnes		_____ tonnes/m3

_____

Q12 a. [If some/all material is used on own land]: If there was a suitable market available, would you still use the output on your own land?

Outputs – Biogas

Q13a. What was the total biogas yield in 2014 (m3)? _____m^3

Q13b. Of the biogas that you produced in 2014, 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) _____	____%

Q13c. What was the gross output of the site in 2014 (Biogas combustion on site)? _____ MWh/yr

Q13d. How much <u>electricity</u> was generated in 2014? _____ MWh

Q13e. How much electricity was exported? _____ % / MWh **INTERVIEWER DELETE AS APPLICABLE**

Q13f. Of all the heat that you generated in 2014, what proportion was exported off site? _____ %

Q13g. IF LESS THAN 100%: What was any remaining heat used for? INCLUDE WASTAGE/VENTING

_____

_____

"Have Your Say"

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

Q14.

For each of the following business issues, please say please say how it affects your AD operation and the (overall) extent to which is affects your operation (1 highly negative impact – 5 highly positive impact, 3 = no impact)

For each of the following business issues, please say how it affects your composting operation and the

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

Issue	1	2	3	4	5
Waste (Scotland) Regulations					
• how has this affected your business?					
• extent					

Competition for feedstocks					
• how has this affected your business?					
• extent					
Markets for outputs					
• how has this affected your business?					
• extent					
• What markets would you like to access but are currently unable to?					
• If 1 or 2: what could be done to improve marketability of products?					
Contamination in feedstocks					
• how has this affected your business?					
• extent					
Compliance with PAS					
• how has this affected your business?					
• Extent					
Compliance with SEPA & APHA					
• how has this affected your business?					
• extent					

Q14a. Potential future impacts.

To what extent do you expect the following issues to impact upon your composting operation (1 high negative impact – 5 high positive impact):

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

Issue	**1**	**2**	**3**	**4**	**5**
Waste (Scotland) Regulations - ban to landfill					
• how will this affect your business?					
Waste (Scotland) Regulations – 5kg food waste threshold					
• how will this affect your business?					

Q15. Do you have anything further you would like to add, in terms of issues for your business?

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

Interviewer to prompt on the basis of the information gathered through the survey so far.

Negative / Threats:	
Positive / Opportunities:	

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b) in regards to qualitative feedback (e.g. comments) provided?

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Would you be happy for Zero Waste Scotland 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 Zero Waste Scotland.

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INTERVIEWER: NOTE ANY CAVEATS/LIMITATIONS:

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or call freephone **0808 100 2040**