Report

The Composition of Mixed Waste from Scottish Health and Social Care, Education, Motor, Wholesale and Retail Sectors in 2011

An estimate of the composition of mixed waste disposed of in 2011 by three sectors of Scottish industry and commerce, namely 1. health and social care, 2. education, and 3. selling, maintenance and repair of motor vehicles, the wholesale sector and the retail sector

A report of a study that provides information about the composition and amount of mixed waste disposed of by Scottish businesses within three key sectors. The purpose of this report is to assist Zero Waste Scotland, government and government bodies, industry and commerce to develop policies, advice, tips and tools to help the reduction of mixed waste to landfill

FINAL REPORT May 2012

Zero Waste Scotland works with businesses, individuals, communities and local authorities to help them reduce waste, recycle more and use resources sustainably.

Find out more at www.zerowastescotland.org.uk

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Executive summary

It was in the summer of 2010 that the Scottish Government first articulated a vision for the country in which all waste is considered too valuable to be disposed of in landfills. In this vision, not only is waste minimised, it's also sorted for reuse and recycling to ensure that only the bare minimum needs to be treated. The measures put in place to achieve this incorporate two new targets for waste: that by 2025, 70% of all waste will be recycled, and that a maximum of 5% will be sent to landfill.

To help all businesses contribute to meeting the ambitious targets for Scotland, the Government has taken forward Waste (Scotland) Regulations, passed by the Scottish Parliament in May 2012. The regulations will require all businesses in Scotland to separate paper and card, plastic, metal, and glass for recycling by 2014. Businesses that produce more than 50kg of food waste per week will also need to separate this for collection by January 2014, and businesses producing between 5kg and 50kg of food waste per week will be asked to follow suit from 2016.

Background, aims and objectives

Latest estimates suggest that Scottish commercial and industrial premises produce large quantities of mixed waste – 2.9 million tonnes in 2008. Returns from licensed sites suggest that around 1.1 million tonnes of mixed commercial and industrial waste went to landfill in 2008 and that nearly two thirds of this is biodegradable. Today, this figure is falling as recycling rates continue to rise, but the reality is that today only just over a tenth of that amount cannot be recycled or reused. The fact that such quantities are still being disposed of represents a very large financial loss and many thousands of tonnes of unnecessary carbon emissions.

Zero Waste Scotland identified three sectors as producing a significant amount of mixed waste and for which there is a realistic opportunity to influence a reduction. The three sectors were:

1. sale, maintenance and repair of motor vehicles (henceforth referred to as 'motor'), the wholesale sector and the retail sector;
2. education; and
3. human health and social work activities.

Knowing what the waste consists of is essential if Zero Waste Scotland and the Scottish Government are to help these three sectors save money and reduce their carbon footprint by becoming more resource efficient. It is this knowledge gap that the research summarised in this report seeks to address. The key objective of this research was to provide estimates of the amount of each type of waste found in the mixed waste that may normally go to landfill, and to quantify the costs and CO_2 equivalent emissions associated with each.

Research approach

The research, which was conducted from December 2010 to March 2011 consisted of:

- a telephone interview of 1,053 business units;

- an on-site audit of 863 business units; and
- the removal and compositional analysis of mixed waste from 681 business units.

In total, 128 tonnes of mixed waste was collected from the selected business units and sorted into 53 categories of waste material. The findings from the compositional analysis of this mixed waste were then used alongside Department for Environment, Food and Rural Affairs estimates of annual mixed waste by container size (Commercial and Industrial Waste Survey 2009, Defra, December 2010) and Office of National Statistics (ONS) business population data for 2010 to estimate the quantity and composition of mixed waste for each of the three sectors in Scotland.

The figures presented in this report should be regarded as indicative of the waste being sent to disposal by the motor, wholesale and retails, education and health and social work activities sectors in Scotland. The sample sizes within each sector are quite small and there are errors associated with both the Defra survey estimates used to derive quantities and the compositional data used to estimate the material make-up of the waste. Also, seasonal differences in waste composition could not be taken into account in this study. Particular caution should be exercised in using the results from the retail sector as large national retailers are under represented in the study.

Scope of the research

A maximum of 750 business units could be included in the compositional analysis for the Scottish motor, wholesale and retail, education and health and social work activities sectors. Ultimately, a total of 681 business units had their mixed waste collected, hand sorted and included in the analyses for this report. The deficiency is caused by missed collections (e.g. the waste was picked up before the arrival of the waste collecting team) or unusable compositional data (e.g. the data was significantly less than one week's worth).

In particular, there were difficulties obtaining the participation of key national grocers within the motor, wholesale and retail sector. Although all the major retailers were contacted by the Exodus research team, participation was only elicited from a small number of them. One of the major reasons given for declining participation was that the organisation has little mixed waste that is not recovered; it seems that these organisations arrange for the collection of their store's waste and it is segregated and recovered/recycled. Information provided by one key retailer confirmed that mixed waste is collected from all but one store (due to logistical issues) and recovered at MRF facilities and overall more than three quarters of the waste is recovered. Therefore, the mixed waste that was collected and analysed from retail business units excludes many of the key nationals.

The annual amount of waste produced, recycled and disposed

It is estimated that in 2011 Scottish business units disposed of the following amounts of mixed waste:

- motor, wholesale and retail sector: 180,370 tonnes.
- education sector: 85,120 tonnes.
- health and social work activities sector: 106,570 tonnes.

The breakdown by the different types of business within each of the three sectors is given in the following table.

Table 1 Estimate of mixed waste (tonnes per annum) disposed of by business units in the motor, wholesale and retail, education and health and social work activities sectors 2011

	Tonnes per annum
Motor	23,050
Wholesale	53,740
Retail	103,580
All motor, wholesale and retail	**180,370**
Pre-primary education	3,240
Primary education	42,280
Secondary education	26,070
Higher education	3,540
Other education	9,760
Educational support	230
All education	**85,120**
Human health activities	54,620
Residential care activities	26,560
Social work activities without accommodation	25,390
All health and social work	**106,570**

Landfill tax, which is included in the waste collection cost paid by a business, was introduced in 1996 and has since increased to £56 per tonne; it is targeted to increase to £80 a tonne by 2014-15, making it an increasingly significant business cost. Based on the estimated 2011 tonnages of mixed waste, the cost of landfill tax associated with mixed waste in 2011-12 and forecast for 2014-15 is as follows:

- Motor, wholesale and retail sector: £10.1 million rising to £14.4 million.
- Education sector: £4.8 million rising to £6.8 million.
- Health and social work activities sector: £6.0 million rising to £8.5 million.

Characteristics of the waste sent for disposal

The most commonly disposed of types of mixed waste were food waste, paper and card.

Food waste disposed of in the mixed waste stream

The amount of food waste disposed of by each of the three sectors was:

- motor, wholesale and retail sector: 42,970 tonnes or 23.8%. Nearly half (49.6%) of this was food that is unused, whole or in a pack;
- education sector: 21,550 tonnes or 25.3%. More than a third (34.6%) of this was cooked food; and
- health and social work activities sector: 21,930 tonnes or 20.6%. More than a quarter (28.2%) of this was cooked food.

Paper waste disposed of in the mixed waste stream

The amount of paper waste disposed of by each of the three sectors was:

- motor, wholesale and retail sector: 35,640 tonnes or 19.8%. More than a quarter (25.9%) of this was hand towels;
- education sector: 21,250 tonnes or 25.3%. More than four tenths (41.3%) of this was hand towels; and
- health and social work activities sector: 32,250 tonnes or 30.3%. Nearly half (48.3%) of this was handtowels.

Card waste disposed of in the mixed waste stream

The amount of card waste disposed of by each of the three sectors was:

- motor, wholesale and retail sector: 24,050 tonnes or 13.3%. Nearly two thirds (65.5%) of this was corrugated card;
- education sector: 9,680 tonnes or 11.4%. More than four tenths (44.6%) of this was corrugated cardboard; and
- health and social work activities sector: 8,280 tonnes or 7.8%.

The health and social work activities sector also disposed of 11,650 tonnes (10.9%) of plastic film (not including single use carrier bags.

Increasing recycling

Waste (Scotland) Regulations, passed by the Scottish Parliament in May 2012, require all businesses in Scotland to separate paper and card, plastic, metal, and glass for recycling by 2014. Businesses that produce more than 50kg of food waste per week will also need to separate this for collection by January 2014, and businesses producing between 5kg and 50kg of food waste per week will be asked to follow suit from 2016.

The ability to recycle will depend on suitable collections being available locally from the council or commercial waste contractor. However, the waste disposed of, mainly to landfill, represents an opportunity for reuse, recycling and recovery; within each sector, around three tenths consisted of materials that are widely recyclable. These materials include the following types of waste:

- glass bottles and jars;
- cans;
- single use carrier bags;
- plastic bottles;
- paper (excluding hand towels);
- cardboard (excluding cups and plates); and
- green waste.

The amount of mixed waste that consisted of materials that are widely recyclable were as follows:

- Motor, wholesale and retail sector: 60,090 tonnes or 33.3%.
- Education sector: 27,740 tonnes or 32.6%.
- Health and social work activities sector: 30,210 tonnes or 28.4%.

In addition, within each of the three sectors, more than half of the mixed waste was made up of materials that are potentially recyclable. These materials include the following types of waste:

- glass (excluding bottles and jars);
- metal (excluding cans);
- plastic film, polystyrene and dense plastic (excluding bottles);
- hand towels;
- textiles;
- card cups and plate); and
- food waste.

The amount of mixed waste that consisted of materials that are potentially recyclable were as follows:

- Motor, wholesale and retail sector: 103,750 tonnes or 57.5%.
- Education sector: 45,360 tonnes or 53.3%.
- Health and social work activities sector: 64,210 tonnes or 60.3%.

The costs of mixed waste

Waste costs businesses money, both in terms of materials purchased and not used and the cost of landfill tax. This study considered three aspects of cost – the cost of food thrown away whole and unused, the cost of unused paper thrown away, and the cost of landfill tax.

Throwing away whole and unused food items costs the three sectors more than £41 million a year:

- Motor, wholesale and retail sector: £29.6 million
- Education sector: £6 million
- Health and social work activities sector: £6 million

Throwing away unused paper costs the three sectors more than £1.6 million a year:

- Motor, wholesale and retail sector: £897,000
- Education sector: £466,000
- Health and social work activities sector: £277,000

And sending mixed waste to landfill cost the three sectors more than £20 million in 2011/12; if waste continues to be sent to landfill at the same rate then the cost in 2014/15 would be nearly £30 million:

- Motor, wholesale and retail sector: £10.1 million in 2011/12 rising to £14.4 million in 2014/15
- Education sector: £4.7 million in 2011/12 rising to £6.8 million in 2014/15
- Health and social work activities sector: £6 million in 2011/12 rising to £8.5 million in 2014/15

The carbon impacts of mixed waste

The Defra 2011 emission factors for the net benefit of alternative treatments (closed-loop recycling, composting and anaerobic digestion) versus landfill were applied to the tonnages. Composting and anaerobic digestion were only considered for food waste. For waste prevention, where significant impacts lie both upstream at the point of avoided production and downstream through avoided disposal, the emission factors for both 'production emissions' (for avoided production) and 'landfill' for avoided disposal were applied.

The carbon emissions associated with the waste landfilled by the motor, wholesale and retail sector that could be diverted to other waste treatment streams produces an estimated 48,240 tonnes of carbon dioxide equivalent (t CO2e) each year. If all waste arisings were prevented, the potential carbon emission saving for the sector would be 404,650 t CO2e per annum. The comparative savings that could be made by the sector, if all appropriate materials were recycled rather than landfilled, amount to 134,880 t CO2e per annum. Similarly, for food waste, if all applicable material were to be composted, the emission savings would total 20,010 t CO2e per annum; the equivalent figure if food waste is consigned to anaerobic digestion is 25,050 t CO2e per annum.

The carbon emissions associated with the waste landfilled by the education sector that could be diverted to other waste treatment streams produces an estimated 23,840 tonnes of carbon dioxide equivalent (t CO2e) each year. If all waste arisings were prevented, the potential carbon emission saving for the sector would be 203,880 t CO2e per annum. The comparative savings that could be made by the sector, if all appropriate materials were recycled rather than landfilled, amount to 74,520 t CO2e per annum. Similarly, for food waste, if all suitable material were to be composted, the emission savings would total 9,160 t CO2e per annum; the equivalent figure if food waste is consigned to anaerobic digestion is 11,470 t CO2e per annum.

The carbon emissions associated with the waste landfilled by the health and social work sector that could be diverted to other waste treatment streams produces an estimated 29,300 tonnes of carbon dioxide equivalent (t CO2e) each year. If all waste arisings were prevented, the potential carbon emission saving for the sector would be 297,070 t CO2e per annum. The comparative savings that could be made by the sector, if all appropriate materials were recycled rather than landfilled, amount to 133,300 t CO2e per annum. Similarly, for food waste, if all applicable material were to be composted, the emission savings would total 9,850 t CO2e per annum; the equivalent figure if food waste is consigned to anaerobic digestion is 12,330 t CO2e per annum.

Waste management practices

Recycling is widespread throughout the three sectors, particularly within the education sector, however nearly a quarter of business units within the motor, wholesale and retail sector and nearly a fifth of business units within the health and social work activities sector stated that they do not currently recycle or reuse any of their business waste.

- 77.4% of the motor, wholesale and retail sector stated that they recycle or reuse at least some of their business waste;
- 96.6% of the education sector stated that they recycle or reuse at least some of their business waste; and
- 81.4% of the health and social work activities sector stated that they recycle or reuse at least some of their business waste.

Paper and card are the most commonly recycled or reused materials. The proportion of business units that indicated that they do not recycle or reuse any of these waste materials is:

- motor, wholesale and retail sector: 23.2% paper and 13.4% card;
- education sector: 2.0% paper and 6.7% card; and
- health and social work activities sector: 15.5% paper and 17.1% card.

Food waste recycling is rare with half of the motor, wholesale and retail sector and more than half of the health and social work activities sector indicating that they do not currently recycle any of their food waste.

- motor, wholesale and retail sector: 49.6% do not recycle any food waste;
- education sector: 35.5% do not recycle any food waste; and
- health and social work activities sector: 52.0% do not recycle any food waste.

Business units overwhelmingly agreed that it is important for Scottish businesses to recycle or reuse their waste. Indeed, many businesses would like to recycle, or recycle more, but cited a lack of recycling services, a lack of storage space for housing the bins and the time or effort required to segregate waste as the main barriers.

Opportunities for waste prevention

Waste prevention involves not producing waste in the first place. This research identified that there were items of food and paper, which were disposed of in an unused state.

The amount of unused food waste that was found within the mixed waste of businesses within each of the three sectors was as follows:

- motor, wholesale and retail sector: 21,310 tonnes or 11.8% unused food.
- Overall food waste made up 23.8% or 42,970 tonnes of the mixed waste and 84.7% or 36,400 tonnes was classified as avoidable or potentially avoidable. That is, it could have been eaten if it had been better portioned,

managed or stored (this excludes unavoidable food waste which cannot be eaten, such as used teabags and banana skins);

- education sector: 2,470 tonnes or 2.9% unused food.
- Overall food waste made up 25.3% or 21,550 tonnes of the mixed waste and 84.0% or 18,100 tonnes was classified as avoidable or potentially avoidable; and
- health and social work activities sector: 2,410 tonnes or 2.3% unused food.
- Overall food waste made up 20.6% or 21,930 tonnes of the mixed waste and 66.6% or 14,600 tonnes was classified as avoidable or potentially avoidable.

The amount of unused paper waste that was found within the mixed waste was as follows:

- motor, wholesale and retail sector: 230 tonnes or 0.1%;
- education sector: 120 tonnes or 0.1%; and
- health and social work activities sector: 70 tonnes or 0.1%.

The change that can be achieved

The Government fully appreciates the difficulties facing business establishments seeking to improve their recycling performance; these include financial constraints, a lack of resources and sometimes stifling bureaucracy that can be hard to overcome. There is a clear role for government in helping to remove these barriers – a role it is committed to fulfilling to encourage businesses to recognise that everything thrown away is a resource with a value, and that whenever possible these resources should be preserved and used again.

Around a third of the mixed waste disposed of by organisations in Scotland is already widely recyclable. A further half is also potentially recyclable – in other words, the facilities do exist in Scotland to recycle it, but these are not widespread. This means that the potential for improvement is very substantial indeed. By increasing the number of facilities that can handle waste currently defined as 'potentially recyclable' to match the coverage of the 'widely recyclable' segment, businesses could recycle close to 85% of mixed waste.

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Acknowledgements

The project team are grateful to everyone who contributed to the report and in particular for the contribution and support of the staff of the following local authorities and organisations that took part in this programme of research.

- Aberdeenshire Council.
- Aberdeen City Council.
- Dundee Council.
- Edinburgh Council.
- Fife Council.
- Glasgow Council.
- North Lanarkshire Council.
- South Lanarkshire Council.
- Local authority sort sites:
  - Glasgow (Shieldhall);
  - Edinburgh (Powder Hall);
  - North Lanarkshire (Auchinlea);
  - Fife (Thornton);
  - Aberdeen (Inverurie); and
  - Dundee (Harefield Road).
- NHS: Waste Management Steering Group and healthcare sector.
- Education: The education sector.
- Retail: Courtauld signatories.
- The business units that kindly participated in the compositional analysis stage of the research.
- The business units that kindly participated in the telephone survey stage of the research.

1 Introduction

Zero Waste Scotland is working to assist with the delivery of the Scottish Government's target to recycle 70% of all waste by 2025 with just 5% to landfill. To support this target, policy makers are dependent on quality data that provides information on the quantity and composition of waste produced. Over the last five years, there have been several programmes of research conducted amongst businesses, including:

- In 2006, the Scottish Environment Protection Agency (SEPA) undertook research to measure the amount and type of waste arising amongst Scottish business units within all commercial and industrial sectors (Estimation of Commercial and Industrial Waste Produced in Scotland in 2006, SEPA, September 2009). This research adopted a methodology that relied on respondents' estimates of waste and this, in addition to the age of the research, means that the results may not be reliable for estimating current waste tonnages and composition.
- More recently in 2009, Defra undertook an extensive research study on the waste arisings from businesses in England within 12 business sectors (Commercial and Industrial Waste Survey 2009, Defra, December 2010). The methodology employed was based predominantly on respondents' records and on site visual assessments, through which the waste weights and material types were estimated.
- In 2009-10, WRAP conducted a compositional analysis study of the waste disposed of by the profit element of the UK hospitality sector (The Composition of Waste Disposed of by the UK Hospitality Industry, WRAP, July 2011). The research study provided information on the different types of waste materials disposed of through a compositional analysis methodology and estimated the tonnage of annual waste for the sector using the weights estimated from the 2009 Defra study.

Latest estimates suggest that Scottish commercial and industrial premises produce large quantities of mixed waste; 2.9 million tonnes in 2008 (Estimation of Commercial and Industrial Waste Produced in Scotland in 2006, SEPA, September 2009). Returns from licensed sites suggest that around 1.1 million tonnes of mixed commercial and industry waste went to landfill in 2008 and that nearly two thirds of this is biodegradable (Waste Data Digest, SEPA, 2009). Mixed commercial and industrial waste also contains many recyclable materials; the 2006 SEPA survey indicated that paper, card, glass, plastic, metals and food waste collectively make up a significant proportion of the waste stream. Diverting this waste would not only help achieve landfill diversion and carbon abatement goals, but would also present an opportunity for growth in the Scottish resource management sector. However, a better understanding of the types, quantities and location of the available resource is needed.

To address the known weakness in existing data, Zero Waste Scotland commissioned a large scale programme of research to obtain a compositional analysis of commercial and industrial mixed waste. The project was based on WRAP's research study on the hospitality sector (The Composition of Waste Disposed of by the UK Hospitality Industry, WRAP, July 2011) but designed to incorporate three key commercial and industry sectors.

To ensure the affordability of the research only a limited number of sectors were selected to be included in the programme; these were selected according to the following criteria:

1. Quantity: the sector produces lots of mixed waste – to ensure that the results have maximum policy relevance but also that waste is available to sample.
2. Presence: the sector has a significant presence in Scotland.
3. Other factors: including whether there is a realistic opportunity to influence the sector to reduce waste and take up existing recycling options and whether studies have already been carried out on the sector.

This selection process led to the following three sectors being included in the programme of research:

1. Wholesale and retail trade, and sale, maintenance and repair of motor vehicles and motorcycles (henceforth referred to as 'motor'). The sector includes businesses that sell, maintain or repair all types of goods and products to consumers and businesses.
2. Education. This sector incorporates nurseries, schools, colleges, universities and businesses that provide teaching or educational support.
3. Human health and social work activities. This sector includes hospitals, medical and dental practices, residential care and social work organisations.

The focus of the research was to weigh and analyse the waste disposed of by business units in the mixed waste stream (please see Appendix L for the study definition of mixed waste); this excludes waste that is separately segregated by the business unit. As far as possible, the research concentrated on business waste that is not recovered, as this provides the greatest opportunities in the delivery of the waste to landfill reduction targets. However it was not always possible to ascertain the exact destination of the waste and so some of the materials analysed may have normally been recovered; for example where a materials recovery facility (MRF) may sort the waste after disposal by the business, to extract materials that can be recycled.

Exodus Market Research in collaboration with WastesWork and the University of Glasgow was commissioned to carry out the work. An expert panel was independently appointed by Zero Waste Scotland to review the methodology and report and an advisory group was convened (see inside front cover for details of the organisations and individuals involved in each). The programme of research took place from 06 December 2010 to 26 March 2011.

More information on Zero Waste Scotland's work can be found on www.zerowastescotland.org.uk

2 Research methodology

The research was designed to quantify the amounts and types of mixed waste disposed of by Scottish business units[1] within three key sectors:

1. the wholesale and retail trade together with the sale, maintenance and repair of motor vehicles and motorcycles ('motor');
2. education; and
3. human health and social work activities.

The project consisted of the following seven stages, which are discussed in turn within this part of the report:

1. devise the sampling framework and research materials;
2. conduct a telephone survey;
3. undertake onsite audits;
4. carry out the compositional analysis;
5. data validation and modelling;
6. data analysis; and
7. reporting

The project schedule dictated by the project team required the compositional analysis to take place during February and March 2011 with reporting in summer 2011. Chapter 2.5 provides information on issues arising from the compositional analysis study with recommendations for addressing these in future studies of this nature.

2.1 Sampling framework

Information on the number of business units by employee size[2] and local authority within each sector's Standard Industry Classification (SIC 2007) was obtained from the Inter Departmental Business Register (IDBR). The IDBR is a business register, which contains information on all businesses in the UK that are VAT registered or operating a PAYE scheme. The register is located in the Office for National Statistics (ONS) and is the sampling frame used for the vast majority of Government statistical surveys to businesses. The IDBR covers most of the economy; however, it does not include very small businesses, which fall below the VAT and PAYE thresholds. Similarly, the IDBR will exclude some new start-ups because of delays in notification.

The IDBR data informed the development of a statistically reliable sampling frame, which detailed the number of organisations to be included in the research by location, size and three-digit SIC. Budgetary restrictions meant that a maximum of 750 business units could be included in the compositional analysis and so the sampling frame within the three sectors was designed to maximise the level of confidence in the results. Full details of the

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1 Business unit refers to the individual business sites; a business may have more than one unit with each unit identified by its postal address.

2 Businesses that are owner run are classified on the IDBR as having '0 employees'.

sampling approach developed, with the expert input from the Professor of Environmental Statistics, University of Glasgow, can be found in Appendix B.

The business units included within the compositional analysis were selected to represent all businesses in Scotland by three-digit SIC and employee size band. For unavoidable logistical reasons, it was necessary to ensure that the geographical locations of the sampled business units were limited to eight key areas. An examination of the ONS dataset showed that the highest density of business units within the SICs under investigation were found within the following local authority areas:

- Aberdeenshire Council.
- Aberdeen City Council.
- Dundee Council.
- Edinburgh Council.
- Fife Council.
- Glasgow Council.
- North Lanarkshire Council.
- South Lanarkshire Council.

2.2 Recruitment of businesses

2.2.1 Motor, wholesale and retail sector

Due to budgetary constraints, a maximum of 255 business units could be included in the compositional analysis for the Scottish motor, wholesale and retail sector (please see Appendix B for details). Through the Courtauld Commitment, WRAP has close working relationships with all the major retailers in the UK and these contacts were used to encourage participation in the project. However, despite delaying the work until after the busy Christmas period, it proved difficult to gain co-operation. Although all the major retailers were contacted by the Exodus research team, participation was only elicited from a small number of them. One of the major reasons given for declining participation was that the organisation has little mixed waste that is not recovered; it seems that these organisations arrange for the collection of their store's waste and it is segregated and recovered/recycled. Information provided by one key retailer confirmed that mixed waste is collected from all but one store (due to logistical issues) and recovered at MRF facilities and overall more than three quarters of the waste is recovered. Therefore, the mixed waste that was collected and analysed from retail business units (SIC 47.1) excludes many of the key nationals.

2.2.2 Education sector

Due to late declines/insufficient data, none of the 55 business units from the educational support group (SIC 85.6) were involved in the compositional data and so material composition and estimated tonnages for this division are not included; however, for the national annual tonnage estimates for the sector, the estimated weight of mixed waste for this division is derived from the results of the 'other education' (SIC 85.5) business units that were analysed.

2.2.3 Health and social work activities sector

In addition to the IDBR database as a source of business units, the NHS Waste Management Steering Group (WMSG) provided support in the provision of NHS organisations (hospitals and some health practices) for inclusion in the compositional analysis work. These organisations were not part of the random sample selection and were excluded from the telephone survey. The NHS Waste Management Steering Group suggested key hospital and community practice sites within four NHS Boards and these were used predominantly to obtain waste data relating to the hospital activities division (SIC 86.1).

2.3 Telephone interviews

For each of the three sectors, a random sample of business units was extracted from the IDBR based on the number of required businesses by location, SIC and employee size band. Names and addresses for a total of 25,000 business units were extracted from the IDBR by the Office of National Statistics (ONS) and telephone numbers were obtained via a telephone-matching agency, a process which resulted in telephone numbers being identified for approximately a third of the units. Where telephone-matching was unsuccessful, telephone numbers were sourced via internet search engines. In some cases, the IDBR data was fully utilised and it was necessary to obtain contacts from the Internet – this was particularly the case for small educational business units.

A questionnaire for each of the business sectors under investigation was developed by Exodus Research in conjunction with the project Advisory Group. The main objectives of the questionnaire were to:

1. seek informed agreement to participation in the waste compositional analysis;
2. obtain information on the procedures in place to dispose of mixed waste, including container size and number; and
3. measure respondent's perceptions of and behaviour relating to the disposal of business mixed waste.

A copy of the three questionnaires can be found in Appendix C.

8,000 individual business units were contacted by telephone and interviews were conducted with the business owner or the person with responsibility for the waste management activities. 1,095 successful interviews were undertaken from 06 December 2010 to 12 March 2011 inclusive; the timing of this fieldwork was to enable the compositional analysis fieldwork to commence by 14 February as required by the project timings.

Support was elicited through influential organisations and sector bodies to maximise the level of participation and integrity of the data as follows:

- The key education and social services contacts within each of the eight local authorities were provided with information regarding the scope and objectives of the research programme so that they could encourage participation amongst their business partners/membership.
- The NHS Waste Management Steering Group (WMSG) provided support in the provision of NHS organisations (hospitals and some health practices) for inclusion in the compositional analysis work. It should be noted that these organisations deviated from the random sample selection and did not participate in the telephone survey.

- Key Account Managers at WRAP (Waste & Resources Action Programme) attempted to secure the participation of key retailers.
- Industry representative groups were contacted including COSLA, SESA and the Scottish Retail Consortium to ensure the project met their needs and, in the case of the SRC, to encourage their members to take part.

2.4 On site audits

Respondents that agreed to participate in the compositional analysis stage from the telephone survey were sent a letter from Zero Waste Scotland outlining the objectives of the project and providing information on the process involved. These business units were then visited by one of the research team's waste auditors so that any issues with the collection of the mixed waste could be identified (such as any hazards or access restrictions). The onsite visit was also used to confirm the information given during the telephone interview regarding the number, size and location of waste containers, the normal day(s) of collection and the name of the usual waste collection contractor. Cases requiring special arrangements were also identified; this included business units which had shared or open-access containers, which were provided with special red sacks in which to place their mixed waste for the week's duration. At each audit, a map was drawn up to inform the waste analysis team of the specific location(s) of the mixed waste containers and related access points. Of the 1,095 businesses that participated in the telephone interview, 863 agreed to take part in the compositional analysis stage and each of these had a site audit.

2.5 Compositional analysis

Compositional analysis is a technique by which waste is collected, sorted by hand into material categories and weighed. Specialist companies are required to carry out the work due in part to the health and safety risks involved. For this project the specialist waste analysis company was WastesWork. Information about the business units willing to participate in the compositional analysis and the data from the on site audits was provided to WastesWork whose staff were then responsible for the waste collection, hand sorting and weighing of the mixed waste. WastesWork's fieldwork protocol can be found in Appendix D; the key points are:

1. The fieldwork manager was responsible for making arrangements with the sort site operator regarding health and safety issues and for offering suitable alternative containers for businesses to hold and store a week's worth of waste (for example, when a business uses a compactor skip).
2. The waste analysis team were to contact businesses prior to the scheduled collection(s) which were timetabled on the normal day(s) of collection.
3. Where a business unit normally has more than one waste collection per week, the waste analysis team would collect all of the waste on all collection days; all of the waste would be weighed but if the amount was too great for hand sorting, a sub-sample would be selected using an agreed method, 'Cone and Quartering'.
4. In the case of very large sites, arrangements would be made by the fieldwork manager for the waste to be delivered by the normal contractor. Where the amount of waste was too large for hand sorting a sub-sample would be selected by cone and quartering.

As far as possible only mixed waste destined for disposal was collected and hand sorted; waste set out in separate recycling containers and single material waste streams (unless it was clear to the waste analysis team that it formed part of the mixed waste for the week) were excluded from the analysis. This was because the focus of the project was on the opportunities for further separation and recycling.

The waste management departments of the eight local authorities (see part 2.1) were invited to participate in and support the research project. In addition to facilitating communications with regular waste crews, the waste departments assisted with the identification of suitable premises for the collected waste to be weighed and hand sorted (the compositional analysis).

The Project Advisory Group agreed 19 key categories of waste, which were then further divided into 53 sub-categories (see Appendix E). The key categories for the compositional analysis were:

1. Paper.
2. Card.
3. Plastic film.
4. Dense plastic.
5. Textiles.
6. Miscellaneous combustible (e.g. rubber, carpets, wood).
7. Miscellaneous non-combustible (e.g. ceramics, hardcore).
8. Glass.
9. FE metal.
10. Non-FE metal.
11. Green waste.
12. Food waste.
13. Fines (particles passing through a 10mm screen).
14. Liquids (excluding milk and drinks).
15. Waste electrical and electronic equipment (WEEE).
16. Hazardous.
17. Sanitary waste.
18. Clinical waste.
19. Furniture.

The waste collected from each of the business units was taken to the designated sort site, where it was weighed and hand sorted into 53 materials categories each of which was then separately weighed.

For each collection a record was made of the weights of the different waste materials on specially designed paper-duplicate sort sheets (see Appendix E). Figure 1 shows a collection of mixed waste at the sort site awaiting weighing and sorting, Figure 2 shows the waste team hand sorting the business mixed waste into different crates according to the type of material.

The fieldwork for the compositional analysis took place from 14 February to 26 March 2011 inclusive.

Figure 1 Business mixed waste delivered to the site

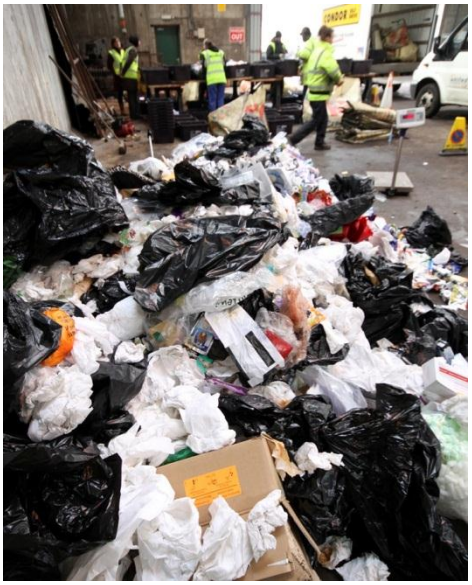

Figure 2 Business mixed waste being hand sorted

After sorting and recording, the waste was either securely disposed of or recycled where facilities were available, often with the assistance of the local authority's contractor. The individual sort sheets detailing the measured weights by material type for each collection made for each of the business units were then forwarded to Exodus for validation, processing and data analysis.

2.6 Participation rates

To encourage participation, business units that participated in the compositional analysis were promised individual tailored reports detailing the weight of their waste that had been collected and analysed by the different types of material; these reports were provided over the summer of 2011 and included information on how they might reduce their landfill tax costs and recycle or reuse more of the waste that is currently disposed of to landfill. An example of this communication can be found at Appendix M.

1,095 business units were interviewed and 863 agreed to participate in the waste audit and compositional analysis part of the research programme. As anticipated, some business units were subsequently unable to be included in the compositional analysis for various reasons including:

- the on site audit indicated that inclusion would be difficult due to access problems or other issues;
- the sampling frame which dictated the number of business units by type and size to be included was already achieved; and/or
- the business unit was no longer able to participate because it had gone out of business, was temporarily closed, was unable to accommodate the timings of the visit or no longer wanted to take part.

Where possible, replacements for business units that declined were found, but this was not possible for businesses that opted out in the last two weeks of the compositional analysis fieldwork for logistical reasons.

Ultimately, 681 business units had their mixed waste collected and analysed by WastesWork, 69 short of the planned 750 businesses. Chapter 22 discusses how participation might be increased in future studies:

- A total of 356 business units within the motor, wholesale and retail sector were interviewed by telephone and of these 229 were included in the waste compositional analysis. 201 business units had their week's worth of mixed waste collected and analysed in full and the other 28 cases required modelling (see part 2.7) to estimate the waste;
- 358 business units within the education sector were interviewed by telephone and of these 219 were included in the waste compositional analysis. 185 business units had their week's worth of mixed waste collected and analysed in full and the other 34 cases required modelling to estimate the waste; and
- 381 business units within the health and social work activities sector were interviewed by telephone and 233 were included in the waste compositional analysis. 199 business units had their week's worth of mixed waste collected and analysed in full and the other 34 cases required modelling to estimate the waste.

The following table provides information on the number of business units involved at each stage of the research programme.

Table 2 Number of business units included at each stage of the research programme

Research stage	Number of business units	%
IDBR database	25,000	
Contacted by telephone	8,000	32.0% of IDBR database
Completed telephone interview[3]	1,095	13.7% of those contacted
Agreed to participate in compositional analysis	863	78.8% of those interviewed
Waste collected and hand sorted by WastesWork	704	81.6% of those who agreed
One full week's worth of waste collected and sorted	586	83.2% of those participating
Less than one full week's worth of waste collected	118	16.7% of those participating
- Less than one week's worth of waste collected and a sufficient quantity was analysed to allow for modelling to one full week	95	80.5% of those where one week's worth was not collected
- Less than one week's worth of waste was collected and an insufficient quantity was analysed to allow for modelling to one full week	23	19.5% of those where one week's worth was not collected
Waste collection was scheduled but not collected[4] (missed collection)	50	5.8% of those who agreed

2.7 Data validation and modelling

Exodus Research checked the returned sort sheets for each of the 704 individual business units that had a waste composition analysis; the correct number of completed sheets per business (one for each collection day) and the date of collection were verified and then each sheet was examined for any apparent anomalies in recorded weights. Where there were any inconsistencies, WastesWork, the usual waste collector and/or the business was contacted to verify whether or not the recording was correct. This included business units that were recorded as

[3] Excluding hospital contacts provided by NHS.

[4] These missed collections occurred where the waste analysis team was unable to collect the waste before the normal contractor's scheduled collection. These business units were sent a letter of apology from Zero Waste Scotland.

having a total weight that was significantly different to that expected (according to the capacity and number of containers) or where there were exceptionally large quantities of a particular waste material.

The 118 business units that had less than a full week's worth of mixed waste collected and analysed were subjected to a review phase to determine whether there was adequate data to allow for statistical modelling to estimate a week's worth of waste. This situation occurred where:

1. a business unit has two or more collections per week but one or more collections were missed;
2. a business unit normally has a collection less frequently than weekly (e.g. fortnightly); and
3. a sub-sample of waste was taken because not all of the waste for the week could be collected and hand sorted within the resources available to the project (e.g. large hospital sites).

Datasets for 23 of these business units were rejected on the grounds that there was insufficient data – for example, where it was suspected that a sub-sample was not representative of the full week's worth of waste or where the business owner confirmed that the waste was not usual or was likely to have been placed in the waste container by someone unrelated to the business. The mixed waste for a full week was estimated for the remaining 95 business units using an approach as follows:

1. Verifying with the normal contractor the correct days and number of collections per week, establishing when the last collection had been made to establish the number of days' worth of waste that had been collected and hand-sorted. To estimate the missing days, the business unit's operational hours for the week were taken into account.
2. Where quantities were large, arrangements were made for the normal collection contractor to deliver a sample of waste to the sort site. When a sub-sample had been taken in this way the normal contractor that supplied the sub-sample was contacted to obtain the weight of the week's worth of collected mixed waste. The composition data from the sub-sample were then applied to this total weight.

Examples of the individual modelling approaches taken to estimate a full week's worth of data for a business unit can be found in Appendix I. Data from the sort sheets of all business units were then entered into both Excel and SPSS using a double-entry system to assist in identifying and correcting any data processing errors.

2.8 Data analysis

2.8.1 Estimating the composition of waste materials for each business unit

The weights recorded for each waste material at the compositional analysis stage were used to estimate the proportion of the different types of materials found in the mixed waste of all business units within each of the three sectors. The sample data was weighted to take account of discrepancies in the sample profile against that of the population of business units by SIC and employee size band. The mean weight of each type of material was then divided by the total of the means to obtain the proportion of mixed waste that each material accounted for. For example; if the mean weight of all mixed waste materials added up to 3,560kgs of which 345kgs was hand towels, then hand towels made up 9.7% of the weight.

This approach gives the make-up of business mixed waste in a snap-shot of time and cannot take account of any seasonality or variation in the amount or types of mixed waste disposed of on a daily or weekly basis; this can

only effectively be achieved through a longitudinal study in which mixed waste disposed of by one representative sample of business units are repeatedly analysed over a year. However, it does provide a good indication of the types of materials that are being disposed of via the mixed waste stream and highlights potential opportunities for further waste material recovery amongst businesses.

Following the peer review, it was suggested that the proportion of food waste within the education sector was over-represented due to the mixed waste being analysed during term-time. Although schools and the like are often open during the holiday periods and therefore still generating waste, it is unlikely that the amount of food waste disposed of in the mixed waste stream remains at the same level. To minimise this over-representation of food waste, a model to annualise the data was applied. The weekly weights of each material waste were multiplied by a factor of 52.18 (the exact number of weeks in a year) with the exception of food waste, which was multiplied by the number of stated weeks of opening (during the telephone questionnaire). 95% confidence intervals associated with the estimated proportions for each material type were calculated at sector level.

2.8.2 Estimating the annual tonnage of mixed waste disposed of by Scotland's business units

Several models to estimate the tonnage of mixed waste disposed of by each sector were considered. Full details of the approaches considered and the method ultimately used for estimating the annual tonnages of mixed waste can be found in Appendix J.

The Defra study was based on visual estimates of container waste and by analysing the Defra raw dataset for the mixed waste of business units within the three sectors under investigation, the estimated annual weight by container type and size could be determined. These annual estimates were then applied to the number and types of containers used (and verified during the on-site audits) by each business unit and this allowed the estimation of the annual weight of mixed waste for each business unit. The mean within different SICs and employee size bands was then grossed up by the number of business units within the population.

As discussed in part 2.2.1, the selection of hospitals (SIC 86.1) was predominantly provided by the NHS and as such, the sample for this group was not representative with respect to the number and size of mixed waste containers. In order to adjust for this, the estimated annual tonnage for this business category was weighted to take account of the NHS Board populations.

2.8.3 Calculating the proportion of materials that could be recycled

The waste that was collected from the business units was hand sorted into 53 different sub-categories of waste materials. The project team at Zero Waste Scotland provided information on the recyclability of each material, which indicated the extent to which the waste is:

1. Widely recyclable.
2. Potentially recyclable.
3. Not currently recyclable.
4. Unclassified (waste items that could not be categorised).

The material categories and their recyclability category can be found in Appendix K.

2.8.4 Calculating the carbon emissions associated with different waste treatment options

The carbon emissions associated with different waste management options were calculated based on the results of the waste compositional analysis and annual estimated tonnages outlined above. The term 'carbon emissions' is used here to represent the net greenhouse gas emissions (as defined by the Kyoto 'basket of six[5]') associated with waste treatment options converted to tonnes carbon dioxide equivalent (t CO_2e).

The following scenarios were considered: landfill; prevention; closed-loop recycling; food waste to composting, and food waste to anaerobic digestion. The results were then aggregated by SIC code and sector.

It has been assumed for the purposes of the analysis that 100% of the mixed waste would have been consigned to landfill. Materials considered not currently recyclable have been excluded from the analysis.

As the aim of the assessment was to provide a comparative analysis of the impacts of different waste treatment options, a baseline figure for carbon equivalent emissions from landfilling of waste has been calculated by applying the Defra 2011[6] emission factors for landfill applied to the tonnages for all materials that could be diverted from landfill (widely recyclable and potentially recyclable).

The Defra 2011 emission factors for the net benefit of alternative treatments (closed-loop recycling, composting and anaerobic digestion) versus landfill were applied to the tonnages. Composting and anaerobic digestion were only considered for food waste. Finally, for prevention, where significant impacts lie both upstream at the point of avoided production and downstream through avoided disposal, the emission factors for both 'production emissions' (for avoided production) and 'landfill' for avoided disposal were applied.

2.8.5 Calculating the cost of disposal of mixed waste

All waste disposed of to landfill incurs landfill tax, a financial instrument aimed at encouraging waste producers to produce less waste, recover more value from waste and to use more environmentally friendly methods of waste disposal. Landfill tax, which is included in the collection cost to business, was introduced in 1996 and has since increased according to the landfill tax escalator; currently (2011-12) at £56 per tonne, the tax rate is targeted to increase to £80 a tonne by 2014-15. The analysis of cost calculates the potential landfill tax due from the estimated annual mixed waste tonnages by sector and division for Scottish businesses based on the estimated weight of mixed waste for 2011.

2.8.6 Calculating the cost of unused materials in mixed waste

In addition to recording the weight of the different waste materials found in a business unit's mixed waste, the compositional analysts also provided information on the different types and weights of any waste falling within the 'food that is unused/whole' category[7]. This category of food waste was analysed because it is waste, which is

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5 The Kyoto 'basket of six' comprises carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride; non-CO_2 gases are converted to carbon dioxide equivalents using the Global Warming Potential (GWP) of each gas.

6 2011 Guidelines to Defra/DECC's GHG Conversion Factors for Company Reporting. http://archive.defra.gov.uk/environment/business/reporting/pdf/110819-guidelines-ghg-conversion-factors.pdf; Annex 9 Table 9d figures provided by WRAP. Accessed 09.09.11.

7 This will include food items that have been partially consumed such as two bread rolls in an original pack of four.

most preventable. Prices per kilogram estimates used in a previous food waste study (Food Waste in Scotland, 2009, Zero Waste Scotland) were then applied to the food items giving a cost in GBP for each item of food.

The most commonly found types of unused food within each key food group are listed in the table below.

Table 3 Most commonly found types of unused food

Food group	Most commonly found type(s) of food
Bakery	Bread
Condiments	Jam, packets of sauce
Confectionery	Chocolate bars, sweets
Dairy	Yoghurt
Desserts	Jelly
Dried foods	Crisps
Fruit	Apples, bananas, oranges
Meat and fish	Chicken, ham, Peperami
Pre-prepared meals and snacks	Sandwiches
Vegetables	Potatoes, tomatoes, onions, carrots

An overall estimate of the price per kilogram of unused A4 type paper was produced using data from business stationers (Viking-Direct.co.uk, WHSmith.co.uk and Staples.co.uk) although it is recognised that this will not account for any discounted prices available via any national contracts. The products were all A4 papers (including coloured, inkjet, economy, premium and copy paper) and exercise/refill pads where available.

Because the type of material weighed during the compositional analysis under the 'unused A4 type paper' category was not recorded, it was not possible to assign a per-item cost; instead the mean of all paper items (£3.83/kg) was applied to each weight of unused A4 paper found in the mixed waste stream of the analysed business units.

2.8.7 Analysis of perceptions and stated behaviour

Although the key objective of the telephone interviews was to recruit business units to the compositional analysis stage of the research, the interviews were also used to obtain information on various issues regarding business waste and recycling. For the analysis, the responses were weighted to reflect the profile of all business units in Scotland by SIC and employee size band within each of the three sectors. Therefore, if primary schools account for 50% of the population of education business units but made up only 25% of the sample, the data was weighted by a factor of two so that it would be representative of all primary schools.

The analysis covers business units that were interviewed and had their waste analysed and also businesses that were interviewed but did not have their waste analysed, either because they declined to take part or because they were surplus to the requirements of the sampling frame. The analysis for each Sector can be found in Chapters 0 (motor, wholesale and retail), 0 (education) and 0 (health and social work). The reported percentages are based on the number (the base) of business units responding to a particular question.

2.9 Report structure

The remainder of the report is divided into three parts:

1. Part one (Chapters 3 to 0) provides information on the mixed waste disposed of by the motor, wholesale and retail sector.
2. Part two (Chapters 9 to 0) provides information on the mixed waste disposed of by the education sector.
3. Part three (Chapters 15 to 0) provides information on the mixed waste disposed of by the human health and social work sector.

Each of these Parts is structured as follows:

- The composition and estimated annual weight of mixed waste for the sector and by division.
- The recyclability of mixed waste for the sector and by division.
- The carbon emissions for the sector and by division.
- The cost of mixed waste for the sector and by division; this covers the cost of disposal and the cost of used paper and the cost of whole or unused food disposed of in the mixed waste stream.
- Perceptions and attitudes to mixed waste issues.

Other concluding chapters are as follows:

- Chapter 21 which explores the implications of the study for the study sectors and the resource management sector;
- Chapter 22 which discusses lessons which may be considered for any future research studies into industrial and commercial waste; and
- Chapter 23 which suggests recommendations for further research.

There are also Appendices, which provide more detail on the sampling frame, analysis approach and research documentation.

Unless otherwise indicated, all weights are rounded to the nearest 10 tonnes per annum, cost estimates are rounded to the nearest £100 and percentages are given to one decimal place. Similarly, data provided by the Office of National Statistics (IDBR) regarding the number of business units has been rounded to avoid disclosure. This means that rounding errors may occur; in particular, table totals may not add up to the sum of the displayed figures.

Part one

The motor, wholesale and retail sector

3 Motor, Wholesale and Retail Sector: Introduction

There were 37,040 motor, wholesale and retail sector business units in Scotland (Source: ONS IDBR, March 2010). The following tables show the number of business units within the three-digit SIC codes covered by the sector and the number of business units within the two-digit SIC by employee size.

Table 4 Number of motor, wholesale and retail business units in Scotland by SIC (2010)

SIC	Description		Number of units
45,46,47	**WHOLESALE / RETAIL / MOTOR**		**37,040**
45	Motor		5,120
45.1		Sale of motor vehicles	1,330
45.2		Maintenance/repair of motor vehicles	3,000
45.3		Motor vehicle parts	655
45.4		Sale and repair of motorcycles and related parts	135
46	Wholesale		7,585
46.1		Fee/contract	1,010
46.2		Agriculture	260
46.3		Food/beverages/tobacco	1,250
46.4		Household goods	1,170
46.5		IT	285
46.6		Other supplies	1,105
46.7		Other specialised	1,845
46.9		Non-specialised	660
47	Retail		24,340
47.1		Non-specialised	5,625
47.2		Food/beverages/tobacco	3,395
47.3		Fuel	450
47.4		IT	575
47.5		Household equipment	2,620
47.6		Cultural/recreational	1,680
47.7		Other goods	8,880
47.8		Stalls/markets	60
47.9		Not in store/stall/market	1,055

Table 5 Number of motor, wholesale and retail business units in Scotland by 2 digit-SIC and employee size band (2010)

Number of employees	45: Motor	46: Wholesale	47: Retail	Total
0 employees (owner run)	890	1,035	2,710	**4,635**
1-9 employees	3,360	4,995	16,975	**25,330**
10-49 employees	725	1,355	4,030	**6,110**
50-249 employees	140	180	500	**820**
250+ employees	0	15	130	**145**
Total	**5,120**	**7,580**	**24,345**	**37,040**

Note: Columns may not sum due to rounding

4 Motor, Wholesale and Retail Sector: The weight and composition of mixed waste in 2011

4.1 Estimated annual weight of mixed waste for Scotland business units within the motor, wholesale and retail sector 2011

In 2011 the motor, wholesale and retail sector disposed of an estimated 180,370 tonnes of mixed waste. The motor division disposed of an estimated 23,050 tonnes, wholesale business units disposed of an estimated 53,740 tonnes and the retail division disposed of an estimated 103,580 tonnes per annum. The following table breaks down the estimated annual tonnages within each division by company size.

Table 6 Estimate of the weight of Scottish motor, wholesale and retail mixed waste by SIC and employee size band 2011

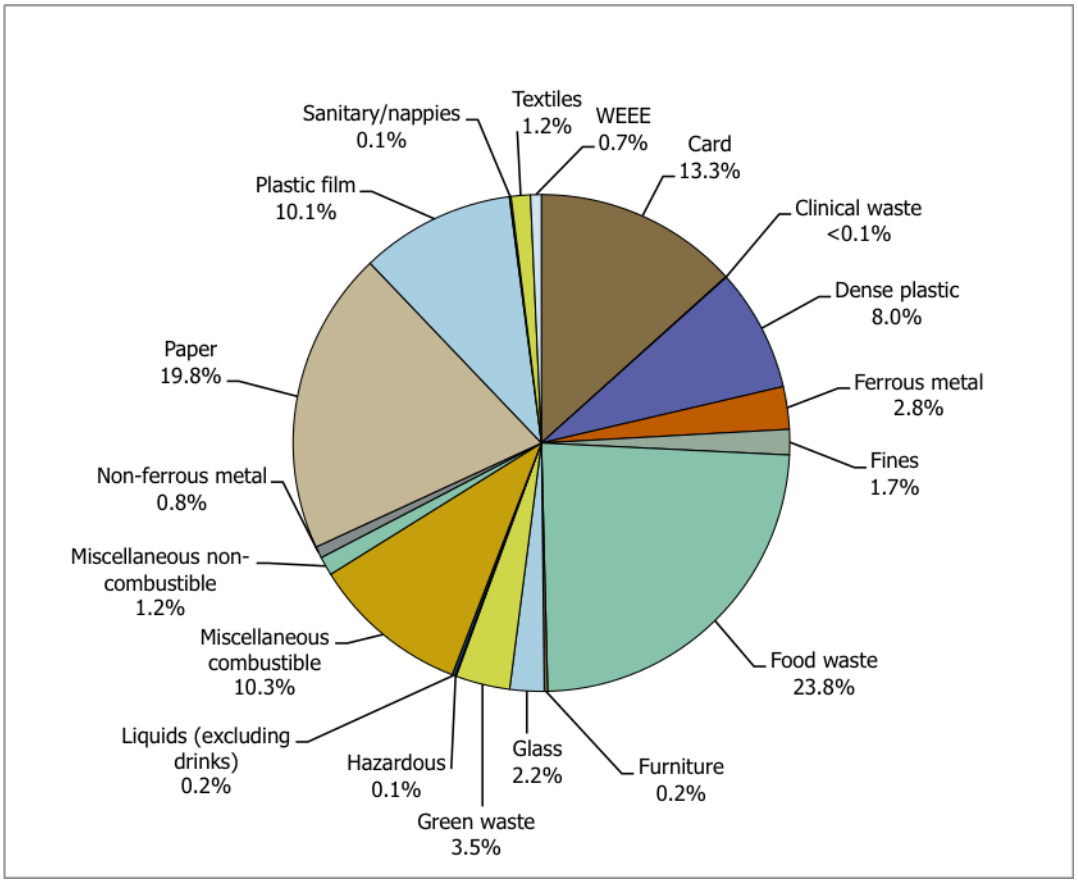
Division	Number of employees	Total Tonnes Per Annum
45: Motor	0 employees	2,020
	1-9 employees	11,830
	10-49 employees	7,710
	50-249 employees	1,500
	250+ employees	None
	All motor	**23,050**
46: Wholesale	0 employees	3,280
	1-9 employees	18,300
	10-49 employees	22,750
	50-249 employees	8,430
	250+ employees	990
	All wholesale	**53,740**
47: Retail	0 employees	5,010
	1-9 employees	45,660
	10-49 employees	36,960
	50-249 employees	9,540
	250+ employees	6,400
	All retail	**103,580**
All wholesale, retail & motor		**180,370**

Note: Columns may not sum due to rounding

4.2 The composition of mixed waste for businesses in the motor, wholesale and retail sector

The composition of the mixed waste disposed of by the motor, wholesale and retail sector is illustrated in the chart below. Nearly a quarter (23.8%) of the mixed waste consisted of food, nearly a fifth (19.8%) was made up of paper materials and more than a tenth (13.3%) was made up of card.

Figure 3 Composition of mixed waste disposed of by the Scottish motor, wholesale and retail sector (% by weight) 2011



The following table provides detail of the composition of the mixed waste disposed of by the motor, wholesale and retail sector, the corresponding 95% confidence intervals attributable to the different materials and the estimated tonnages per annum.

Table 7 The estimated proportion and annual weight of mixed waste by type disposed of by the Scottish motor, wholesale and retail sector 2011

Material Type	Percentage by weight	95% CI ±	Weight (tonnes pa)
Food waste	23.8	2.3	42,970
Paper	19.8	2.1	35,640
Card	13.3	2.2	24,050
Miscellaneous combustible	10.3	1.7	18,540
Plastic film	10.1	2.0	18,130
Dense plastic	8.0	0.9	14,380
Green waste	3.5	1.4	6,370
Ferrous metal	2.8	0.8	5,000
Glass	2.2	0.9	4,020
Fines	1.7	0.4	2,980
Textiles	1.2	0.8	2,250
Miscellaneous non-combustible	1.2	1.7	2,220
Non-ferrous metal	0.8	0.2	1,360
WEEE	0.7	0.5	1,270
Liquids (excluding drinks)	0.2	0.1	370
Furniture	0.2	0.1	400
Sanitary products, disposable nappies	0.1	0.1	200
Hazardous	0.1	<0.1	130
Clinical waste	<0.1	<0.1	80
Total	**100**		**180,370**

Note: Columns may not sum due to rounding

4.3 Most common waste materials disposed of by the motor, wholesale and retail sector

This part of the report looks at the categories of waste most commonly disposed of by the motor, wholesale and retail sector; that is, key materials that make up significantly more than a tenth of the mixed waste. The proportion of waste materials by detailed category can be found in Appendix F.

4.3.1 The types of food waste disposed of by the motor, wholesale and retail sector

Nearly a quarter of the mixed waste disposed of by the motor, wholesale and retail sector was made up of food waste; nearly half of this consisted of unused food that is whole or in a pack.

Table 8 The proportion of different types of food waste disposed of by the Scottish motor, wholesale and retail sector 2011

Type of food waste	% of all food waste	% of all mixed waste
Food that is unused, whole or in pack	49.6	11.8
Unavoidable food waste (e.g. banana skins, tea bags)	15.3	3.6
Cooked food	13.7	3.3
Other partially consumed food items	7.9	1.9
Drinks/milk (excluding packaging)	4.8	1.1
Meat, fish and meat/fish bones	4.6	1.1
Sandwiches - partially consumed	2.3	0.5
Fruit and vegetables - partially consumed	1.9	0.5
Total	**100**	**23.8**

Note: Columns may not sum due to rounding

4.3.2 The types of paper waste disposed of by the motor, wholesale and retail sector

Nearly a fifth of the mixed waste disposed of by the motor, wholesale and retail sector was made up of paper waste; just over a quarter (25.9%) of this consisted of hand towels.

Table 9 The proportion of different types of paper waste disposed of by the Scottish motor, wholesale and retail sector 2011

Type of paper waste	% of all paper waste	% of all mixed waste
Hand towels	25.9	5.1
Other non-recyclable paper	18.7	3.7
Other recyclable paper	16.3	3.2
Magazines, directories and catalogues	15.8	3.1
Newspapers	10.1	2.0
Used A4 type paper including letters	9.7	1.9
Envelopes	2.8	0.6
Unused A4 type paper including unused exercise books	0.7	0.1
Total	**100**	**19.8**

Note: Columns may not sum due to rounding

4.3.3 The types of card waste disposed of by the motor, wholesale and retail sector

More than a tenth of the mixed waste disposed of by the motor, wholesale and retail sector was made up of card waste; nearly two thirds (65.5%) of this consisted of corrugated cardboard.

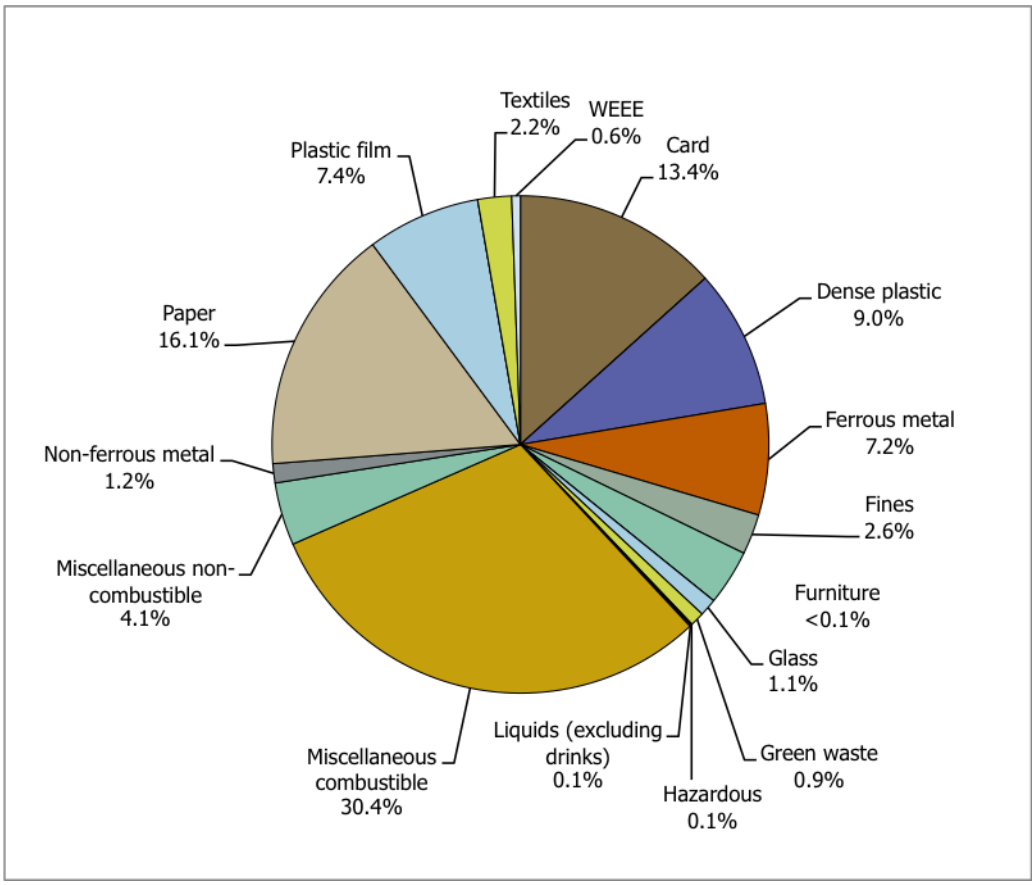
Table 10 The proportion of different types of card waste disposed of by the Scottish motor, wholesale and retail sector 2011

Type of card waste	% of all card waste	% of all mixed waste
Corrugated cardboard	65.5	8.7
Other card	27.1	3.6
Liquid cartons	4.3	0.6
Card plates and cups	3.1	0.4
Total	**100**	**13.3**

4.4 The composition and weight of mixed waste for motor business units

The motor business units disposed of an estimated 23,050 tonnes of mixed waste per annum. More than three tenths (30.4%) of this was made up of miscellaneous, combustible materials; most commonly identified as rubber. 16.1% of the mixed waste by weight consisted of paper materials and 13.4% was made up of card.

Figure 4 Types of mixed waste within the Scottish motor division (% by weight) 2011



The following table provides detail of the estimated proportion and tonnage per annum for the different material categories of waste disposed of by business units within the motor division as a whole.

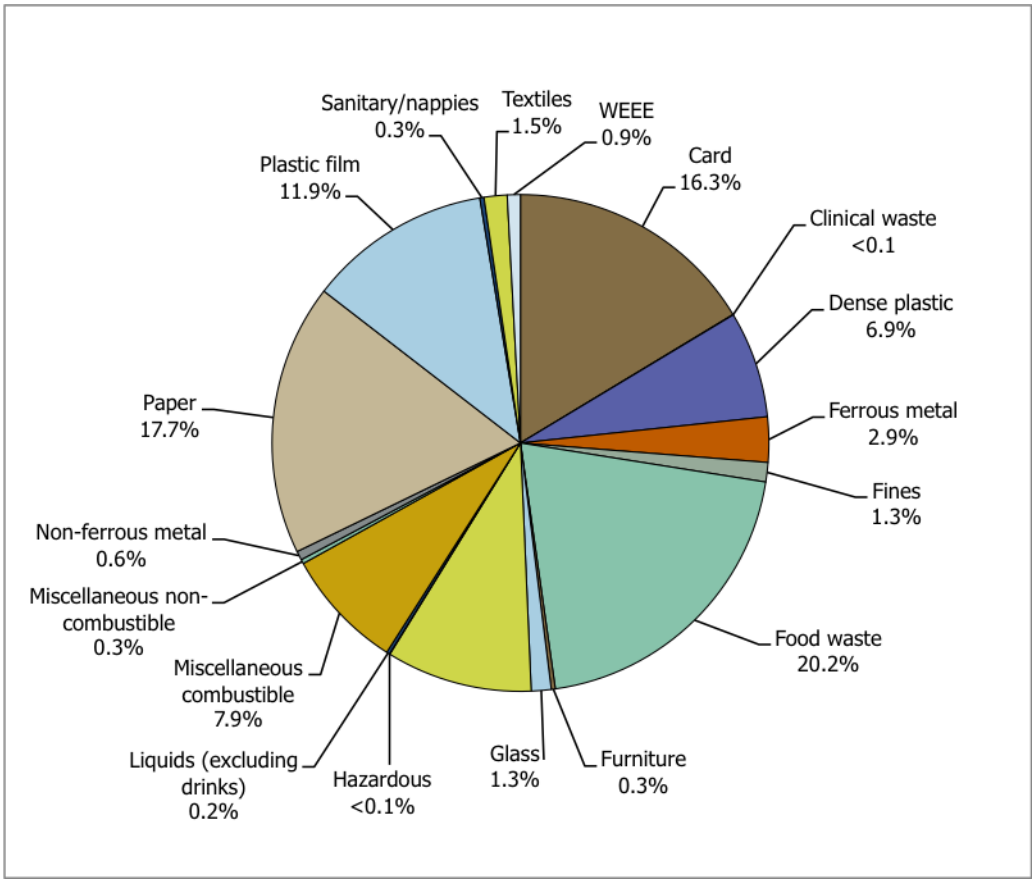
Table 11 The estimated proportion and annual weight of mixed waste by type within the Scottish motor division

Material Type	Percentage by weight	Weight (tonnes pa)
Miscellaneous combustible	30.4	7,010
Paper	16.1	3,710
Card	13.4	3,080
Dense plastic	9.0	2,070
Plastic film	7.4	1,700
Ferrous metal	7.2	1,670
Miscellaneous non-combustible	4.1	940
Food waste	3.6	830
Fines	2.6	600
Textiles	2.2	510
Non-ferrous metal	1.2	290
Glass	1.1	260
Green waste	0.9	210
WEEE	0.6	130
Liquids (excluding drinks)	0.1	20
Hazardous	0.1	20
Clinical; sanitary products, disposable nappies	0	0
Clinical; other clinical waste	0	0
Furniture	0	0
Total	**100**	**23,050**

4.5 The composition and weight of mixed waste for wholesale business units

The wholesale business units disposed of an estimated 53,740 tonnes of mixed waste per annum. Just over a fifth (20.2%) of this was made up of food waste and less than a fifth (16.3%) consisted of card.

Figure 5 Types of mixed waste within the Scottish wholesale division (% by weight) 2011



The following table provides detail of the estimated proportion and tonnage per annum for the different material categories of waste disposed of by business units within the wholesale division as a whole.

Table 12 The estimated proportion and annual weight of mixed waste by type within the Scottish wholesale division 2011

Material Type	Percentage by weight	Weight (tonnes pa)
Food waste	20.2	10,880
Paper	17.7	9,500
Card	16.3	8,790
Plastic film	11.9	6,400
Green waste	9.5	5,110
Miscellaneous combustible	7.9	4,240
Dense plastic	6.9	3,730
Ferrous metal	2.9	1,580
Textiles	1.5	810
Glass	1.3	690
Fines	1.3	680
WEEE	0.9	460
Non-ferrous metal	0.6	310
Miscellaneous non-combustible	0.3	150
Sanitary products, disposable nappies	0.3	140
Furniture	0.3	140
Liquids (excluding drinks)	0.2	110
Hazardous	<0.1	20
Clinical waste	<0.1	10
Total	**100**	**53,740**

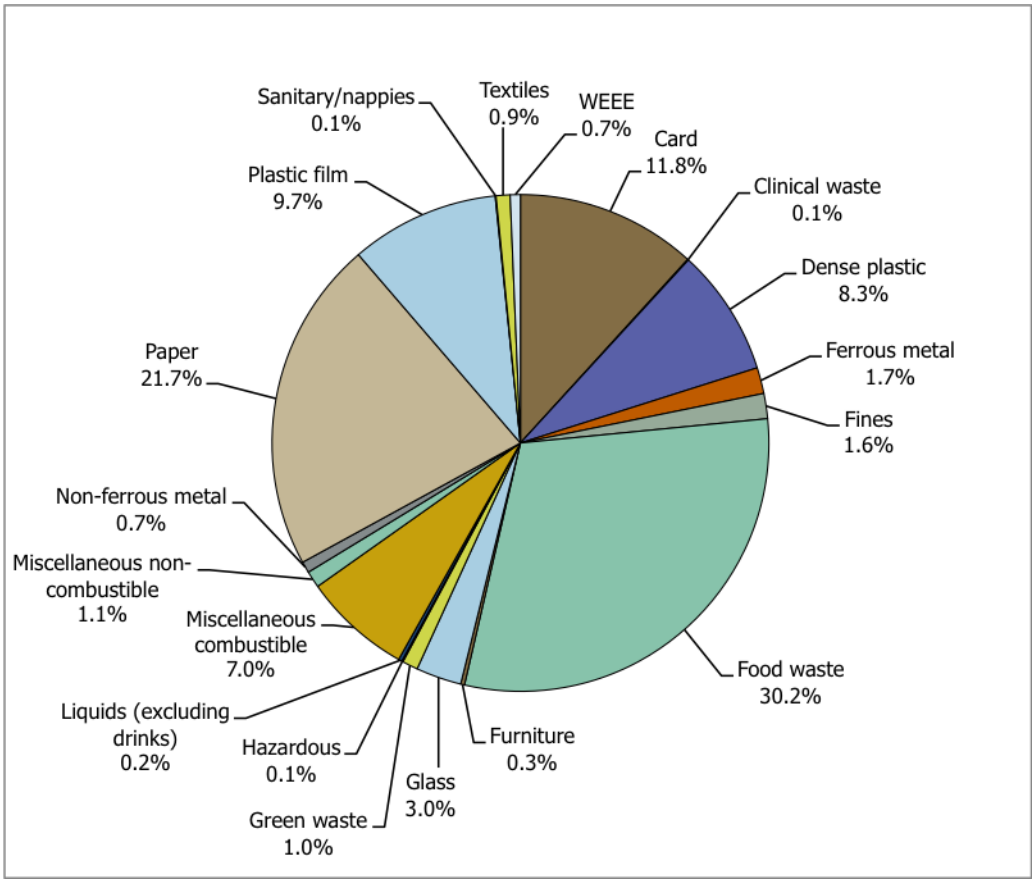
Note: Columns may not sum due to rounding

4.6 The composition and weight of mixed waste for retail business units[8]

The retail business units disposed of an estimated 103,580 tonnes of mixed waste per annum. Just over three tenths (30.2%) of this was made up of food waste and more than a fifth (21.7%) consisted of paper materials.

8 The compositional analysis excluded key national grocers (see part 2.2.1 for information).

Figure 6 Types of mixed waste within the Scottish retail division (% by weight) 2011



The following table provides detail of the estimated proportion and tonnage per annum for the different material categories of waste disposed of by business units within the retail division as a whole.**Table 13** The estimated proportion and annual weight of mixed waste by type within the Scottish retail division 2011

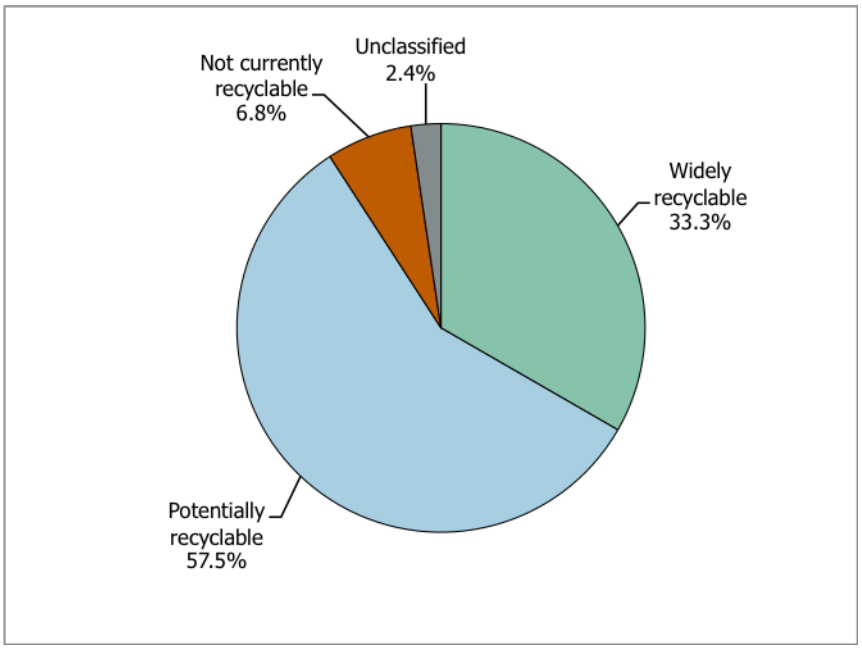
Material Type	Percentage by weight	Weight (tonnes pa)
Food waste	30.2	31,260
Paper	21.7	22,440
Card	11.8	12,180
Plastic film	9.7	10,030
Dense plastic	8.3	8,580
Miscellaneous combustible	7.0	7,300
Glass	3.0	3,070
Ferrous metal	1.7	1,750
Fines	1.6	1,700
Miscellaneous non-combustible	1.1	1,130
Green waste	1.0	1,050
Textiles	0.9	940
Non-ferrous metal	0.7	760
WEEE	0.7	690
Furniture	0.3	260
Liquids (excluding drinks)	0.2	230
Hazardous	0.1	90
Clinical waste	0.1	60
Sanitary products, disposable nappies	0.1	50
Total	**100**	**103,580**

Note: Columns may not sum due to rounding

5 Motor, Wholesale and Retail Sector: The recyclability of mixed waste

A third (33.3%) of the mixed waste disposed of by the motor, wholesale and retail sector was widely recyclable and nearly three fifths (57.5%) was potentially recyclable (subject to local facilities).

Figure 7 The recyclability of mixed waste disposed of by the Scottish motor, wholesale and retail sector (% by weight) 2011



The following table provides detail of the recyclability of the mixed waste disposed of by the motor, wholesale and retail sector as a whole and by each division, together with the estimated annual tonnages.

Table 14 The estimated proportion and annual weight (tonnes per annum) of mixed waste by recyclability disposed of by the Scottish motor, wholesale and retail sector 2011

Recyclability	Motor, wholesale and retail sector		Motor division		Wholesale division		Retail division	
	% by weight	Weight	% by weight	Weight	% by weight	Weight	% by weight	Weight
Widely recyclable	33.3	60,090	28.6	6,590	41.3	22,210	30.2	31,280
Potentially recyclable	57.5	103,750	58.6	13,520	51.0	27,400	60.7	62,840
Not currently recyclable	6.8	12,250	6.2	1,430	5.4	2,910	7.6	7,910
Unclassified	2.4	4,280	6.6	1,510	2.3	1,220	1.5	1,550
Total	**100**	**180,370**	**100**	**23,050**	**100**	**53,740**	**100**	**103,580**

6 Motor, Wholesale and Retail Sector: The potential opportunities for carbon emission savings

The carbon emissions associated with the waste landfilled by the motor, wholesale and retail sector that could be diverted to other waste treatment streams produces an estimated 48,240 tonnes of carbon dioxide equivalent (t CO_2e) each year. Through landfilling of this waste, the motor division produces an estimated 4,100 t CO_2e, wholesale business units 14,210 t CO_2e and the retail division 29,960 t CO_2e per annum.

If all waste arisings were prevented, the potential carbon emission saving for the sector would be 404,650 t CO_2e per annum. The comparative savings that could be made by the sector, if all appropriate materials were recycled rather than landfilled, amount to 134,880 t CO_2e per annum. Similarly, for food waste, if all applicable material were to be composted, the emission savings would total 20,010 t CO_2e per annum; the equivalent figure if food waste is consigned to anaerobic digestion is 25,050 t CO_2e per annum.

Table 14 breaks down the estimated annual emissions within each division by waste treatment option and waste material type.

For recycling, the materials were further subdivided into the categories: widely recyclable and potentially recyclable and not currently recyclable. Those wastes categorised as not currently recyclable and unclassified were not considered. Table 15 summarises the findings.

Table 15 Carbon emissions (tonnes CO_2 equivalent) associated with different waste management options by sector and material for Scottish the motor, wholesale and retail sector 2011

Sector	Waste management method[9]	Glass	FE metal	Non FE metal	Plastic Film	Dense Plastic	Textiles	Paper	Card	Food waste	TOTAL
Sector: Wholesale/ Retail/Motor	Landfill	100	100	30	620	490	680	16,810	13,950	15,460	48240
	Prevention	-3,700	-15,120	-13,430	-47,600	-51,710	-50,920	-44,460	-38,910	-138,800	-404650
	Recycling	-1580	-10340	-12620	-19510	-18090	-31690	-21330	-19720	0	-134880
	FW to composting	0	0	0	0	0	0	0	0	-20,010	-20010
	FW to AD	0	0	0	0	0	0	0	0	-25,050	-25050
Division 45 Motor	Landfill	10	30	10	60	70	150	1,740	1790	240	4100
	Prevention	-240	-5,250	-2,840	-4,470	-6,960	-11,470	-45,90	-4,980	-2,160	-42960
	Recycling	-100	-3,690	-2,670	-1,830	-2,560	-7,130	-2,200	-2,520	0	-22700
	FW to composting	0	0	0	0	0	0	0	0	-370	-370
	FW to AD	0	0	0	0	0	0	0	0	-470	-470
Division 46 Wholesale	Landfill	20	30	10	220	130	240	4,530	5,100	3,930	14,210
	Prevention	-640	-4,740	-3,090	-16,800	-13,600	-18,220	-11,980	-14,220	-35,260	-118,550
	Recycling	-270	-3,220	-2,910	-6,890	-4,680	-11,340	-5,750	-7,200	0	-42,260
	FW to composting	0	0	0	0	0	0	0	0	-5,120	-5,120
	FW to AD	0	0	0	0	0	0	0	0	-6,410	-6,410
Division 47 Retail	Landfill	80	40	20	340	290	280	10,550	7,070	11,290	29,960
	Prevention	-2,820	-5,140	-7,500	-26,340	-31,160	-21,230	-27,890	-19,710	-101,370	-243,160
	Recycling	-1,200	-3,430	-7,050	-10,800	-10,850	-13,210	-13,380	-9,990	0	-69,910
	FW to composting	0	0	0	0	0	0	0	0	-14,520	-14,520
	FW to AD	0	0	0	0	0	0	0	0	-18,170	-18,170

[9] FW denotes food waste; AD denotes anaerobic digestion.

Table 16 Net carbon emissions (tonnes CO_2 equivalent) associated with recycling compared to landfill by material, recyclability and SIC code for the Scottish motor, wholesale and retail sector 2011

Waste type	Recyclability	Motor, wholesale and retail sector	Division 45 Motor	Division 46 Wholesale	Division 47 Retail
Glass bottles and jars	Widely recycled	-960	-90	-210	-660
Ferrous cans	Widely recycled	-3,110	-260	-1,140	-1,720
Non-ferrous cans	Widely recycled	-7,500	-730	-1,870	-4,900
Single use carrier bags	Widely recycled	-910	-70	-130	-710
Long-life carrier bags	Widely recycled	-440	-10	-70	-360
PET bottles	Widely recycled	-2,520	-260	-590	-1,660
HDPE bottles	Widely recycled	-1,720	-720	-270	-720
Other bottles	Widely recycled	-150	-10	-40	-100
Newspapers	Widely recycled	-2,660	-270	-870	-1,520
Magazines, directories and catalogues	Widely recycled	-4,150	-320	-1,190	-2,640
Used A4 type paper including letters	Widely recycled	-2,550	-290	-820	-1,430
Unused A4 type paper including unused exercise books	Widely recycled	-170	-10	-20	-140
Other recyclable paper	Widely recycled	-4,270	-450	-1,030	-2,790
Envelopes	Widely recycled	-740	-80	-280	-390
Liquid cartons	Widely recycled	-860	-50	-240	-570
Corrugated cardboard	Widely recycled	-12,910	-1620	-5,680	-5,610
Other card	Widely recycled	-5,340	-810	-1,220	-3,300
Subtotal		***-50,960***	***-6,050***	***-15,670***	***-29,220***
Other glass	Potentially recyclable	-620	-10	-60	-540
Other ferrous metal	Potentially recyclable	-7,230	-3,440	-2,080	-1,710
Other non-ferrous metal	Potentially recyclable	-5,120	-1,930	-1,040	-2,150
Other film	Potentially recyclable	-18,150	-1,740	-6,680	-9,730
Polystyrene including cups	Potentially recyclable	-3,380	-250	-1,040	-2,090
Other dense plastic	Potentially recyclable	-10,330	-1,320	-2,730	-6,290
Re-usable fabrics	Potentially recyclable	-4,520	-310	-2,030	-2,180
Non-reusable fabrics including used mop heads	Potentially recyclable	-24,120	-6,610	-6,970	-10,540
Shoes, boots, slippers and other outer footwear	Potentially recyclable	-3,050	-210	-2,340	-500
Handtowels	Potentially recyclable	-6,790	-790	-1,540	-4,470
Card plates and cups	Potentially recyclable	-620	-50	-60	-500
Subtotal		***-83,930***	***-16,660***	***-26,570***	***-40,700***
TOTAL		**-134,880**	**-22,710**	**-42,260**	**-69,910**

Note: Columns may not sum due to rounding

7 Motor, Wholesale and Retail Sector: The cost of mixed waste

7.1 Estimated cost of disposal

Based on the estimated tonnages of disposed mixed waste, business units within the motor, wholesale and retail sector currently spend more than £10 million pounds in landfill tax charges and this will rise to more than £14 million in the 2014 financial year. The following table gives the estimated landfill tax charges attributable to the motor, wholesale and retail divisions.

Table 17 The estimated cost of landfill tax attributable to mixed waste disposed of by business units within the Scottish motor, wholesale and retail sector

	Cost of annual landfill tax by year	
	2011 - 2012	**2014 - 2015**
Motor division	£1,291,100	£1,844,400
Wholesale division	£3,009,400	£4,299,100
Retail division	£5,800,300	£8,286,100
Wholesale, motor, retail sector	**£10,100,700**	**£14,429,600**

Note: Columns may not sum due to rounding

7.2 Estimated purchase price of unused paper

Overall the motor, wholesale and retail sector disposes of 234 tonnes of unused A4 and similar type paper in the mixed waste stream that is worth nearly £900,000.

Table 18 The estimated weight (tonnes per annum) and cost (£ per annum) of unused paper waste disposed of by the Scottish motor, wholesale and retail sector in 2011

Sector / Division	Weight (tonnes pa)	Cost of unused paper (£ pa)
Motor division	10	£43,000
Wholesale division	30	£105,000
Retail division	200	£749,000
All motor, wholesale and retail	**230**	**£897,000**

Note: Columns may not sum due to rounding

7.3 Estimated purchase price of unused/whole food

Overall the motor, wholesale and retail sector is estimated to dispose of 21,310 tonnes of food that is whole or unused in the mixed waste stream per annum and this has an estimated cost of nearly £30 million. The following table gives the estimated annual weight and cost of food that is whole or unused that is disposed of by each of the motor, wholesale and retail divisions and by the sector as a whole, by food type.

Table 19 The estimated weight (tonnes per annum) and cost (£'000 per annum) of food that is whole or unused that is disposed of in the mixed waste stream by the Scottish motor, wholesale and retail sector in 2011

Food Type	Motor, wholesale and retail sector		Motor		Wholesale		Retail	
	Tonnes	Cost	Tonnes	Cost	Tonnes	Cost	Tonnes	Cost
Fruit	8,090	£13,303	80	£132	2,230	£3,670	5,780	£9,501
Vegetables	11,240	£11,838	110	£117	3,100	£3,266	8,030	£8,455
Bakery	1,300	£1,827	10	£18	360	£504	930	£1,305
Meat and fish	160	£971	<10	£10	40	£268	110	£693
Pre-prepared meals and snacks	150	£835	<10	£8	40	£230	100	£596
Dairy	200	£634	<10	£6	50	£175	140	£453
Confectionery	20	£100	<10	£1	10	£28	20	£72
Condiments	110	£94	<10	£1	30	£26	80	£67
Dried foods	40	£72	<10	£1	10	£20	30	£52
Desserts	0	£0	0	£0	0	£0	0	£0
Total	**21,310**	**£29,673**	**210**	**£294**	**5,880**	**£8,186**	**15,220**	**£21,194**

Note: Columns may not sum due to rounding

8 Motor, Wholesale and Retail sector: Perceptions and attitudes to mixed waste issues[10]

The perceptions of key national grocers were not included in the analysis (see part 2.2.1 for further information).

8.1 Recycle or reuse activity amongst motor, wholesale and retail business units

The following chart illustrates that overall, more than three quarters (77.4%) of business units surveyed in the motor, wholesale and retail sector stated that they recycle or reuse some of their waste. Conversely more than a fifth (22.0%) of the business units stated that they do not recycle or reuse any business waste.

Figure 8 Stated recycling or reuse activity by Scottish motor, wholesale and retail sector business units (base 348)

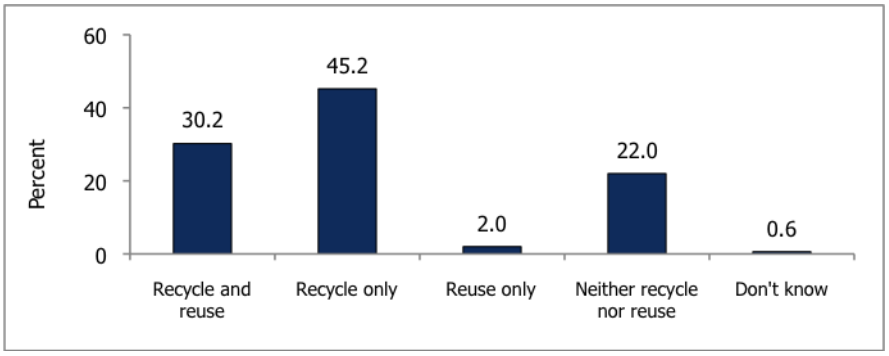


Table 20 Stated recycling or reuse activity by division in the Scottish motor, wholesale and retail sector

Division	Recycle and reuse	Recycle only	Reuse only	Neither recycle nor reuse	Don't know
Motor (base 55)	52.7	29.1	1.8	14.5	1.8
Wholesale (base 64)	42.1	40.6	3.1	12.6	1.6
Retail (base 229)	21.4	50.4	1.8	26.4	0

Almost one third (30.9%) business units within the motor, wholesale and retail sector stated that they recycle all or most of their waste, whilst 15.2% stated that they reuse all or most of their business waste. Businesses are twice more likely to recycle than reuse their waste.

[10] The perceptions of key national grocers were not included in the analysis (see part 2.2.1 for further information).

Figure 9 Stated proportion of Scottish motor, wholesale and retail business waste recycled or reused (base 339)

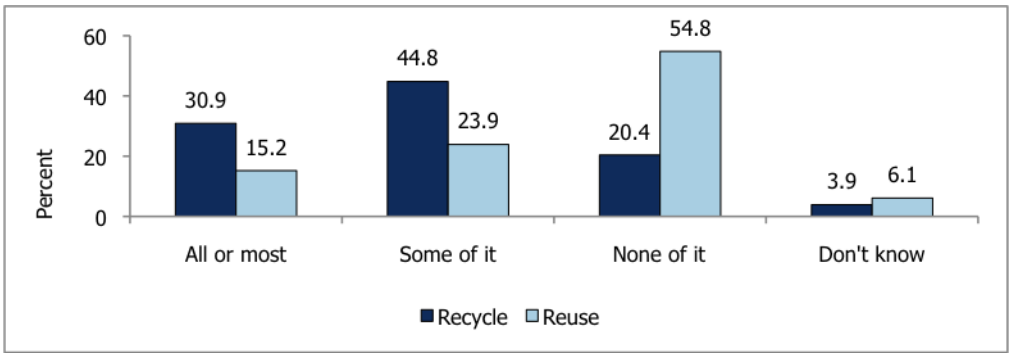
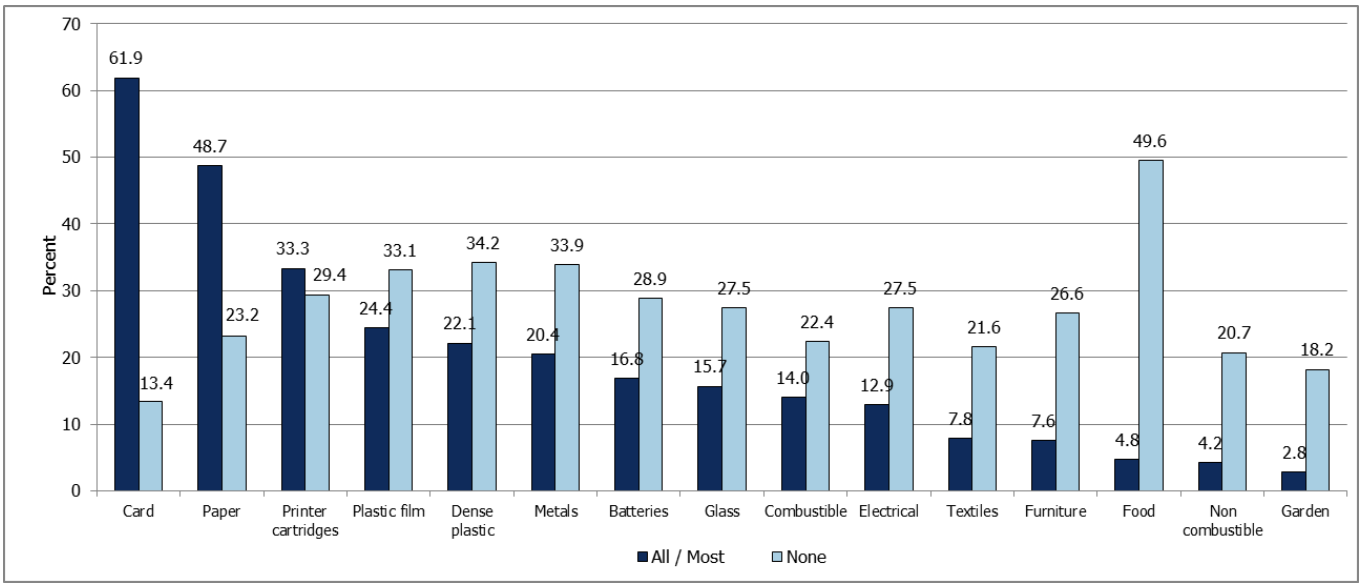


Table 21 Stated proportion of waste recycled or reused by division in the Scottish motor, wholesale and retail sector

Division (base)	Amount of recyclable waste recycled				Amount of reusable waste reused			
	All or most	Some	None	Don't know	All or most	Some	None	Don't know
Motor (base 53)	34.0	49.1	11.3	5.7	25.0	33.3	27.1	14.6
Wholesale (base 59)	36.9	46.0	13.6	3.4	23.0	33.8	39.5	3.6
Retail (base 227)	28.6	43.5	24.3	3.6	10.9	19.1	65.2	4.9

Businesses most commonly stated that they recycle card products with more than six in ten (61.9%) indicating that all or most of their waste card is currently recycled. Nearly half (48.7%) of businesses stated that they recycle all or most of their paper waste.

Figure 10 Stated proportion of Scottish motor, wholesale and retail business units, claiming to recycle or reuse differing proportions of given waste streams (base 345, multiple response)



Businesses that do not currently recycle or reuse all or most of their waste were asked what prevented them from doing so. Eight in ten (81.0%) stated that there are 'no facilities available to enable them to recycle more'. Approaching one in ten (8.5%) indicate that the process of segregating their waste is too time consuming or too much effort.

Figure 11 Stated reasons for not recycling or reusing more Scottish motor, wholesale and retail business waste (base 214, multiple response)

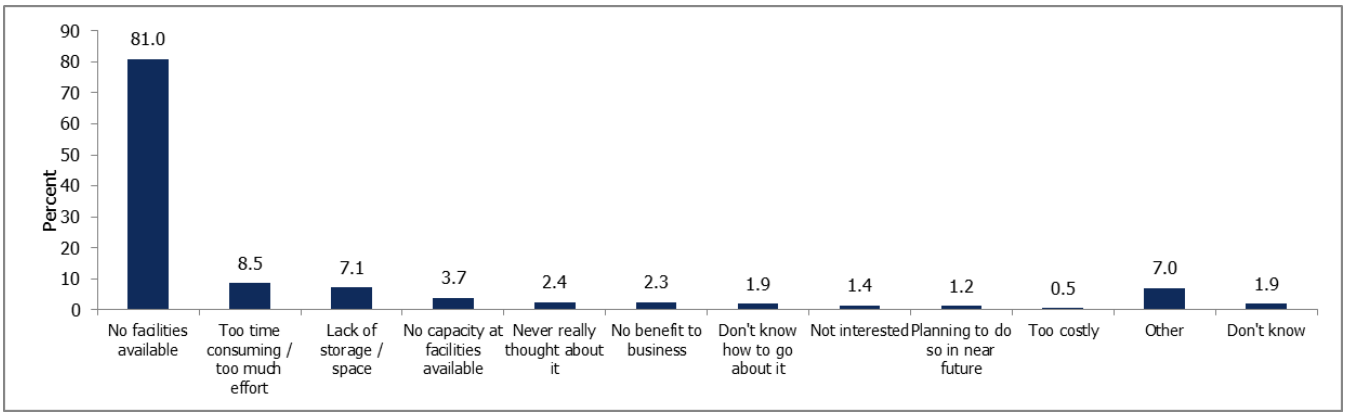


Table 22 Stated reasons for not recycling or reusing more business waste by division in the Scottish motor, wholesale and retail sector (multiple response)

% of respondents	**Motor** (base 27)	**Wholesale** (base 35)	**Retail** (base 152)
No facilities available	81.5	65.7	84.4
Too time consuming/too much effort	7.4	8.6	8.7
Lack of storage/space	7.4	14.3	5.3
No capacity at facilities available	18.5	2.9	1.3
Never really thought about it	3.7	2.9	2
No benefit to business	3.7	8.6	0.7
Don't know how to go about it	0	0	2.7
Not interested	0	2.9	1.3
Planning to do so in near future	0	2.9	1
Too costly	0	2.9	0
Other	7.4	11.4	6
Don't know	7.4	5.7	0

8.2 Presence of environmental policies or procedures amongst motor, wholesale and retail business units

Less than a fifth (18.1%) of business units surveyed do not have any formal or informal environmental policies or procedures in place. Respondents were most likely (62.7%) to indicate that their business has an informal commitment to reduce waste and a quarter (25.7%) stated that their business has an environmental policy in place. Only 5.9% stated that they have introduced targets for recycling within their workplace.

Figure 12 Stated type of environmental policy or procedure in place within Scottish motor, wholesale and retail business units (base 344, multiple response)

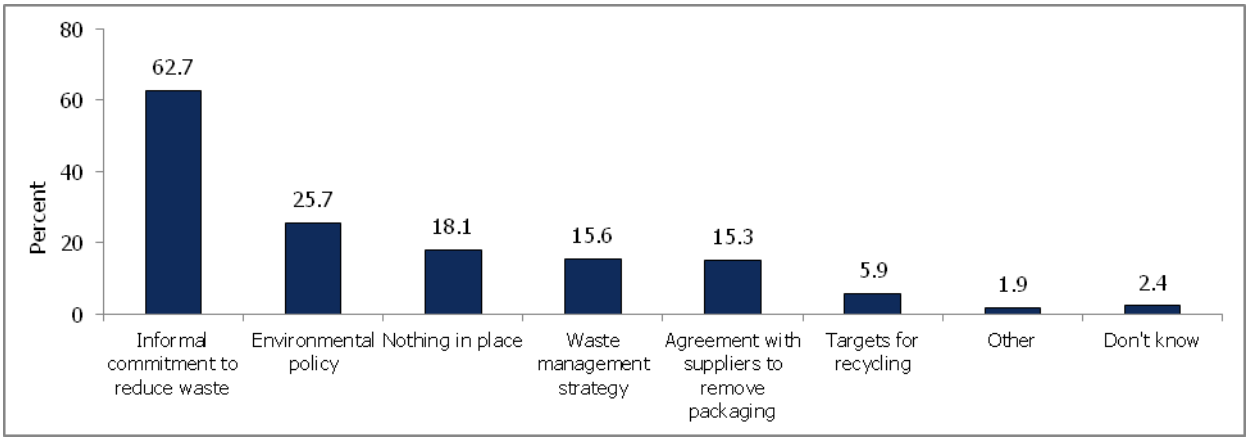


Table 23 Stated type of environmental policy or procedure in place by division in the Scottish motor, wholesale and retail sector

% of respondents	**Motor** (base 54)	**Wholesale** (base 60)	**Retail** (base 230)
Informal commitment to reduce waste	63.0	74.9	59.4
Environmental policy	27.8	31.3	23.8
Nothing in place	16.7	6.7	21.4
Waste management strategy	16.7	16.5	15.1
Agreement with suppliers to remove packaging	29.6	19.8	10.7
Targets for recycling	3.7	10.1	5.3
Other	0	3.4	2.0
Don't know	1.9	1.7	2.7

8.3 Encouraging motor, wholesale and retail business units to recycle more waste

The following chart illustrates than more than eight in ten (84.8%) of business units in the motor, wholesale and retail sector believe that it is very important that business units recycle or reuse their business waste. Nearly all (98.2%) agreed that this is at least somewhat important.

Figure 13 Stated importance of recycling or reusing Scottish motor, wholesale and retail business waste (base 347)

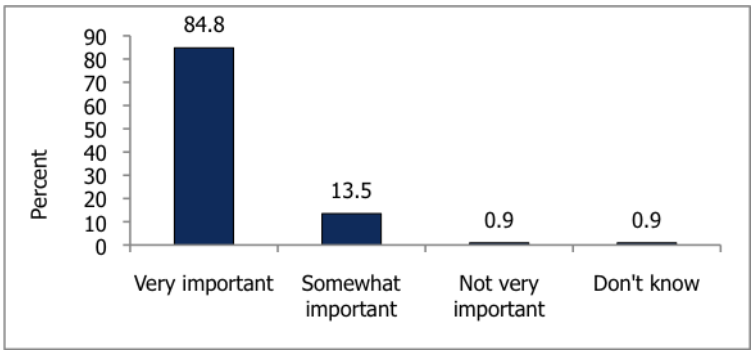
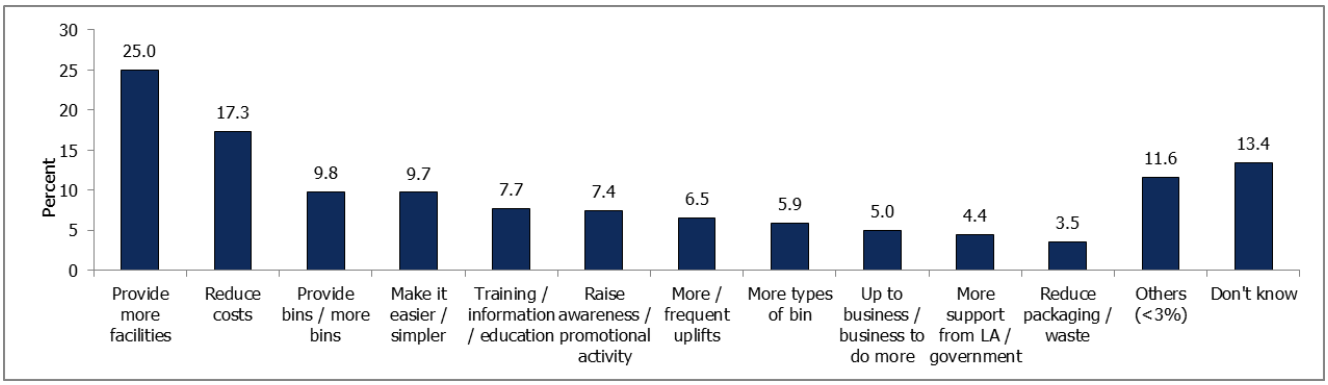


Table 24 Stated importance of recycling or reusing business waste by division in the Scottish motor, wholesale and retail sector

Division (base)	Very important	Somewhat important	Not very important	Don't know
Motor (55)	76.4	21.8	1.8	0
Wholesale (60)	86.6	10.1	1.7	1.7
Retail (232)	86.3	12.4	0.4	0.9

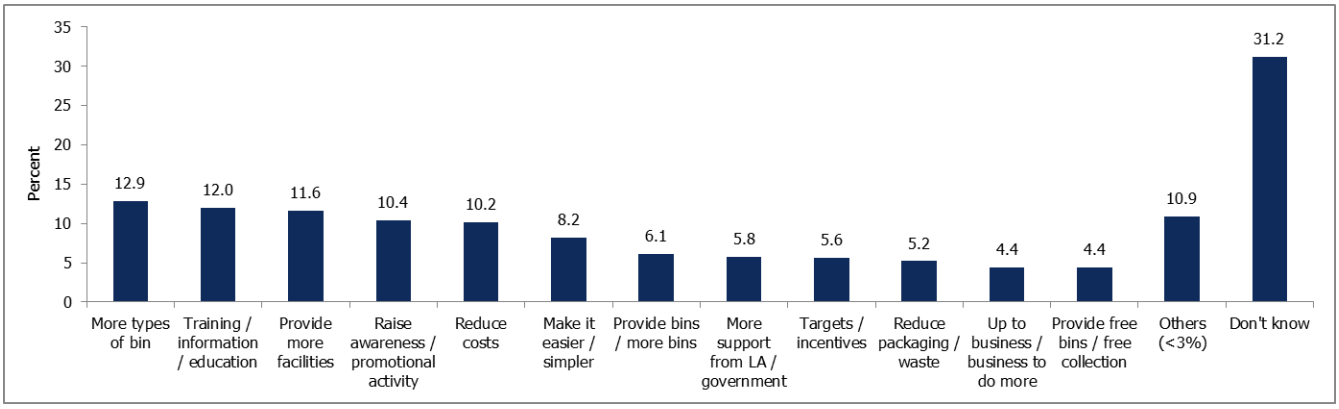
A quarter (25.0%) of respondents felt that they would need to have easy access to (more) facilities if they were to be encouraged to recycle more of their business waste. More than one in six (17.3%) felt that they do not recycle more (or any) of their business waste because of the financial costs involved; lower costs may encourage them to recycle more of their waste.

Figure 14 Suggested ways of encouraging the Scottish motor, wholesale and retail business units to recycle more waste (base 344, multiple response)



Finally, respondents were asked what would be needed in order for them to implement more efficient general mixed waste management processes. Of those that offered a suggestion, the most common responses made were for the provision of a greater range of bins (12.9%) and more training or information (12.0%) on general waste issues.

Figure 15 Suggested ways of improving general mixed waste management processes amongst Scottish motor, wholesale and retail business units (base 344, multiple response)



Part two

The education sector

9 The Education Sector: Introduction

There are 5,615 business units in Scotland in the education sector (Source: ONS IDBR, March 2010). The following table shows the number of business units within the three-digit SIC codes covered by the education sector and the number of business units within the two-digit SIC by employee size.

Table 25 Number of education business units in Scotland by 2 digit-SIC and employee size band (2010)

Number of employees	85.1 Pre-primary	85.2 Primary	85.3 Secondary	85.4 Higher education	85.5 Other education	85.6 Educational support	Total
0 employees	0	0	5	0	130	5	**145**
1-9 employees	220	550	210	115	1,215	45	**2,355**
10-49 employees	215	1,720	95	35	265	5	**2,335**
50-249 employees	10	245	375	30	45	0	**705**
250+ employees	0	5	30	40	0	0	**75**
Total	**445**	**2,520**	**715**	**220**	**1,655**	**55**	**5,615**

Note: Non-disclosure rules mean that categories that contain less than five businesses must be supressed (i.e. stated as zero). This means that zero should be interpreted as 'less than five', hence some rows and columns may appear not to sum.

10 The Education Sector: The weight and composition of mixed waste

10.1 Estimated annual weight of mixed waste for Scotland business units within the education sector

In 2011 the education sector disposed of an estimated 85,120 tonnes of mixed waste each year. The following table breaks down the estimated annual tonnages within each division by company size.

Table 26 Estimate of the weight of Scottish education business mixed waste by SIC and employee size group (2011)

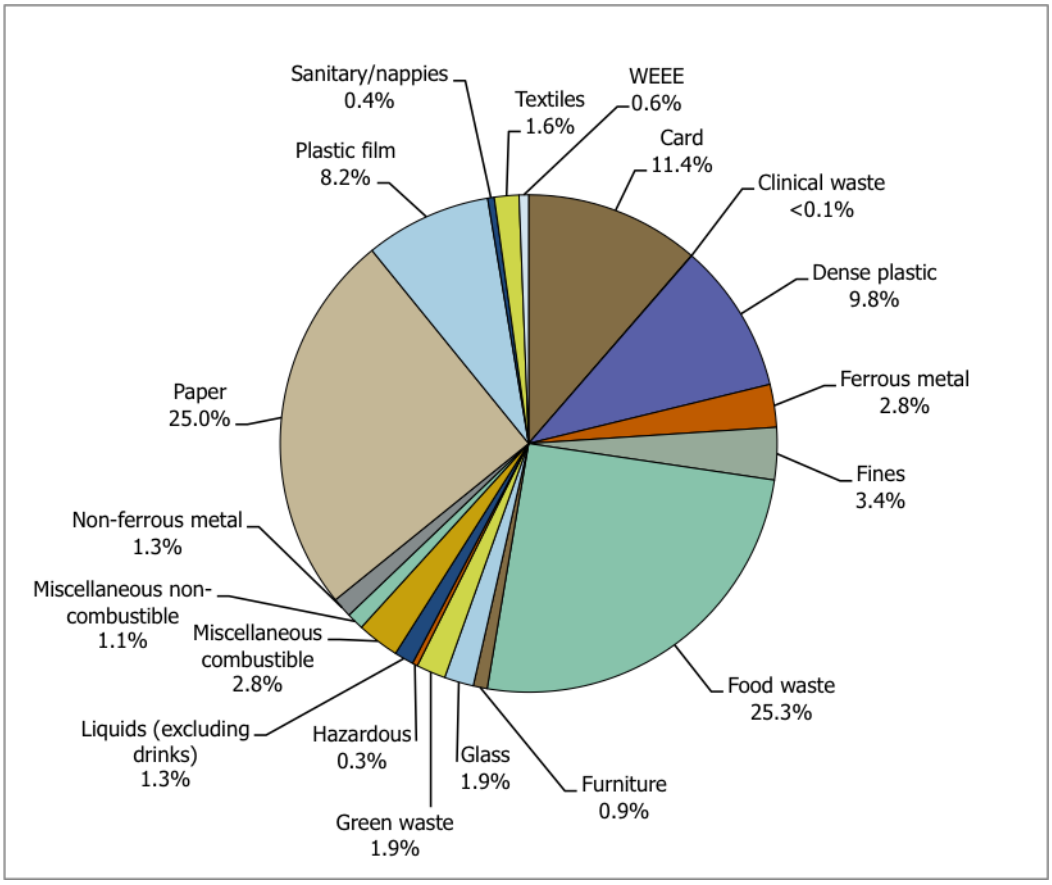
Division	Number of employees	Tonnes per annum
85.1: Pre-primary	0 employees	n/a
	1-9 employees	1,580
	10-49 employees	1,590
	50-249 employees	70
	250+ employees	n/a
	All pre-primary	**3,240**
85.2: Primary	0 employees	n/a
	1-9 employees	4,470
	10-49 employees	31,300
	50-249 employees	6,380
	250+ employees	130
	All primary	**42,280**
85.3: Secondary	0 employees	10
	1-9 employees	570
	10-49 employees	3,520
	50-249 employees	20,330
	250+ employees	1,630
	All secondary	**26,070**
85.4: Higher	0 employees	n/a
	1-9 employees	710
	10-49 employees	260
	50-249 employees	1,290
	250+ employees	1,290
	All higher	**3,540**
85.5: Other education	0 employees	120
	1-9 employees	3,890
	10-49 employees	4,100
	50-249 employees	1,650
	250+ employees	n/a
	All other education	**9,760**
85.6: Educational support	0 employees	<10
	1-9 employees	140
	10-49 employees	80
	50-249 employees	n/a
	250+ employees	n/a
	All educational support	**230**
	ALL EDUCATION	**85,120**

Note: Columns may not sum due to rounding

10.2 The composition of mixed waste for businesses in the education sector

The composition of the mixed waste disposed of by the education sector is illustrated in the chart below. Slightly more than a quarter (25.3%) of the mixed waste consisted of food, a further quarter (25.0%) was made up of paper materials and more than a tenth (11.4%) was made up of card.

Figure 16 Composition of mixed waste disposed of by the Scottish education sector (% by weight) 2011



The following table provides detail of the composition of the mixed waste disposed of by the education sector, the corresponding 95% confidence intervals attributable to the different materials and the estimated tonnages per annum.

Table 27 The estimated proportion and annual weight of mixed waste by type disposed of by the Scottish education sector 2011

Material Type	Percentage by weight	95% CI ±	Weight (tonnes pa)
Food waste	25.3	1.7	21,550
Paper	25.0	1.9	21,250
Card	11.4	0.9	9,680
Dense plastic	9.8	0.7	8,330
Plastic film	8.2	0.8	6,990
Fines	3.4	0.5	2,890
Miscellaneous combustible	2.8	0.5	2,340
Ferrous metal	2.8	0.6	2,370
Glass	1.9	0.5	1,620
Green waste	1.9	0.6	1,630
Textiles	1.6	0.2	1,360
Non-ferrous metal	1.3	0.2	1,110
Liquids (excluding drinks)	1.3	0.3	1,070
Miscellaneous non-combustible	1.1	0.5	950
Furniture	0.9	0.9	770
WEEE	0.6	0.1	530
Sanitary products, disposable nappies	0.4	0.5	360
Hazardous	0.3	0.4	290
Clinical waste	<0.1	0.5	20
Total	**100**		**85,120**

Note: Columns may not sum due to rounding

10.3 Most common waste materials disposed of by the education sector

This part of the report looks at the categories of waste most commonly disposed of by the education sector; that is, key materials that make up significantly more than a tenth of the mixed waste. The proportion of all the different types of waste materials can be found in Appendix G.

10.3.1 The types of food waste disposed of by the education sector

Just over a quarter of the mixed waste disposed of by the education sector was made up of food waste. More than a third (34.6%) of this consisted of cooked food.

Table 28 The proportion of types of food waste disposed of by the Scottish education sector 2011

Type of food waste	% of all food waste	% of all mixed waste
Cooked food	34.6	8.8
Unavoidable food waste (e.g. banana skins, tea bags)	16.0	4.1
Drinks/milk (excluding packaging)	13.1	3.3
Food that is unused, whole or in a pack	11.4	2.9
Sandwiches - partially consumed	10.4	2.6
Fruit and vegetables - partially consumed	7.2	1.8
Other partially consumed food items	5.8	1.5
Meat, fish and meat/fish bones	1.5	0.4
Total	**100**	**25.3**

Note: Columns may not sum due to rounding

10.3.2 The types of paper waste disposed of by the education sector

A quarter of the mixed waste disposed of by the education sector was made up of paper waste. More than four tenths (41.3%) of this consisted of hand towels.

Table 29 The proportion of types of paper waste disposed of by the Scottish education sector 2011

Type of paper waste	% of all paper waste	% of all mixed waste
Hand towels	41.3	10.3
Other non-recyclable paper	16.4	4.1
Other recyclable paper	14.2	3.5
Used A4 type paper including letters	12.2	3.1
Magazines, directories and catalogues	9.0	2.3
Newspapers	4.9	1.2
Envelopes	1.4	0.4
Unused A4 type paper including unused exercise books	0.6	0.1
Total	**100.0**	**25.0**

10.3.3 The types of card waste disposed of by the education sector

More than a tenth of the mixed waste disposed of by the education sector was made up of card waste. More than four tenths (44.6%) of this consisted of corrugated cardboard.

Table 30 The proportion of types of card waste disposed of by the Scottish education sector 2011

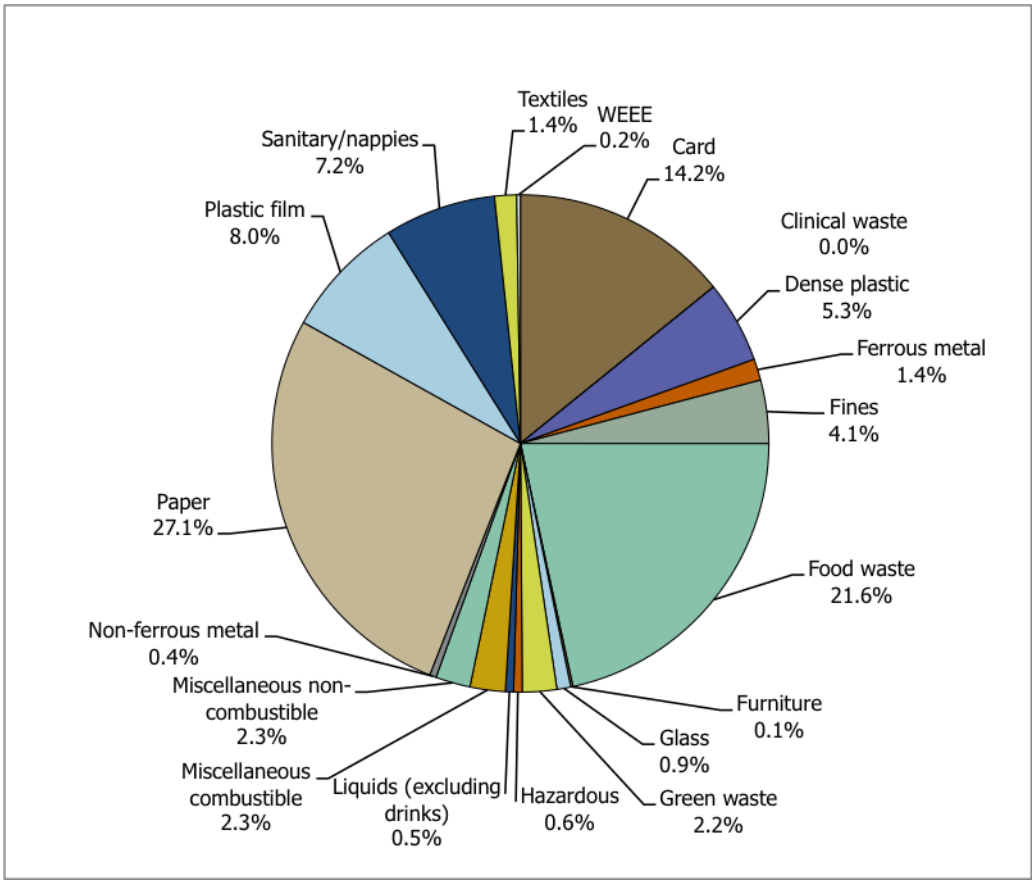
Type of card waste	% of all card waste	% of all mixed waste
Corrugated cardboard	44.6	5.1
Liquid cartons	30.3	3.4
Other card	20.3	2.3
Card plates and cups	4.8	0.5
Total	**100**	**11.4**

Note: Columns may not sum due to rounding

10.4 The composition and weight of mixed waste for pre-primary education business units

Pre-primary education business units disposed of an estimated 3,240 tonnes of mixed waste per annum. More than a quarter (27.1%) of this was made up of paper and more than a fifth (21.6%) consisted of food waste.

Figure 17 Types of mixed waste within the Scottish pre-primary education division (% by weight) 2011



The following table provides detail of the estimated proportion and tonnage per annum for the different material categories of waste disposed of by business units within the pre-primary education division.

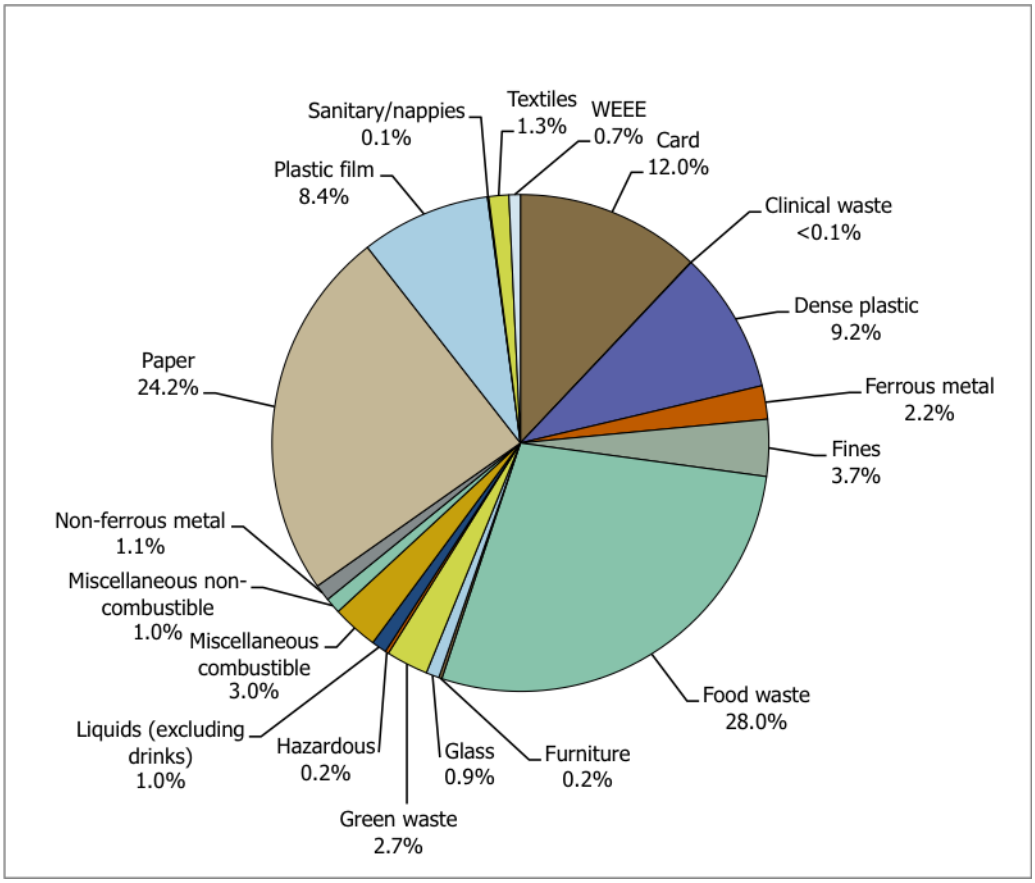
Table 31 The estimated proportion and annual weight of mixed waste by type within the Scottish pre-primary education division 2011

Material Type	Percentage by weight	Weight (tonnes pa)
Paper	27.1	880
Food waste	21.6	700
Card	14.2	460
Plastic film	8.0	260
Sanitary/nappies waste	7.2	230
Dense plastic	5.3	170
Fines	4.1	130
Miscellaneous combustible	2.3	70
Miscellaneous non-combustible	2.3	70
Green waste	2.2	70
Textiles	1.4	50
Ferrous metal	1.4	40
Glass	0.9	30
Hazardous	0.6	20
Liquids (excluding drinks)	0.5	20
Non-ferrous metal	0.4	10
WEEE	0.2	10
Furniture	0.1	<10
Clinical waste	0.1	<10
Total	**100**	**3,240**

10.5 The composition and weight of mixed waste for primary education business units

The primary education business units disposed of an estimated 42,280 tonnes of mixed waste per annum. More than a quarter (28.0%) of this was made up of food waste and nearly a quarter (24.2%) consisted of paper materials.

Figure 18 Types of mixed waste within the Scottish primary education division (% by weight) 2011



The following table provides detail of the proportion and estimated tonnage per annum for the different material categories of waste disposed of by business units within the primary education division as a whole.

Table 32 The estimated proportion and annual weight of mixed waste by type within the Scottish primary education division 2011

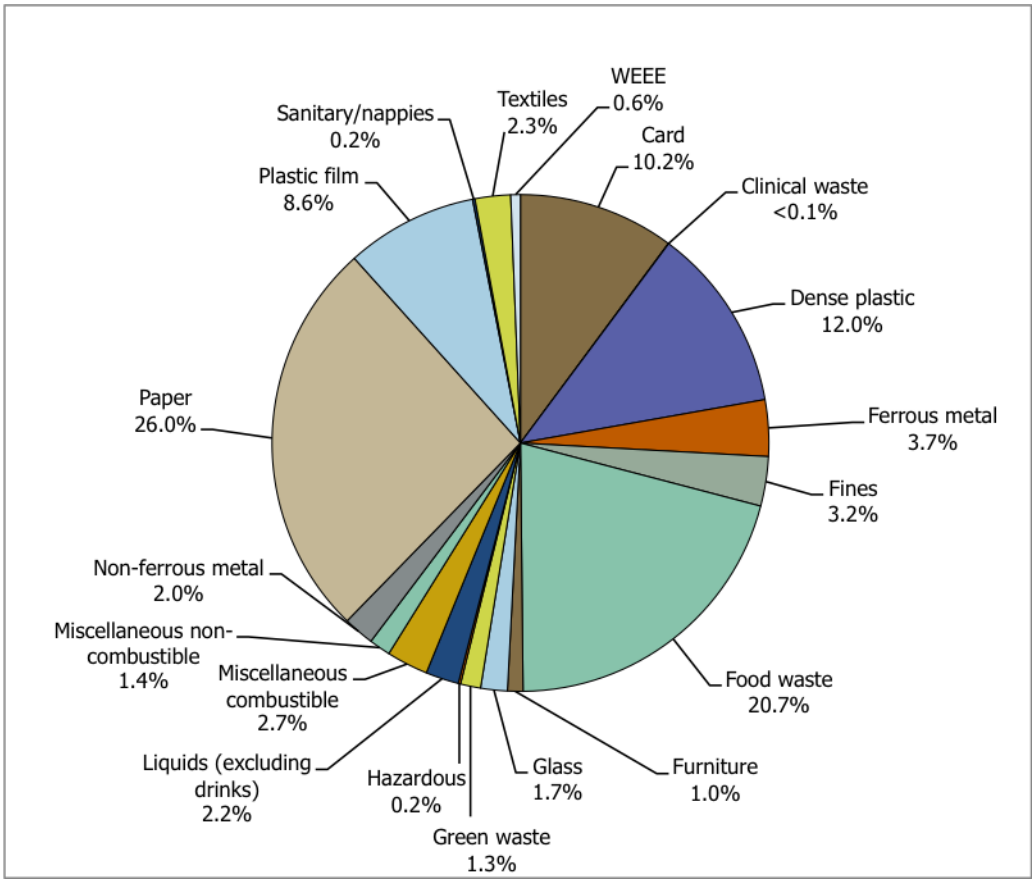
Material Type	Percentage by weight	Weight (tonnes pa)
Food waste	28.0	11,830
Paper	24.2	10,230
Card	12.0	5,090
Dense plastic	9.2	3,900
Plastic film	8.4	3,570
Fines	3.7	1,560
Miscellaneous combustible	3.0	1,260
Green waste	2.7	1,160
Ferrous metal	2.2	920
Textiles	1.3	550
Non-ferrous metal	1.1	460
Miscellaneous non-combustible	1.0	430
Liquids (excluding drinks)	1.0	420
Glass	0.9	360
WEEE	0.7	320
Hazardous	0.2	100
Furniture	0.2	90
Sanitary products, disposable nappies	0.1	40
Clinical waste	<0.1	10
Total	**100**	**42,280**

Note: Columns may not sum due to rounding

10.6 The composition and weight of mixed waste for secondary education business units

Secondary education business units disposed of an estimated 26,070 tonnes of mixed waste per annum. More than a quarter (26.0%) of this mixed waste was made up of paper, just over a fifth (20.7%) consisted of food waste and more than one tenth (12.0%) consists of dense plastic materials.

Figure 19 Types of mixed waste within the Scottish secondary education division (% by weight) 2011



The following table provides detail of the estimated proportion and tonnage per annum for the different material categories of waste disposed of by business units within the secondary education division as a whole.

Table 33 The estimated proportion and annual weight of mixed waste by type within the Scottish secondary education division 2011

Material Type	Percentage by weight	Weight (tonnes pa)
Paper	26.0	6,790
Food waste	20.7	5,410
Dense plastic	12.0	3,130
Card	10.2	2,650
Plastic film	8.6	2,230
Ferrous metal	3.7	960
Fines	3.2	840
Miscellaneous combustible	2.7	710
Textiles	2.3	600
Liquids (excluding drinks)	2.2	560

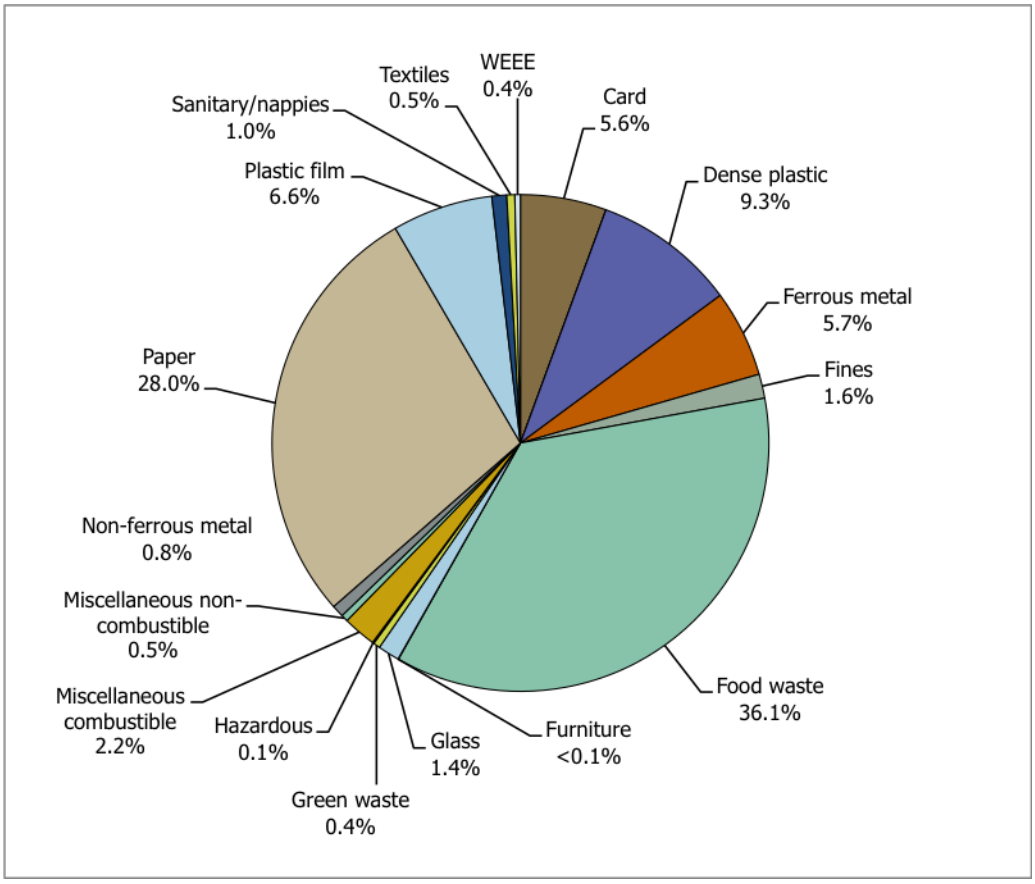
Material Type	Percentage by weight	Weight (tonnes pa)
Non-ferrous metal	2.0	520
Glass	1.7	450
Miscellaneous non-combustible	1.4	360
Green waste	1.3	340
Furniture	1.0	260
WEEE	0.6	160
Hazardous	0.2	40
Sanitary products, disposable nappies	0.2	40
Clinical waste	<0.1	10
Total	**100**	**26,070**

Note: Columns may not sum due to rounding

10.7 The composition and weight of mixed waste for higher education business units

Higher education business units disposed of an estimated 3,540 tonnes of mixed waste per annum. More than a third (36.1%) of this was made up of food waste and more than a quarter (28.0%) consisted of paper waste.

Figure 20 Types of mixed waste within the Scottish higher education division (% by weight) 2011



The following table provides detail of the estimated proportion and tonnage per annum for the different material categories of waste disposed of by business units within the higher education division as a whole.

Table 34 The estimated proportion and annual weight (tonnes per annum) of mixed waste by type within the Scottish higher education division 2011

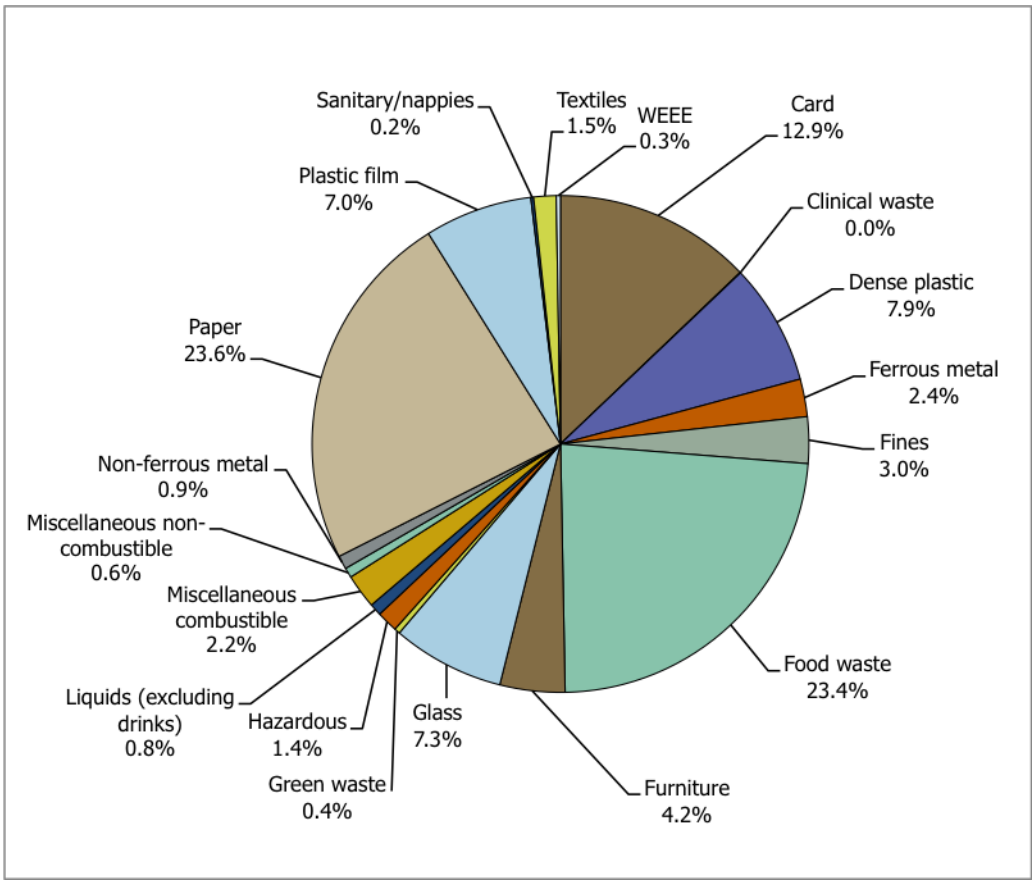
Material Type	Percentage by weight	Weight (tonnes pa)
Food waste	36.1	1280
Paper	28.0	990
Dense plastic	9.3	330
Plastic film	6.6	230
Ferrous metal	5.7	200
Card	5.6	200
Miscellaneous combustible	2.2	80
Fines	1.6	60
Glass	1.4	50
Sanitary products, disposable nappies	1.0	30
Non-ferrous metal	0.8	30
Textiles	0.5	20
Miscellaneous non-combustible	0.5	20
Green waste	0.4	20
WEEE	0.4	10
Hazardous	0.1	<10
Furniture	<0.1	<10
Liquids (excluding drinks)	0	0
Clinical waste	0	0
Total	**100**	**3,540**

Note: Column totals may not sum due to rounding

10.8 The composition and weight of mixed waste for other education business units

Other education business units disposed of an estimated 9,760 tonnes of mixed waste per annum. Nearly a quarter was made up of paper (23.6%), a similar proportion was food waste (23.4%) and more than one tenth (12.9%) of the mixed waste by weight consisted of card.

Figure 21 Types of mixed waste within the Scottish other education division (% by weight) 2011



The following table provides detail of the estimated proportion and tonnage per annum for the different material categories of waste disposed of by business units within the other education division as a whole.

Table 35 The estimated proportion and annual weight (tonnes per annum) of mixed waste by type within the Scottish other education division 2011

Material Type	Percentage by weight	Weight (tones pa)
Paper	23.6	2,300
Food waste	23.4	2,290
Card	12.9	1,260
Dense plastic	7.9	770
Glass	7.3	710
Plastic film	7.0	680
Furniture	4.2	410
Fines	3.0	300
Ferrous metal	2.4	240
Miscellaneous combustible	2.2	220
Textiles	1.5	140
Hazardous	1.4	130
Non-ferrous metal	0.9	90
Liquids (excluding drinks)	0.8	80
Miscellaneous non-combustible	0.6	60
Green waste	0.4	40
WEEE	0.3	30
Sanitary products, disposable nappies	0.2	20
Clinical waste	<0.1	<10
Total	**100**	**9,760**

Note: Columns may not sum due to rounding

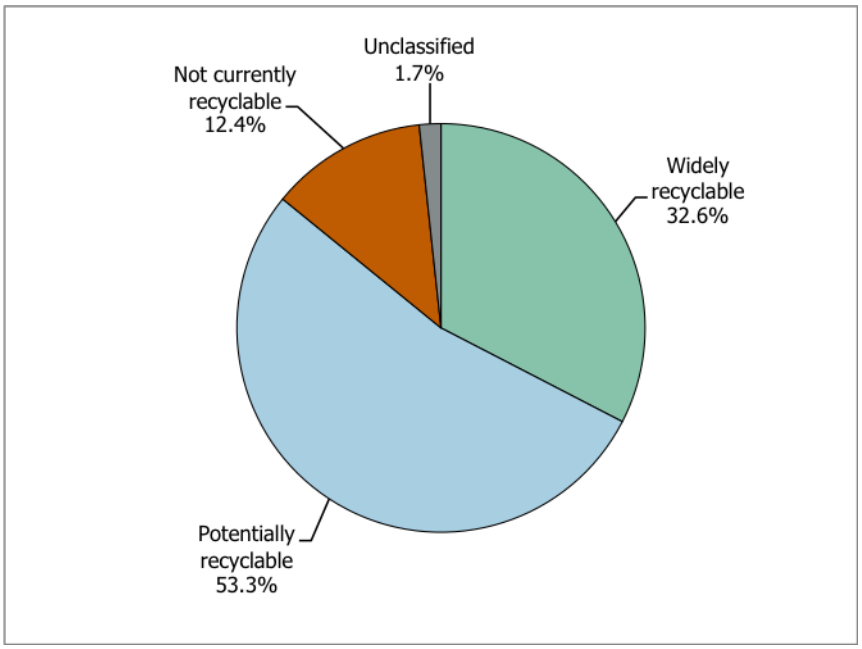
10.9 The composition and weight of mixed waste for educational support business units

None of the business units included in the compositional analysis belonged to the Scottish educational support division and so there is no information on the compositional makeup of this mixed waste. It is estimated that the division disposed of an estimated 230 tonnes of mixed waste per annum.

11 The Education Sector: The recyclability of mixed waste for businesses

A third (32.6%) of the mixed waste disposed of by the education sector was widely recyclable and more than half (53.3%) was potentially recyclable (subject to local facilities).

Figure 22 The recyclability of mixed waste disposed of by the Scottish education sector (% by weight)



The following table provides detail of the recyclability of the mixed waste disposed of by the education sector as a whole and by each division, together with the estimated annual tonnages.

Table 36 The estimated proportion and annual tonnage per annum of mixed waste by recyclability disposed of by the Scottish education sector

		Recyclability				
		Widely recyclable	**Potentially recyclable**	**Not currently recyclable**	**Unclassified**	**Total**
Education sector	Percentage by weight	32.6	53.3	12.4	1.7	*100*
	Weight (tonnes pa)	27,740	45,360	10,570	1,450	*85,120*
Pre-Primary education division	Percentage by weight	28.7	56.1	13.1	2.1	*100*
	Weight (tonnes pa)	930	1,820	430	70	*3,240*
Primary education division	Percentage by weight	30.5	55.1	12.6	1.8	*100*
	Weight (tonnes pa)	12,890	23,310	5,320	760	*42,280*
Secondary education division	Percentage by weight	36.5	49.4	12.3	1.8	*100*
	Weight (tonnes pa)	9,520	12,870	3,200	480	*26,070*
Higher education division	Percentage by weight	24.9	60.1	13.7	1.3	*100*
	Weight (tonnes pa)	880	2,130	490	40	*3,540*
Other education division	Percentage by weight	35.2	52.4	11.4	1.0	*100*
	Weight (tonnes pa)	3,440	5,110	1,110	100	*9,760*

Note: Columns may not sum due to rounding

12 The Education Sector: The potential opportunities for carbon emission savings

The carbon emissions associated with the waste landfilled by the education sector that could be diverted to other waste treatment streams produces an estimated 23,840 tonnes of carbon dioxide equivalent (t CO_2e) each year. Through landfilling of this waste, the pre-primary division produces an estimated 920 t CO_2e, primary division 12,300 t CO_2e, secondary division 6,930 t CO_2e, higher education division 920 t CO_2e and other education division 2,720 t CO_2e per annum.

If all waste arisings were prevented, the potential carbon emission saving for the sector would be 203,880 t CO_2e per annum. The comparative savings that could be made by the sector, if all appropriate materials were recycled rather than landfilled, amount to 74,520 t CO_2e per annum. Similarly, for food waste, if all suitable material were to be composted, the emission savings would total 9,160 t CO_2e per annum; the equivalent figure if food waste is consigned to anaerobic digestion is 11,470 t CO_2e per annum.

Table 36 breaks down the estimated annual emissions within each division by waste treatment option and waste material type.

For recycling, the materials were further subdivided into the categories: widely recyclable and potentially recyclable. Those wastes categorised as not currently recyclable and unclassified were not considered. Table 37 summarises the findings.

It is important to note that in the above text and the tables below, the values for Sector 2 comprise the sum of emissions from the total tonnage for divisions 85.1-85.6. However, carbon emissions were not calculated for division 85.6 as no compositional data was available; as a result the total for divisions 85.1-85.5 will not be equal to the sector total.

Table 37 Carbon emissions associated with different waste management options by sector and material for the Scottish education sector 2011[11]

Sector	Waste management method	Glass	FE metal	Non FE metal	Plastic Film	Dense Plastic	Textiles	Paper	Card	Food waste	TOTAL
Sector: Education	Landfill	40	50	20	240	280	410	10,310	5,610	6,880	23,840
	Prevention	-1,490	-6,820	-10,960	-18,350	-30,800	-30,800	-27,260	-15,660	-61,740	-203,880
	Recycling	-640	-4,500	-10,300	-7,520	-11,370	-19,170	-13,080	-7,940	0	-74,520
	FW to composting	0	0	0	0	0	0	0	0	-9,160	-9,160
	FW to AD	0	0	0	0	0	0	0	0	-11,470	-11,470
Division 85.1 Pre-primary	Landfill	0.76	0.93	0.28	10	10	10	410	270	210	920
	Prevention	-30	-130	-140	-680	-590	-1,050	-1,070	-740	-1,920	-6,350
	Recycling	-10	-90	-130	-280	-220	-650	-510	-380	0	-2,270
	FW to composting	0	0	0	0	0	0	0	0	-310	-310
	FW to AD	0	0	0	0	0	0	0	0	-380	-380
Division 85.2 Primary	Landfill	10	20	10	120	130	160	5,130	2,950	3,770	12,300
	Prevention	-330	-2,670	-4,510	-9,360	-14,020	-12,410	-13,570	-8,230	-33,860	-98,960
	Recycling	-140	-1,770	-4,240	-3,840	-5,180	-7,720	-6,510	-4,170	0	-33,570
	FW to composting	0	0	0	0	0	0	0	0	-4,880	-4,880
	FW to AD	0	0	0	0	0	0	0	0	-6,110	-6,110
Division 85.3 Secondary	Landfill	10	20	10	80	110	180	3,250	1,540	1,730	6,930
	Prevention	-420	-2,760	-5,170	-5,860	-12,160	-13,630	-8,580	-4,280	-15,570	-68,430
	Recycling	-180	-1,820	-4,860	-2,400	-4,480	-8,480	-4,120	-2,170	0	-28,510
	FW to composting	0	0	0	0	0	0	0	0	-2,370	-2,370
	FW to AD	0	0	0	0	0	0	0	0	-2,960	-2,960

[11] FW denoted food waste; AD denotes anaerobic digestion

Sector	Waste management method	Glass	FE metal	Non FE metal	Plastic Film	Dense Plastic	Textiles	Paper	Card	Food waste	TOTAL
Division 85.4 Higher	Landfill	1.30	4.20	0.58	10	10	10	350	110	420	920
	Prevention	-50	-550	-280	-610	-1,170	-420	-920	-320	-3,770	-8,090
	Recycling	-20	-350	-260	-250	-430	-260	-440	-160	0	-2,170
	FW to composting	0	0	0	0	0	0	0	0	-610	-610
	FW to AD	0	0	0	0	0	0	0	0	-760	-760
Division 85.5 Other	Landfill	20	4.93	1.76	20	30	40	1150	730	720	2,720
	Prevention	-660	-690	-840	-1,790	-2,790	-3,220	-3,040	-2,030	-6,480	-21,540
	Recycling	-280	-460	-790	-740	-1,030	-2,010	-1,460	-1,030	0	-7,800
	FW to composting	0	0	0	0	0	0	0	0	-980	-980
	FW to AD	0	0	0	0	0	0	0	0	-1,220	-1,220

Table 38 Net carbon emissions associated with recycling compared to landfill by material, recyclability and SIC code for the Scottish education sector 2011

Waste type	Recyclability	Education sector	Division 85.1 Pre-primary	Division 85.2 Primary	Division 85.3 Secondary	Division 85.4 Higher	Division 85.5 Other
Glass bottles and jars	Widely recycled	-540	-10	-130	-140	-20	-240
Ferrous cans	Widely recycled	-2,730	-50	-990	-1,100	-330	-250
Non-ferrous cans	Widely recycled	-5,230	-70	-1,070	-3,440	-200	-440
Single use carrier bags	Widely recycled	-370	-10	-170	-130	-10	-40
Long-life carrier bags	Widely recycled	-70	0	-40	-20	0	-10
PET bottles	Widely recycled	-4,610	-40	-1,670	-2,410	-130	-370
HDPE bottles	Widely recycled	-770	-30	-310	-300	-50	-80
Other bottles	Widely recycled	-60	0	-30	-20	0	0
Newspapers	Widely recycled	-760	-40	-340	-230	-50	-100
Magazines, directories and catalogues	Widely recycled	-1,420	-50	-600	-540	-50	-170
Used A4 type paper including letters	Widely recycled	-1,910	-40	-810	-760	-70	-230
Unused A4 type paper including unused exercise books	Widely recycled	-90	0	-50	-30	0	0
Other recyclable paper	Widely recycled	-2,220	-80	-1,040	-840	-40	-220
Envelopes	Widely recycled	-220	-10	-110	-50	0	-50
Liquid cartons	Widely recycled	-2,400	-160	-1,680	-320	-30	-210
Corrugated cardboard	Widely recycled	-3,540	-110	-1,640	-1,200	-60	-510
Other card	Widely recycled	-1,610	-90	-740	-500	-50	-230
Subtotal		**-28,550**	**-790**	**-11,420**	**-12,030**	**-1,090**	**-3,150**
Other glass	Potentially recyclable	-90	0	-20	-40	0	-40
Other ferrous metal	Potentially recyclable	-1,770	-30	-780	-720	-30	-210
Other non-ferrous metal	Potentially recyclable	-5,070	-60	-3,170	-1,420	-60	-360
Other film	Potentially recyclable	-7,080	-270	-3,630	-2,250	-240	-680
Polystyrene including cups	Potentially recyclable	-710	-10	-230	-390	-20	-60
Other dense plastic	Potentially recyclable	-5,210	-140	-2,940	-1,360	-230	-520
Re-usable fabrics	Potentially recyclable	-4,880	-80	-2,510	-2,040	-90	-160
Non-reusable fabrics	Potentially recyclable	-11,610	-460	-3,710	-5,490	-130	-1,770

Waste type	Recyclability	Education sector	Division 85.1 Pre-primary	Division 85.2 Primary	Division 85.3 Secondary	Division 85.4 Higher	Division 85.5 Other
including used mop heads							
Shoes, boots, slippers and other outer footwear	Potentially recyclable	-2,670	-110	-1,510	-950	-40	-70
Handtowels	Potentially recyclable	-6,450	-300	-3,570	-1,650	-230	-680
Card plates and cups	Potentially recyclable	-380	-20	-120	-140	-10	-80
Subtotal		**-45,920**	**-1,480**	**-22,190**	**-16,450**	**-1,080**	**-4,630**
TOTAL		**-74,510**	**-2,270**	**-33,580**	**-28,510**	**-2,180**	**-7,800**

Note: Columns may not sum due to rounding

13 The Education Sector: The cost of mixed waste

13.1 Estimated cost of disposal

Based on the estimated tonnages of disposed mixed waste, business units within the education sector currently spend more than £4.5 million in landfill tax charges and this will rise to nearly £7 million in the 2014 financial year. The following table gives the estimated landfill tax charges attributable to the education divisions.

Table 39 The estimated cost of landfill tax attributable to mixed waste disposed of by business units within the Scottish education sector

	Cost of annual landfill tax by year	
	2011 - 2012	**2014 - 2015**
Pre-primary education division	£181,700	£259,600
Primary education division	£2,367,900	£3,382,700
Secondary education division	£1,459,800	£2,085,400
Higher education division	£198,400	£283,400
Other education division	£546,500	£780,800
Educational support division	£12,700	£18,100
Education sector	**£4,766,900**	**£6,809,900**

Note: Columns may not sum due to rounding

13.2 Estimated purchase price of unused paper

Overall the education sector is estimated to dispose of 120 tonnes of unused A4 paper in the mixed waste stream, which cost £466,000.

Table 40 The estimated weight (tonnes per annum) and cost (£ per annum) of unused paper waste disposed of in the mixed waste stream by the Scottish education sector in 2011

Sector / Division	**Weight (tonnes pa)**	**Cost of unused paper (£/annum)**
Pre-primary	<10	£5,000
Primary	70	£249,000
Secondary	50	£181,000
Higher education	<10	£7,000
Other education	10	£23,000
All education	**120**	**£466,000**

Note: Columns may not sum due to rounding

13.3 Estimated purchase price of unused/whole food

Overall the education sector is estimated to dispose of 2,470 tonnes of unused food per annum and this has an estimated cost of more than £6 million. The following table gives the estimated annual weight and cost of whole or unused food waste by food type for each of the education divisions and for the sector as a whole.

Table 41 The estimated weight (tonnes per annum) and cost (£000 per annum) of food that is whole or unused that is disposed of in the mixed waste stream by the Scottish education sector in 2011

Food Type	Education sector		Pre-primary		Primary		Secondary		Higher		Other education	
	Tonnes	Cost	Tonnes	Cost	Tonnes	Cost	Tonnes	Cost	Tonnes	Cost	Tonnes	Cost
Fruit	1,260	£2,391	60	£107	680	£1,286	330	£631	30	£61	160	£299
Pre-prepared meals and snacks	200	£1,065	10	£48	110	£573	50	£281	10	£27	20	£133
Confectionery	80	£582	<10	£26	40	£313	20	£154	<10	£15	10	£73
Dairy	240	£510	10	£23	130	£274	60	£135	10	£13	30	£64
Bakery	260	£491	10	£22	140	£264	70	£130	10	£12	30	£61
Vegetables	280	£372	10	£17	150	£200	70	£98	10	£9	40	£46
Dried foods	50	£286	<10	£13	30	£154	10	£76	<10	£7	10	£36
Meat and fish	40	£220	<10	£10	20	£118	10	£58	<10	£6	10	£28
Desserts	40	£112	<10	£5	20	£60	10	£30	<10	£3	<10	£14
Condiments	10	£9	<10	<£1	<10	£5	<10	£2	<10	<£1	<10	£1
Total	**2,470**	**£6,039**	**110**	**£271**	**1330**	**£3,248**	**650**	**£1,594**	**60**	**£153**	**310**	**£755**

Note: Columns may not sum due to rounding

14 The Education Sector: Perceptions and attitudes to mixed waste issues

14.1 Recycling and reuse activity by education business units

The following chart illustrates that seven in ten (70.2%) of business units surveyed within the education sector stated that they both recycle and reuse at least some of their business waste. Overall, nearly all (96.6%) of respondents indicated that they recycle or reuse at least some of their business waste. Conversely only 2.5% of business units stated that they do not recycle or reuse any business waste.

Figure 23 Stated recycling and reuse activity amongst Scottish education sector business units (base 327)

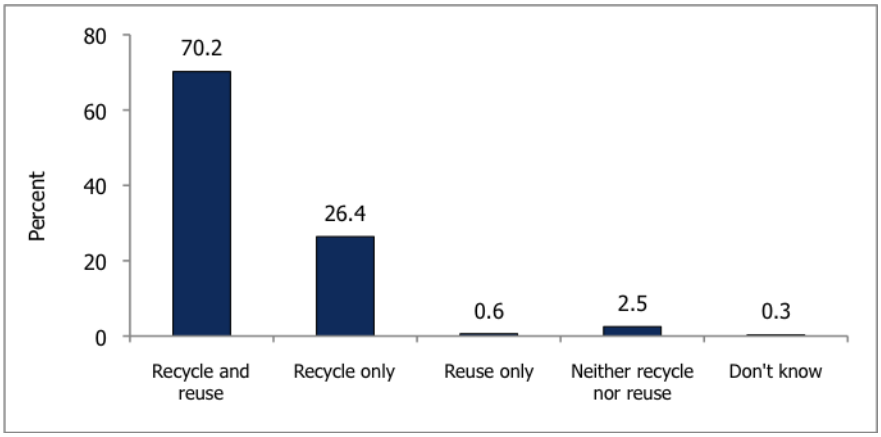


Table 42 Stated recycling or reuse activity by division in the Scottish education sector

Division (base)	Recycle and reuse	Recycle only	Reuse only	Neither recycle nor reuse	Don't know
Pre-primary education (30)	76.7	13.3	6.7	3.3	0
Primary education (136)	77.4	21.9	0	0.7	0
Secondary education (45)	64.0	34.3	0	1.7	0
Higher education (24)	82.2	17.8	0	0	0
Other education (90)	57.7	35.4	0	5.7	1.1
Education support (2)	50.0	50.0	0	0	0

Nearly six in ten (59.7%) of business units within the education sector stated that they recycle all or most of their waste compared to nearly a third (32.3%) that stated that they reuse all or most of their business waste. Businesses are significantly more likely to recycle than reuse their waste, with just 1.6% stating that they do not recycle any of their waste, whilst more than a fifth (21.4%) stated that they never reuse any of their waste.

Figure 24 Stated proportion of Scottish education business waste recycled or reused (base 321)

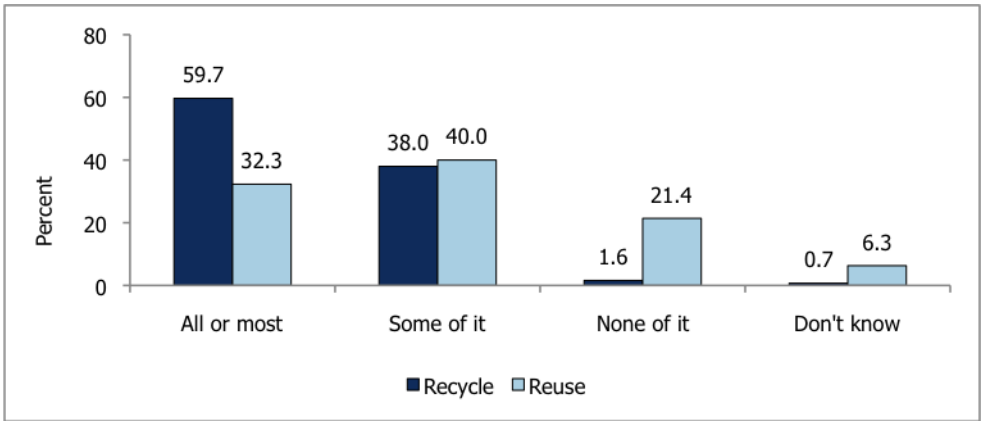
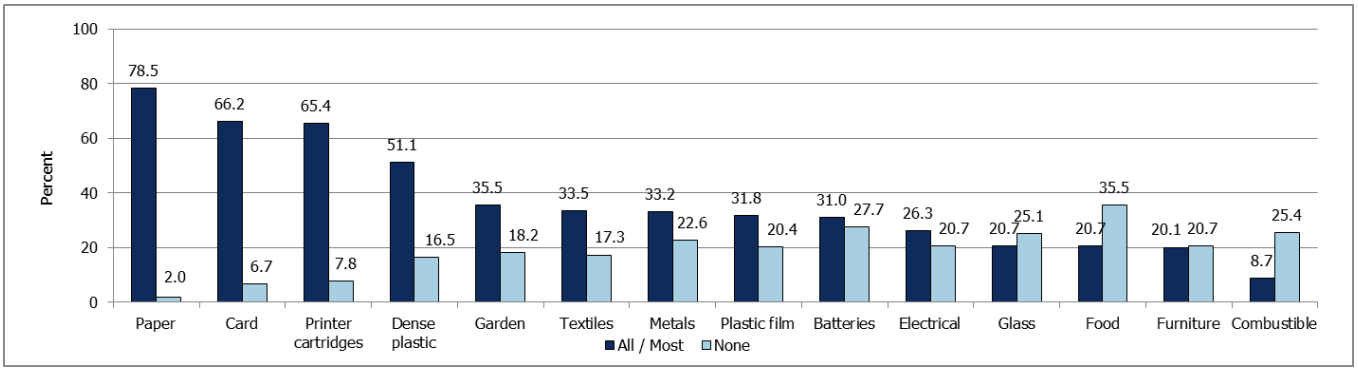


Table 43 Stated proportion of waste recycled or reused by division in the Scottish education sector

Division (base)	Amount of recyclable waste recycled				Amount of reusable waste reused			
	All or most	Some of it	None of it	Don't know	All or most	Some of it	None of it	Don't know
Pre-primary education (30)	53.3	40.0	6.7	0	46.7	40.0	13.3	0
Primary education (134)	60.5	39.5	0	0	34.5	43.1	14.2	8.3
Secondary education (44)	70.4	29.6	0	0	31.8	33.9	25.3	9.0
Higher education (24)	88.2	11.8	0	0	51.0	31.2	17.8	0
Other education (87)	49.8	44.3	3.5	2.4	19.3	41.0	34.1	5.7
Education support (2)	50.0	50.0	0	0	50.0	0	50.0	0

Education business units were most likely to state that they recycle paper products with more than three quarters (78.5%) stating that all or most of their waste paper is currently recycled or reused. Two thirds (66.2%) of the business units indicated that they recycle all or most of their card waste.

Figure 25 Stated proportion of Scottish education business waste recycled or reused by material type (base 358)



Business units within the education sector that do not currently recycle or reuse all or most of their waste were asked what prevented them from doing so. Nearly six in ten (56.2%) stated that 'there is a lack of facilities' to enable them to easily recycle more (or any) waste materials. More than one tenth (14.0%) indicated that they did not recycle more business waste because of a lack of space to segregate and store the waste. A similar proportion (13.6%) stated that the process of segregating more of their waste would be too time consuming or require too much effort on their part.

Figure 26 Stated reasons for not recycling or reusing more Scottish education business waste (base 153, multiple response)

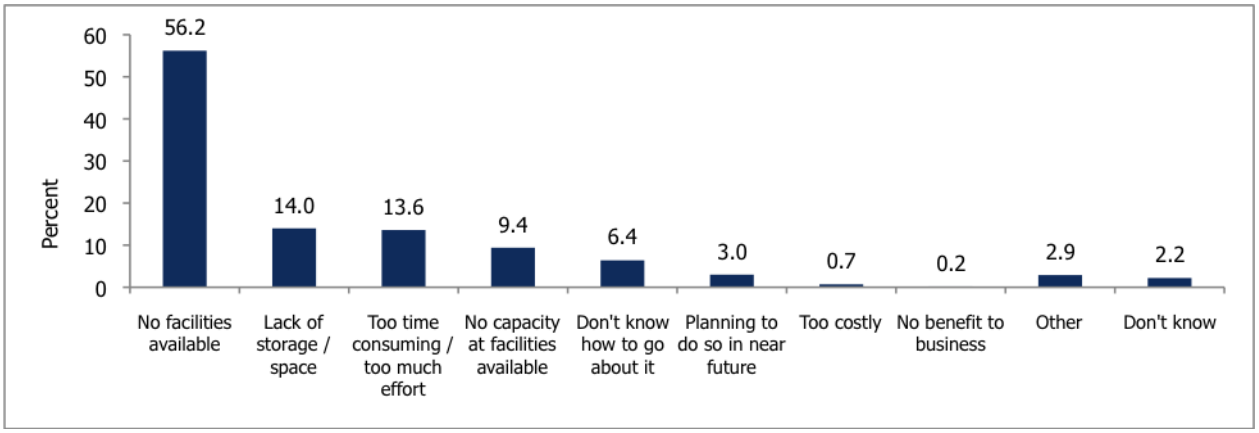


Table 44 Reasons for not recycling or reusing more waste by division in the Scottish education sector

Division (base)	no facilities available	lack of storage/ space	too time consuming /too much effort	no capacity at facilities available	don't know how to go about it	planning to do so in near future	too costly	no benefit to business	other	don't know
Pre-primary (15)	60.0	20.0	6.7	20.0	0	0	6.7	0	0	6.7
Primary (66)	42.1	21.3	15.3	14.0	6.0	6.0	0	0	1.5	1.5
Secondary (14)	50.0	27.2	22.8	0	4.4	4.4	0	0	0	0
Higher (5)	50.7	0	12.3	0	0	0	0	12.3	12.3	12.3
Other education (52)	74.4	0	11.0	3.9	7.9	0	0	0	5.9	2.0
Education support (1)	100	0	0	0	100	0	0	0	0	0

14.2 Presence of environmental policies or procedures amongst education sector business units

Only 6.9% of education business units surveyed do not have any formal or informal environmental policies or procedures in place. Respondents were most likely (68.7%) to indicate that their business has an environmental policy operating within their organisation and nearly a fifth (46.7%) are part of the eco-schools/eco-campus initiative. More than four in ten (44.3%) stated that their business has an informal commitment to reduce waste.

Figure 27 Stated type of environmental policy or procedure in place within Scottish education business units (base 319, multiple response)

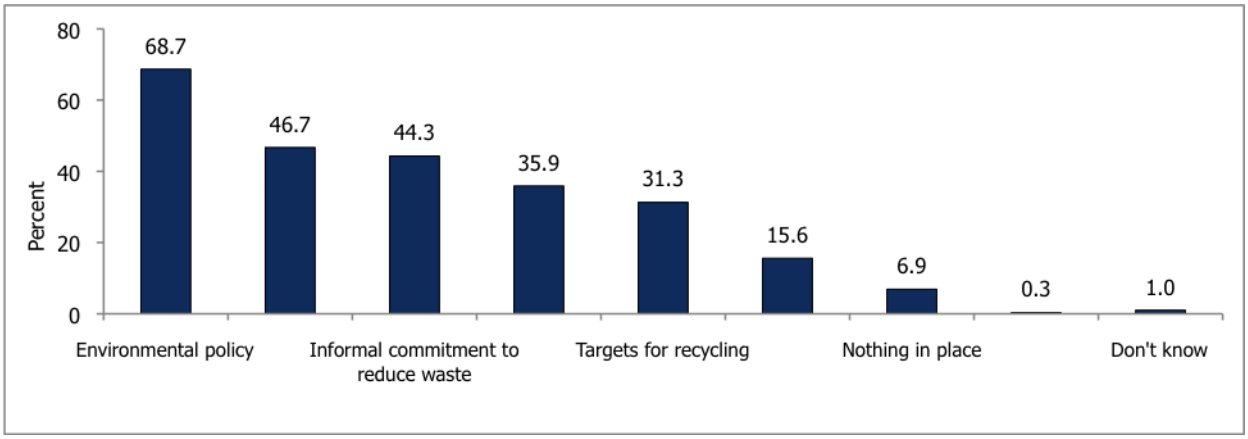


Table 45 Type of environmental policy or procedure in place by division in the Scottish education sector

	Pre-primary (base=30)	**Primary** (base=133)	**Secondary** (base=45)	**Higher** (base=24)	**Other education** (base=86)	**Educational support** (base=1)
Environmental policy	83.3	79.6	74.7	92.1	39.5	0
Eco-schools/campus	56.7	61.9	69.3	29.6	13.3	0
Informal commitment to reduce waste	53.3	27.9	43.8	68.8	62.2	0
Waste management strategy	36.7	27.9	54.7	88.2	28.1	0
Targets for recycling	43.3	32.4	32.1	76.5	15.5	0
Agreement with suppliers to remove packaging	16.7	8.3	29	43.1	14.5	0
Nothing in place	0	2.2	15.5	3.9	13.1	0
Other	0	0	0	0	1.2	0
Don't know	0	0	0	1.9	1.9	100

14.3 Encouraging education sector business units to recycle more waste

The following chart illustrates that more than nine in ten (95.4%) of business units in the education sector believe that it is very important that business units recycle or reuse their business waste. None felt that this was not of any importance.

Figure 28 Stated importance of recycling or reusing Scottish education business waste (base 324)

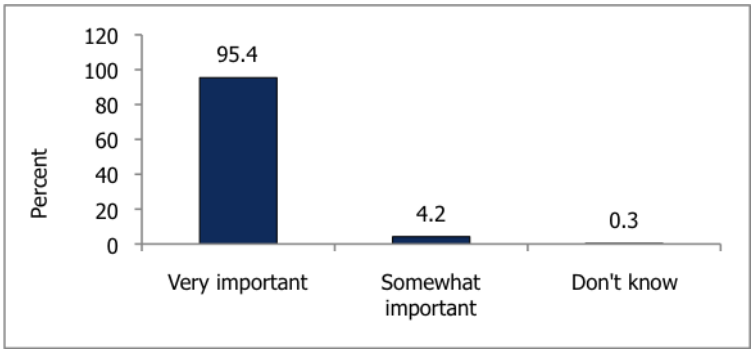
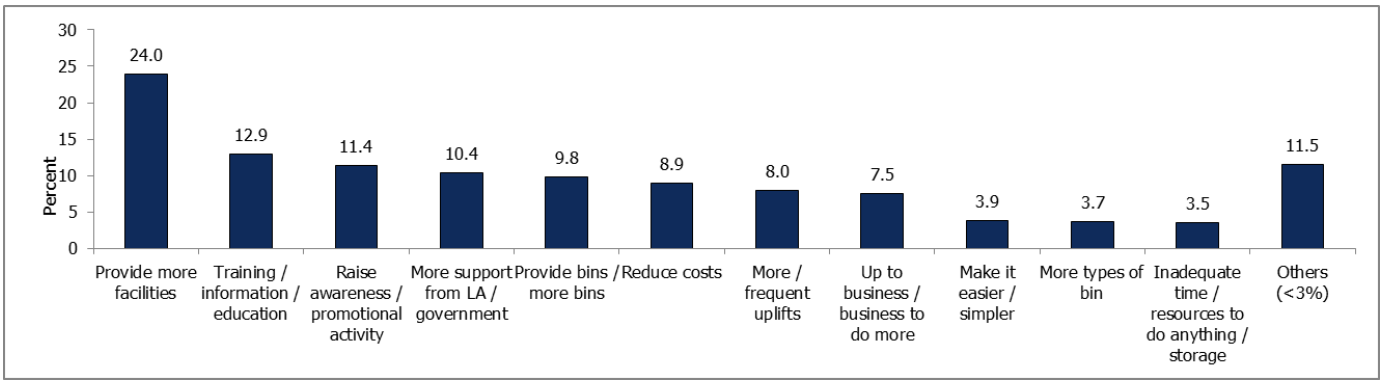


Table 46 Importance of recycling or reusing by division in the Scottish education sector

Division (base)	Very important	Somewhat important	Don't know
Pre-primary (30)	96.7	3.3	0
Primary (134)	99.3	0.7	0
Secondary (45)	100	0	0
Higher (24)	92.1	7.9	0
Other (86)	88.9	10.0	1.2
Support (2)	50.0	50.0	0

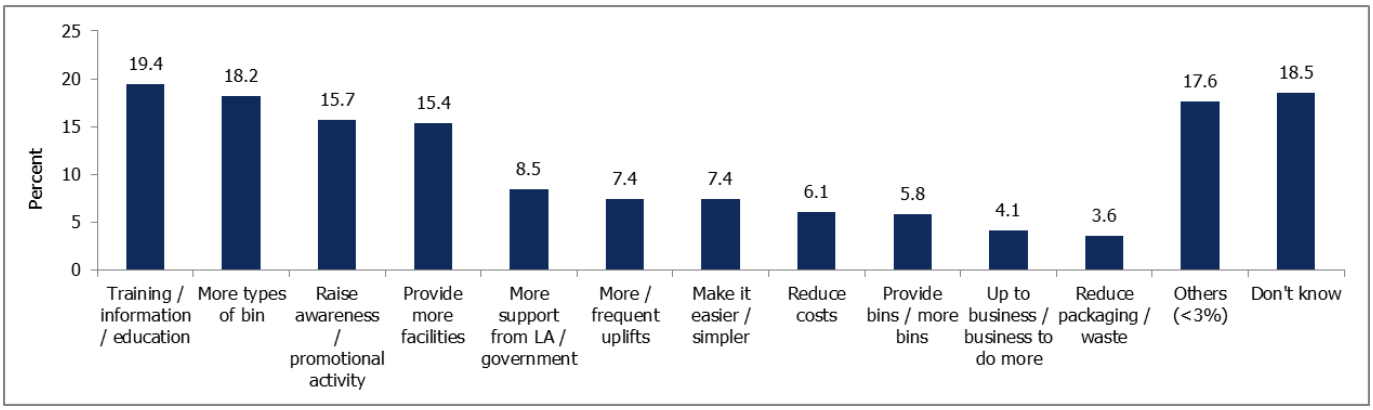
Nearly a quarter (24.0%) of respondents felt that they would need to have easy access to (more) facilities if they were to be encouraged to recycle more of their business waste. One in eight (12.9%) thought that there should be more information or training available to inform businesses on ways of recycling their waste and more than one in ten (11.4%) indicated that more promotional activity is needed to raise awareness.

Figure 29 Suggested ways of encouraging Scottish education sector business units to recycle more waste (base 321, multiple response)



Finally, respondents were asked what would be needed in order for them to implement more efficient general mixed waste management processes. Of those that offered a suggestion, the most common responses made were for the more training or information (19.4%) on general waste issues and the provision of a range of bins (18.2%).

Figure 30 Suggested ways of improving general mixed waste management processes amongst Scottish education business units (base 296, multiple response)



Part three

Human health and social work activities sector

15 Human Health and Social Work Activities Sector: Introduction

There are 11,835 business units in Scotland in the health and social work activities sector (source: ONS IDBR, March 2010). The following tables show the number of business units within the three-digit SIC codes covered by the sector and the number of business units within the two-digit SIC by employee size.

Table 47 Number of health and social work activities business units in Scotland by SIC code (2010)

SIC	Description	Number of units
86, 87, 88	**HEALTH AND SOCIAL WORK**	**11,835**
86	Human health	3,940
86.1	Hospitals	530
86.1	Medical and dental	2,235
86.9	Other human health	1,175
87	Residential care	2,345
87.1	Nursing care	380
87.2	Learning disabilities, mental health and substance abuse	65
87.3	Elderly/disabled	1,000
87.9	Other residential	900
88	Social Work (non-residential)	5,555
88.1	Elderly/disabled	945
88.9	Other social work	4,610

Note: Columns may not sum due to rounding

Table 48 Number of health and social work activities business units in Scotland by 2 digit-SIC and employee size band (2010)

Number of employees	86: Human health	87: Residential care	88: Social work	Total
0 employees	45	5	0	**50**
1-9 employees	2,255	1,050	3,380	**6,680**
10-49 employees	1,175	920	1,830	**3,920**
50-249 employees	350	370	320	**1,035**
250+ employees	115	5	25	**145**
Total	**3,940**	**2,345**	**5,555**	**11,835**

Note: Columns may not sum due to rounding

16 Human Health and Social Work Activities Sector: The weight and composition of mixed waste

16.1 Estimated annual weight of mixed waste for Scotland business units within the health and social work activities sector

The health and social work activities sector disposed of an estimated 106,570 tonnes of mixed waste each year. The human health activities division disposed of an estimated 54,620 tonnes, residential care business units disposed of 26,560 tonnes and the social work activities division disposed of 25,390 tonnes per annum. The following table breaks down the estimated annual tonnages within each division by company size.

Table 49 Estimate of the weight of Scottish health and social work activities' business mixed waste by SIC and employee size group 2011

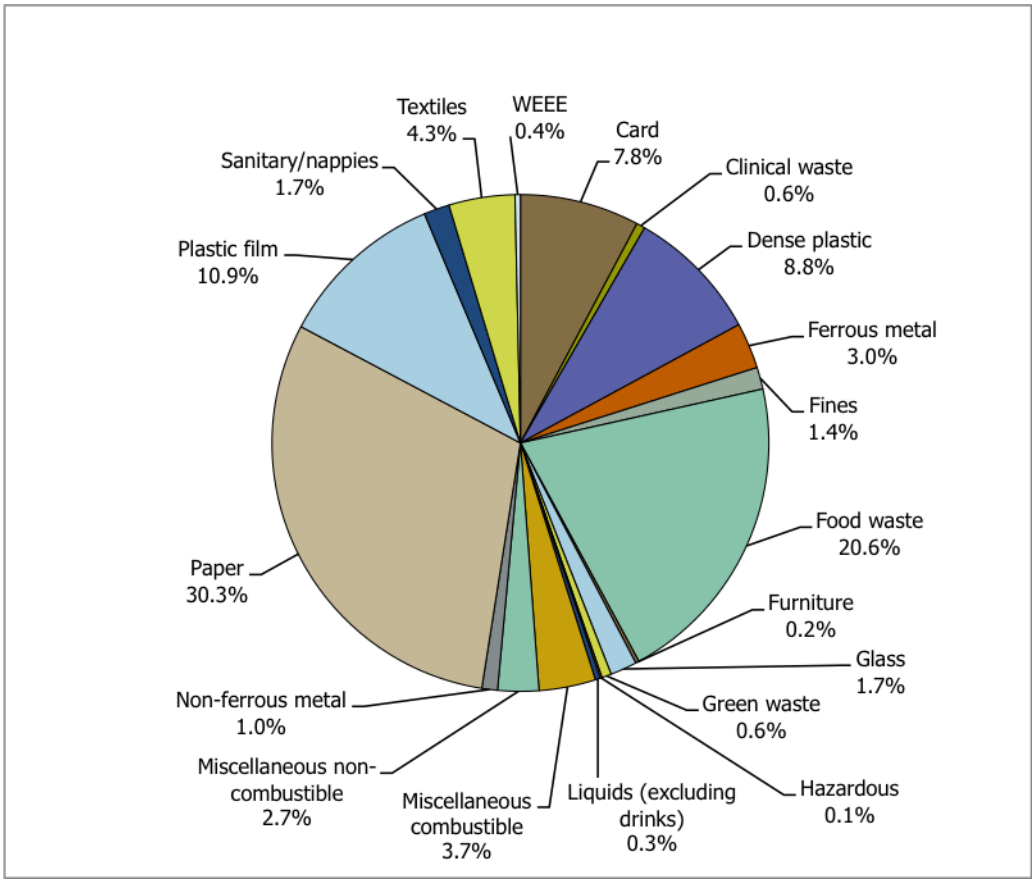
Division	Number of employees	Total Tonnes Per Annum
86: Human health activities	0 employees	100
	1-9 employees	7,070
	10-49 employees	19,320
	50-249 employees	15,050
	250+ employees	13,070
	All human health activities	**54,620**
87: Residential care activities	0 employees	70
	1-9 employees	9,700
	10-49 employees	6,650
	50-249 employees	10,060
	250+ employees	70
	All residential care activities	**26,560**
88: Social work activities without accommodation	0 employees	none
	1-9 employees	13,610
	10-49 employees	9,370
	50-249 employees	2,170
	250+ employees	230
	All social work activities without accommodation	**25,390**
All human health and social work activities		**106,570**

Note: Columns may not sum due to rounding

16.2 The composition of mixed waste for businesses in the health and social work activities sector

The composition of the mixed waste disposed of by the health and social work activities sector is illustrated in the chart below. Just over three tenths (30.3%) of the waste consisted of paper, slightly more than a fifth (20.6%) was made up of food waste and more than a tenth (10.9%) was made up of plastic film.

Figure 31 Composition of mixed waste disposed of by the Scottish health and social work activities sector (% by weight) 2011



The following table provides detail of the composition of the mixed waste disposed of by the health and social work activities sector, the corresponding 95% confidence intervals attributable to the different materials and the estimated tonnages per annum.

Table 50 The proportion and weight of mixed waste by type disposed of by the Scottish health and social work activities sector 2011

Material Type	Percentage by weight	95% CI ±	Weight (tonnes pa)
Paper	30.3	2.2	32,250
Food waste	20.6	1.8	21,930
Plastic film	10.9	0.5	11,650
Dense plastic	8.8	0.7	9,340
Card	7.8	1.2	8,280
Textiles	4.3	0.4	4,580
Miscellaneous combustible	3.7	0.8	3,930
Ferrous metal	3.0	0.4	3,180
Miscellaneous non-combustible	2.7	1.1	2,850
Glass	1.7	0.4	1,850
Sanitary products, disposable nappies	1.7	0.9	1,780
Fines	1.4	0.4	1,520
Non-ferrous metal	1.0	0.4	1,080
Green waste	0.6	0.3	660
Clinical waste	0.6	0.3	600
WEEE	0.4	0.3	370
Liquids (excluding drinks)	0.3	0.2	350
Furniture	0.2	0.1	240
Hazardous	0.1	0.1	130
Total	**100**		**106,570**

Note: Column totals may not sum due to rounding

16.3 Most common waste materials disposed of by the health and social work activities sector

This part of the report looks at the categories of waste most commonly disposed of by the health and social work activities sector; that is, key materials that make up significantly more than a tenth of the mixed waste. The proportion of all the different types of waste materials can be found in Appendix H.

16.3.1 The types of paper waste disposed of by the health and social work activities sector

Just more than three tenths of the mixed waste disposed of by the health and social work activities sector was made up of paper waste; nearly half (48.3%) of this consisted of hand towels.

Table 51 The proportion of different types of paper waste disposed of by the Scottish health and social work activities sector 2011

Type of paper waste	% of all paper waste	% of all mixed waste
Hand towels	48.3	14.6
Newspapers	12.1	3.6
Other non-recyclable paper	11.8	3.6
Magazines, directories and catalogues	9.9	3.0
Used A4 type paper including letters	8.2	2.5
Other recyclable paper	7.1	2.2
Envelopes	2.4	0.7
Unused A4 type paper including unused exercise books	0.2	0.1
Total	**100**	**30.3**

16.3.2 The types of food waste disposed of by the health and social work activities sector

More than a fifth of the mixed waste disposed of by the health and social work activities sector was made up of food waste. A third (33.4%) of this consisted of unavoidable food waste, which is food that cannot be eaten such as tea bags, hard fruit and vegetable peelings. More than a quarter (28.2%) was made up of cooked food.

Table 52 The proportion of different types of food waste disposed of by the Scottish health and social work activities sector 2011

Type of food waste	% of all food waste	% of all mixed waste
Unavoidable food waste (e.g. banana skins, tea bags)	33.4	6.9
Cooked food	28.2	5.8
Food that is unused, whole or in pack	11.0	2.3
Drinks/milk (excluding packaging)	8.1	1.7
Sandwiches - partially consumed	7.4	1.5
Other partially consumed food items	6.1	1.2
Fruit and vegetables - partially consumed	3.6	0.7
Meat, fish and meat/fish bones	2.2	0.5
Total	**100**	**20.6**

16.3.3 The types of plastic film waste disposed of by the health and social work activities sector

More than a tenth of the mixed waste disposed of by the health and social work activities sector was made up of plastic film; nearly all of this waste (96.1%) consisted of other plastic film excluding carrier bags.

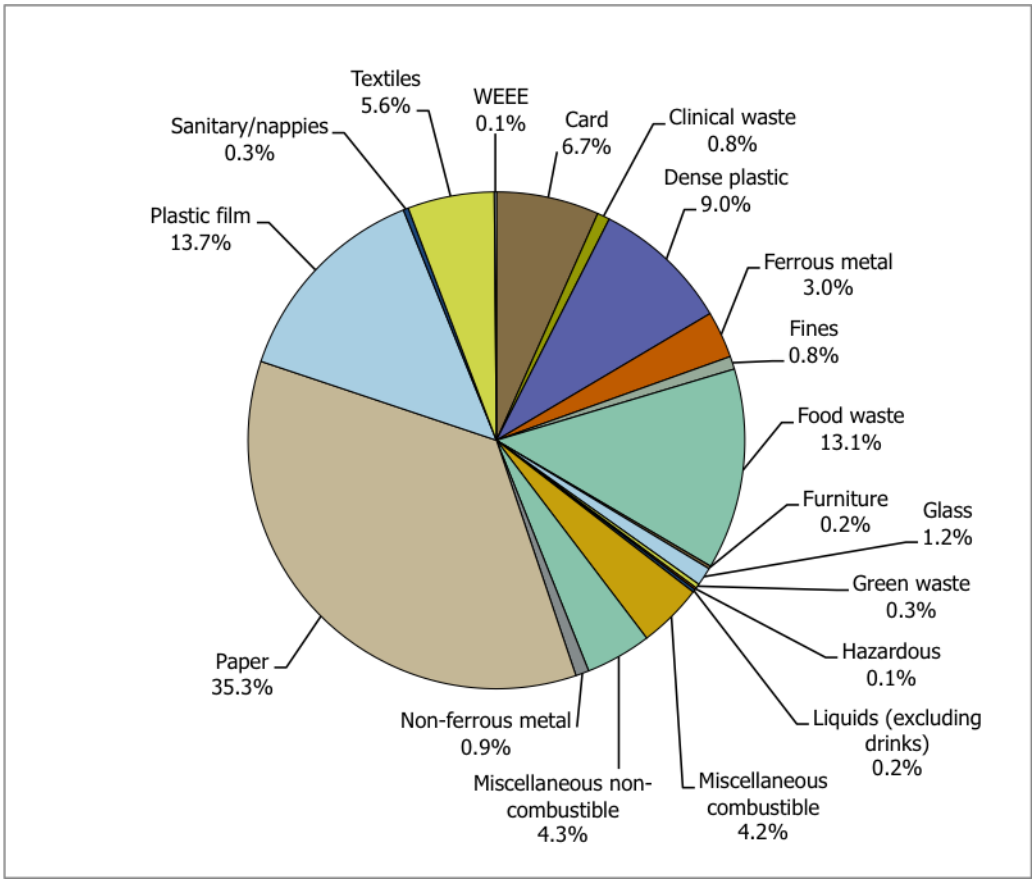
Table 53 The proportion of different types of plastic film waste disposed of by the Scottish health and social work activities sector 2011

Type of plastic film waste	% of all plastic film waste	% of all mixed waste
Other film	96.1	10.5
Single use carrier bags	3.5	0.4
Long-life carrier bags	0.4	<0.1
Total	**100**	**10.9**

16.4 The composition and weight of mixed waste for business units within the human health activities business units

The human health activities division comprises of both NHS and private hospitals, GP and dental practices and medical nursing homes. The division disposed of an estimated 54,620 tonnes of mixed waste per annum. More than a third (35.3%) of this was made up of paper and more than a tenth (13.1%) consisted of food waste.

Figure 32 Types of mixed waste within the Scottish human health activities division (% by weight) 2011



The following table provides detail of the proportion and estimated tonnage per annum for the different material categories of waste disposed of by business units within the human health activities division as a whole.

Table 54 The estimated proportion and annual weight of mixed waste by type within the Scottish human health activities division 2011

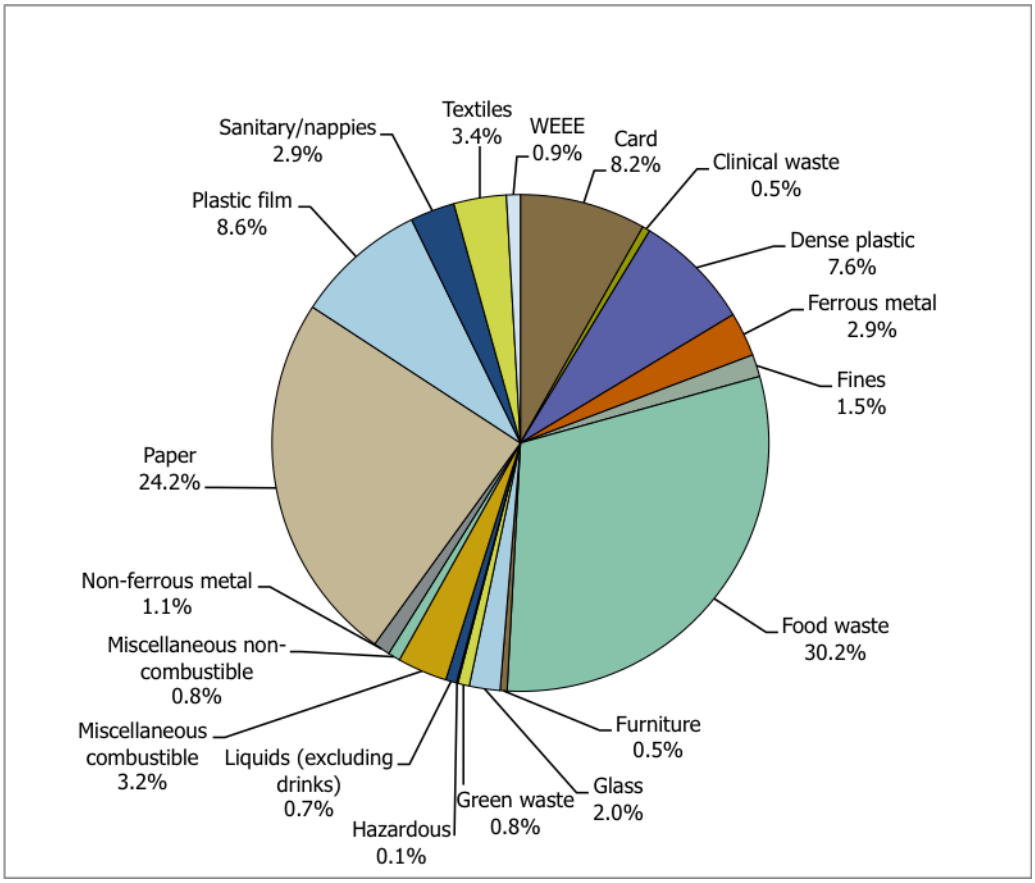
Material Type	Percentage by weight	Weight (tonnes pa)
Paper	35.3	19,300
Plastic film	13.7	7,500
Food waste	13.1	7,150
Dense plastic	9.0	4,900
Card	6.7	3,650
Textiles	5.6	3,080
Miscellaneous non-combustible	4.3	2,340
Miscellaneous combustible	4.2	2,300
Ferrous metal	3.0	1,660
Glass	1.2	650
Non-ferrous metal	0.9	470
Clinical waste	0.8	450
Fines	0.8	460
Sanitary products, disposable nappies	0.3	180
Green waste	0.3	160
Liquids (excluding drinks)	0.2	110
Furniture	0.2	110
WEEE	0.1	80
Hazardous	0.1	70
Total	**100**	**54,620**

Note: Column totals may not sum due to rounding

16.5 The composition and weight of mixed waste for residential care business units

The residential care activities division disposed of an estimated 26,560 tonnes of mixed waste per annum. More than three tenths (30.2%) of this was made up of food waste and nearly a quarter (24.2%) consisted of paper materials.

Figure 33 Types of mixed waste within the Scottish residential care activities division (% by weight) 2011



The following table provides detail of the proportion and estimated tonnage per annum for the different material categories of waste disposed of by business units within the residential care activities division as a whole.

Table 55 The estimated proportion and annual weight of mixed waste by type within the Scottish residential care activities division 2011

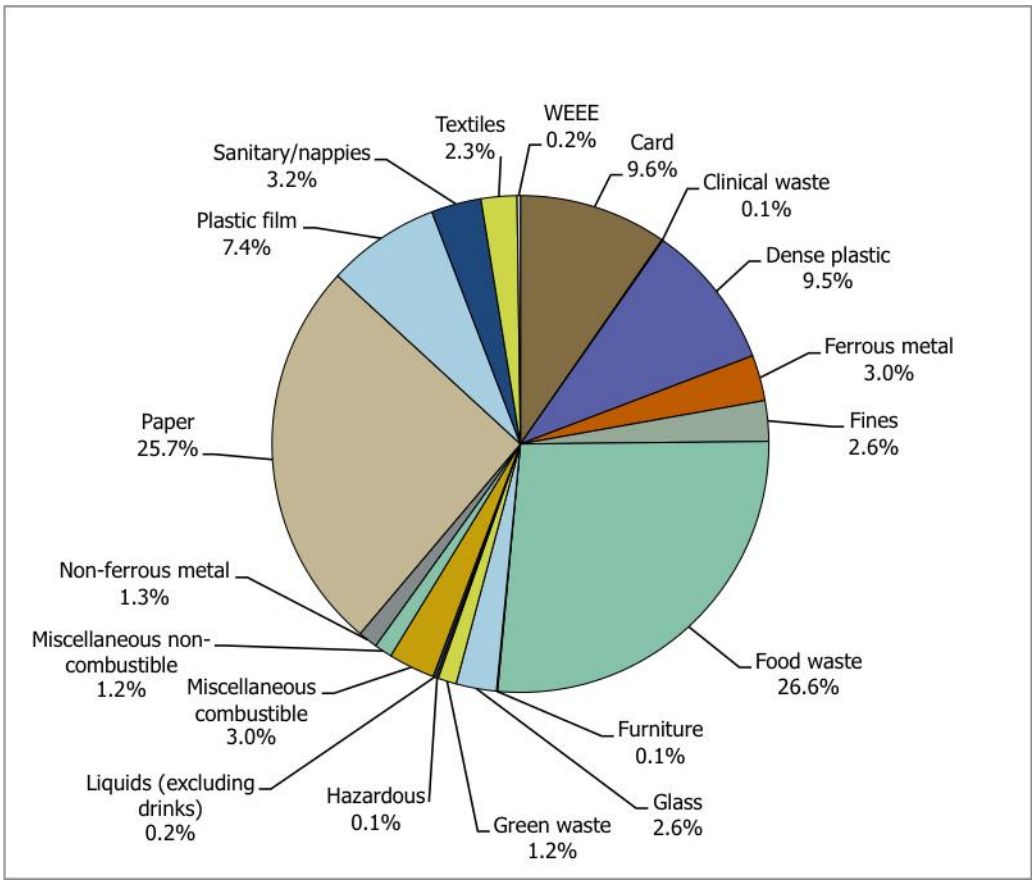
Material Type	Percentage by weight	Weight (tonnes pa)
Food waste	30.2	8,020
Paper	24.2	6,440
Plastic film	8.6	2,270
Card	8.2	2,180
Dense plastic	7.6	2,030
Textiles	3.4	910
Miscellaneous combustible	3.2	860
Sanitary products, disposable nappies	2.9	770
Ferrous metal	2.9	760
Glass	2.0	530
Fines	1.5	390
Non-ferrous metal	1.1	290
WEEE	0.9	240
Miscellaneous non-combustible	0.8	210
Green waste	0.8	200
Liquids (excluding drinks)	0.7	190
Clinical waste	0.5	130
Furniture	0.5	120
Hazardous	0.1	30
Total	**100**	**26,560**

Note: Columns may not sum due to rounding

16.6 The composition and weight of mixed waste for social work activities without accommodation business units

The social work activities without accommodation business units disposed of an estimated 25,390 tonnes of mixed waste per annum. More than a quarter (26.6%) of the mixed waste was made up of food waste and more than a quarter (25.7%) by weight consisted of paper materials.

Figure 34 Types of mixed waste within the Scottish social work activities without accommodation division (% by weight) 2011



The following table provides detail of the proportion and estimated tonnage per annum for the different material categories of waste disposed of by business units within the social work activities without accommodation division as a whole.

Table 56 The estimated proportion and annual weight of mixed waste by type within the Scottish social work activities without accommodation division 2011

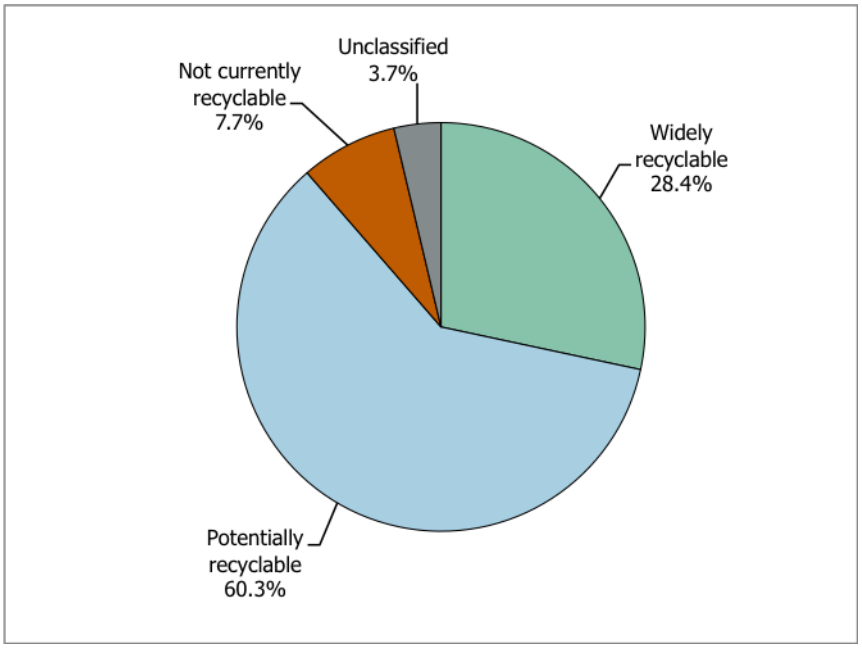
Material Type	Percentage by weight	Weight (tonnes pa)
Food waste	26.6	6,760
Paper	25.7	6,520
Card	9.6	2,450
Dense plastic	9.5	2,410
Plastic film	7.4	1,870
Sanitary products, disposable nappies	3.2	820
Miscellaneous combustible	3.0	770
Ferrous metal	3.0	760
Glass	2.6	670
Fines	2.6	670
Textiles	2.3	590
Non-ferrous metal	1.3	320
Miscellaneous non-combustible	1.2	300
Green waste	1.2	310
Liquids (excluding drinks)	0.2	50
WEEE	0.2	60
Hazardous	0.1	30
Clinical waste	0.1	20
Furniture	0.1	20
Total	**100**	**25,390**

Note: Columns may not sum due to rounding

17 Human Health and Social Work Activities Sector: The recyclability of mixed waste

More than a quarter (28.4%) of the mixed waste disposed of by the health and social work activities sector was widely recyclable and just over six tenths (60.3%) was potentially recyclable (subject to local facilities).

Figure 35 The recyclability of mixed waste disposed of by the Scottish health and social work activities sector (% by weight) 2011



The following table provides detail of the recyclability of the mixed waste disposed of by the health and social work activities sector as a whole and by each division, together with the estimated annual tonnages.

Table 57 The estimated proportion and annual tonnage of mixed waste by recyclability disposed of by the Scottish health and social work activities sector 2011

Recyclability	Health and social work sector		Human health activities division		Residential care activities division		Social work activities division	
	% by weight	Weight (tonnes pa)	% by weight	Weight (tonnes pa)	% by weight	Weight (tonnes pa)	% by weight	Weight (tonnes pa)
Widely recyclable	28.4	30,210	27.2	14,850	28.0	7,440	31.2	**7,920**
Potentially recyclable	60.3	64,210	61.1	33,380	61.0	16,200	57.6	**14,640**
Not currently recyclable	7.7	8,180	6.2	3,390	9.3	2,480	9.1	**2,310**
Unclassified	3.7	3,960	5.5	2,990	1.7	440	2.1	**520**
Total	**100**	**106,570**	**100**	**54,620**	**100**	**26,560**	**100**	**25,390**

Note: Columns may not sum due to rounding

18 Human Health and Social Work Activities Sector: The potential opportunities for carbon emission savings

The carbon emissions associated with the waste landfilled by the health and social work sector that could be diverted to other waste treatment streams produces an estimated 29,300 tonnes of carbon dioxide equivalent (t CO_2e) each year. Through landfilling of this waste, the human health division produces an estimated 15,510 t CO_2e, residential care 6,770 t CO_2e and the social work (non-residential) division 7,020 t CO_2e per annum.

If all waste arisings were prevented, the potential carbon emission saving for the sector would be 297,070 t CO_2e per annum. The comparative savings that could be made by the sector, if all appropriate materials were recycled rather than landfilled, amount to 133,300 t CO_2e per annum. Similarly, for food waste, if all applicable material were to be composted, the emission savings would total 9,850 t CO_2e per annum; the equivalent figure if food waste is consigned to anaerobic digestion is 12,330 t CO_2e per annum.

Table 57 breaks down the estimated annual emissions within each division by waste treatment option and waste material type.

For recycling, the materials were further subdivided into the categories: widely recyclable and potentially recyclable. Those wastes categorised as not currently recyclable and unclassified were not considered. Table 58 summarises the findings.

Table 58 Carbon emissions associated with different waste management options by sector and material for the Scottish health and social work sector 2011

Sector	Waste management method[12]	Glass	FE metal	Non FE metal	Plastic Film	Dense Plastic	Textiles	Paper	Card	Food waste	TOTAL
Sector: healthcare and social work	Landfill	50	70	20	400	320	1,370	16,500	4,800	5,770	29,300
	Prevention	-1,700	-8,940	-10,680	-30,570	-32,840	-103,530	-43,640	-13,400	-51,770	-297,070
	Recycling	-720	-5,780	-10,030	-12,530	-12,090	-64,420	-20,940	-6,790	0	-133,300
	FW to composting	0	0	0	0	0	0	0	0	-9,850	-9,850
	FW to AD	0	0	0	0	0	0	0	0	-12,330	-12,330
Division 86 human health	Landfill	20	30	10	260	170	920	10,370	2,120	1,610	15,510
	Prevention	-600	-4,620	-4,680	-19,690	-17,340	-69,630	-27,440	-5,910	-14,470	-164,380
	Recycling	-260	-2,960	-4,400	-8,070	-6,370	-43,320	-13,160	-3,000	0	-81,540
	FW to composting	0	0	0	0	0	0	0	0	-3,060	-3,060
	FW to AD	0	0	0	0	0	0	0	0	-3,830	-3,830
Division 87 residential care	Landfill	10	20	10	80	70	270	2,830	1,260	2,220	6,770
	Prevention	-490	-2,180	-2,840	-5,970	-6,980	-20,520	-7,480	-3,530	-19,980	-69,970
	Recycling	-210	-1,430	-2,670	-2,450	-2,610	-12,770	-3,590	-1,790	0	-27,520
	FW to composting	0	0	0	0	0	0	0	0	-3,830	-3,830
	FW to AD	0	0	0	0	0	0	0	0	-4,790	-4,790
Division 88 social work without accommodation	Landfill	20	20	10	60	80	180	3,300	1,420	1,930	7,020
	Prevention	-610	-2,140	-3,150	-4,910	-8,520	-13,380	-8,730	-3,960	-17,320	-62,720
	Recycling	-260	-1,390	-2,960	-2,010	-3,110	-8,330	-4,190	-2,010	0	-24,260
	FW to composting	0	0	0	0	0	0	0	0	-2,960	-2,960
	FW to AD	0	0	0	0	0	0	0	0	-3,710	-3,710

[12] FW denotes food waste; AD denotes anaerobic digestion

Table 59 Net carbon emissions associated with recycling compared to landfill by material, recyclability and SIC code for the Scottish health and social work sector 2011

Waste type	Recyclability	Health and social work sector	Division 86 human health	Division 87 residential care	Division 88 social work without accommodation
Glass bottles and jars	Widely recycled	-680	-250	-190	-240
Ferrous cans	Widely recycled	-4,540	-2,570	-950	-1,030
Non-ferrous cans	Widely recycled	-4,760	-1,880	-1,000	-1,870
Single use carrier bags	Widely recycled	-430	-170	-120	-140
Long-life carrier bags	Widely recycled	-50	-10	-40	0
PET bottles	Widely recycled	-3,040	-1,690	-620	-730
HDPE bottles	Widely recycled	-1,910	-950	-540	-430
Other bottles	Widely recycled	-60	-20	-30	-10
Newspapers	Widely recycled	-2,860	-1,350	-1,030	-480
Magazines, directories and catalogues	Widely recycled	-2,360	-1,380	-380	-590
Used A4 type paper including letters	Widely recycled	-1,950	-1,240	-240	-470
Unused A4 type paper including unused exercise books	Widely recycled	-50	-30	-10	-10
Other recyclable paper	Widely recycled	-1,690	-840	-260	-590
Envelopes	Widely recycled	-560	-380	-70	-110
Liquid cartons	Widely recycled	-420	-120	-150	-150
Corrugated cardboard	Widely recycled	-2,870	-1,050	-910	-910
Other card	Widely recycled	-2,870	-1,460	-710	-700
Subtotal		**-31,100**	**-15,390**	**-7,250**	**-8,460**
Other glass	Potentially recyclable	-50	-10	-20	-20
Other ferrous metal	Potentially recyclable	-1,240	-400	-490	-350
Other non-ferrous metal	Potentially recyclable	-5,280	-2,520	-1,670	-1,090
Other film	Potentially recyclable	-12,050	-7,900	-2,280	-1,870
Polystyrene including cups	Potentially recyclable	-900	-500	-120	-290
Other dense plastic	Potentially recyclable	-6,180	-3,210	-1,320	-1,660
Re-usable fabrics	Potentially recyclable	-18,910	-9,770	-6,260	-2,880
Non-reusable fabrics including used mop heads	Potentially recyclable	-43,360	-32,630	-6,020	-4,720
Shoes, boots, slippers and other outer footwear	Potentially recyclable	-2,140	-930	-490	-730
Handtowels	Potentially recyclable	-11,460	-7,940	-1,590	-1,940
Card plates and cups	Potentially recyclable	-640	-370	-30	-250
Subtotal		**-102,210**	**-66,180**	**-20,290**	**-15,800**
TOTAL		**-133,320**	**-81,550**	**-27,510**	**-24,250**

Note: Columns may not sum due to rounding

19 Human Health and Social Work Activities Sector: The cost of mixed waste

19.1 Estimated cost of disposal

Based on the estimated tonnages of disposed mixed waste, business units within the health and social work activities sector currently spend nearly £6 million pounds in landfill tax charges and this will rise to more than £8.5 million in the 2014 financial year. The following table gives the estimated landfill tax charges attributable to the health and social work activities divisions.

Table 60 The estimated cost of landfill tax attributable to mixed waste disposed of by business units within the Scottish health and social work activities sector

	Cost of annual landfill tax by year	
	2011 - 2012	**2014 - 2015**
Human health activities division	£3,058,700	£4,369,500
Residential care activities division	£1,487,500	£2,125,000
Social work activities division without accommodation	£1,421,700	£2,030,900
Health and social work activities sector	**£5,967,800**	**£8,525,400**

Note: Columns may not sum due to rounding

19.2 Estimated purchase price of unused paper

Overall, the health and social work sector was estimated to dispose of 70 tonnes of unused A4 paper in the mixed waste stream with a cost of nearly £280,000.

Table 61 Estimated weight (tonnes per annum) and cost (£ per annum) of unused paper waste disposed of by the Scottish health and social work activities sector in 2011

Sector / Division	**Weight (tonnes pa)**	**Cost of unused paper (£/annum)**
Human health activities division	50	£175,000
Residential care activities division	20	£61,000
Social work activities division without accommodation	10	£42,000
Health and social work activities sector	**70**	**£277,000**

Note: Columns may not sum due to rounding

19.3 Estimated purchase price of unused/whole food

Overall the health and social work sector was estimated to dispose of 2,410 tonnes of food that is whole or unused in the mixed waste stream per annum and this has an estimated cost of nearly £6 million. The following

table gives the estimated weight and cost of this food waste for each of the health and social work divisions and for the sector as a whole, by food type.

Table 62 Estimate weight (tonnes per annum) and cost (£000 per annum) of food that is whole or unused that is disposed of in the mixed waste stream by the Scottish health and social work activities sector in 2011

Food Type	Human health and social work activities sector		Human health activities		Residential care activities		Social work activities without accommodation	
	Tonnes	Cost	Tonnes	Cost	Tonnes	Cost	Tonnes	Cost
Pre-prepared meals and snacks	210	£1,116	60	£339	100	£555	40	£221
Vegetables	860	£1,112	260	£338	430	£553	170	£221
Fruit	610	£1,084	190	£330	310	£539	120	£215
Dairy	260	£954	80	£290	130	£475	50	£189
Bakery	330	£946	100	£288	160	£470	60	£188
Meat and fish	60	£486	20	£148	30	£242	10	£97
Confectionery	30	£148	10	£45	20	£74	10	£29
Dried foods	30	£105	10	£32	10	£52	10	£21
Desserts	10	£29	<10	£9	<10	£15	<10	£6
Condiments	<10	£5	<10	£2	<10	£3	<10	£1
Total	**2,410**	**£5,985**	**730**	**£1,820**	**1,200**	**£2,977**	**480**	**£1,188**

Note: Columns may not sum due to rounding

20 Human Health and Social Work Activities Sector: Perceptions and attitudes to mixed waste issues

The following analyses are based on the telephone interviews conducted with business units within the Scottish health and social work activities sector. It excludes hospitals and medical practices provided by the NHS Waste Management Steering Group for inclusion in the compositional analysis.

20.1 Recycling and reuse activities amongst health and social work business units

The following chart illustrates that a third (33.7%) of business units surveyed within the health and social work sector stated that they recycle and reuse at least some of their business waste. Overall, more than eight in ten (81.4%) recycle and/or reuse business waste. Conversely 17.7% of business units do not recycle or reuse any business waste.

Figure 36 Stated recycling or reuse activity amongst Scottish health and social work activities sector (base 335)

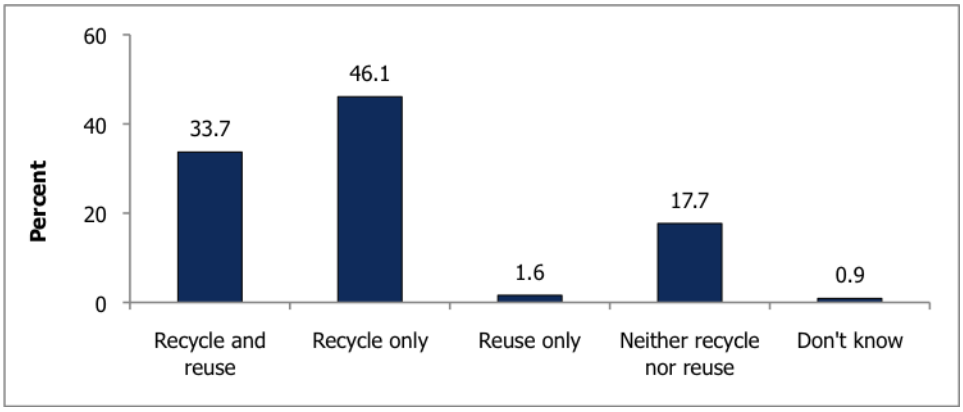


Table 63 Stated recycling or reuse activity by division in the Scottish health and social work activities sector

Division (base)	Recycle and reuse	Recycle only	Reuse only	Neither recycle nor reuse	Don't know
Human health activities (89)	30.0	45.2	2.3	20.3	2.3
Residential care activities (86)	22.7	53.3	1.3	22.7	0
Social work activities without accommodation (160)	41.7	42.8	1.3	13.5	0.7

More than a third (37.8%) of business units within the health and social work sector stated that they recycle all or most of their waste compared to over one in ten (12.9%) that stated that they reuse all or most of their business waste. Businesses are three times more likely to recycle than reuse their waste.

Figure 37 Stated proportion of Scottish health and social work business waste recycled or reused (base 332)

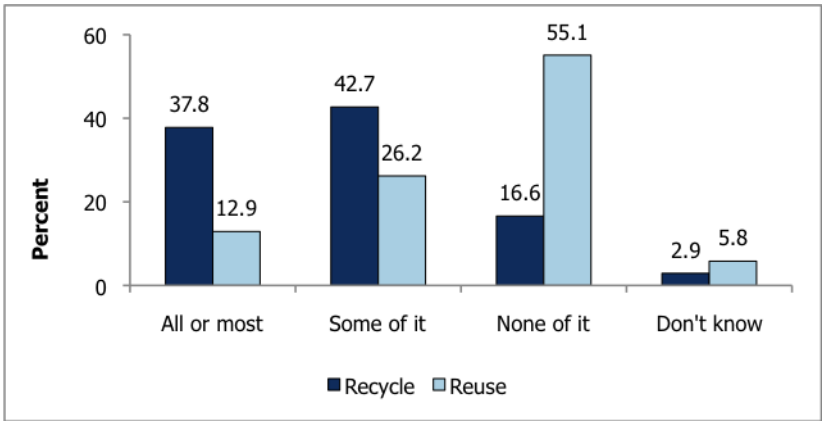
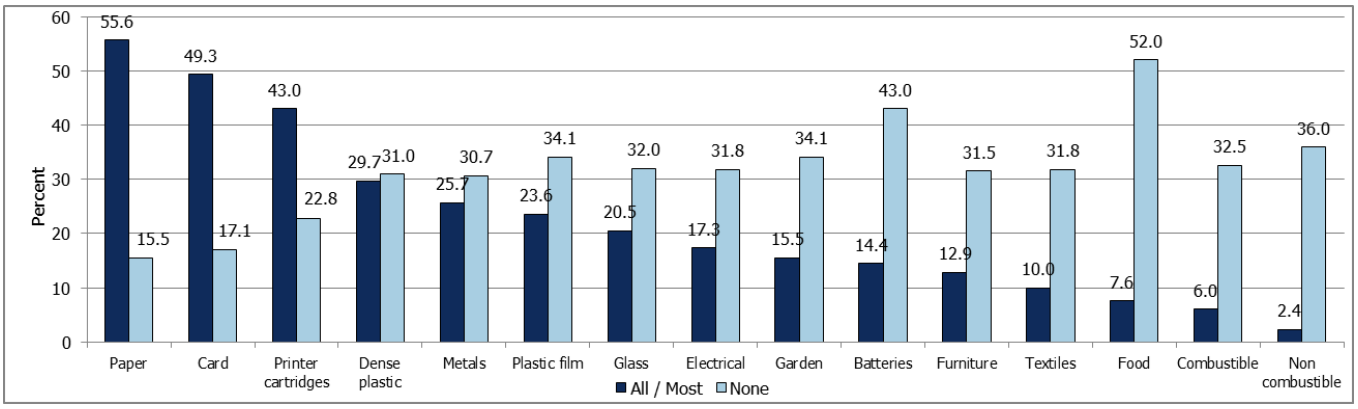


Table 64 Stated proportion of business waste recycled or reused by division in the Scottish health and social work activities sector

Division (base)	Amount of recyclable waste recycled				Amount of reusable waste reused			
	All or most	Some of it	None of it	Don't know	All or most	Some of it	None of it	Don't know
Human health activities (87)	30.7	49.7	18.4	1.2	13.0	20.8	62.5	3.7
Residential care activities (86)	30.4	41.8	22.7	5.1	9.6	20.2	59.3	10.8
Social work activities (159)	45.8	39.3	12.3	2.6	14.4	32.0	49.0	4.6

Businesses were most likely to state that they recycle or reuse paper products with more than half (55.6%) stating that all or most of their waste paper is currently recycled. Half (49.3%) of businesses recycle all or most of their card waste.

Figure 38 Stated proportion of Scottish health and social work business waste recycled or reused by material type (base 339)



Business units that do not currently recycle or reuse all or most of their waste were asked what prevented them from doing so. More than two thirds (67.9%) stated that there is a lack of facilities to enable them to easily

recycle more (or any) waste materials. More than one in eight (13.4%) indicated that they did not recycle more business waste because of a lack of space to segregate and store the waste. More than a tenth (11.0%) indicated that they would find the process of segregating their waste too time consuming or requiring too much effort on their part.

Figure 39 Stated reasons for not recycling or reusing more Scottish health and social work business waste (base 210, multiple response)

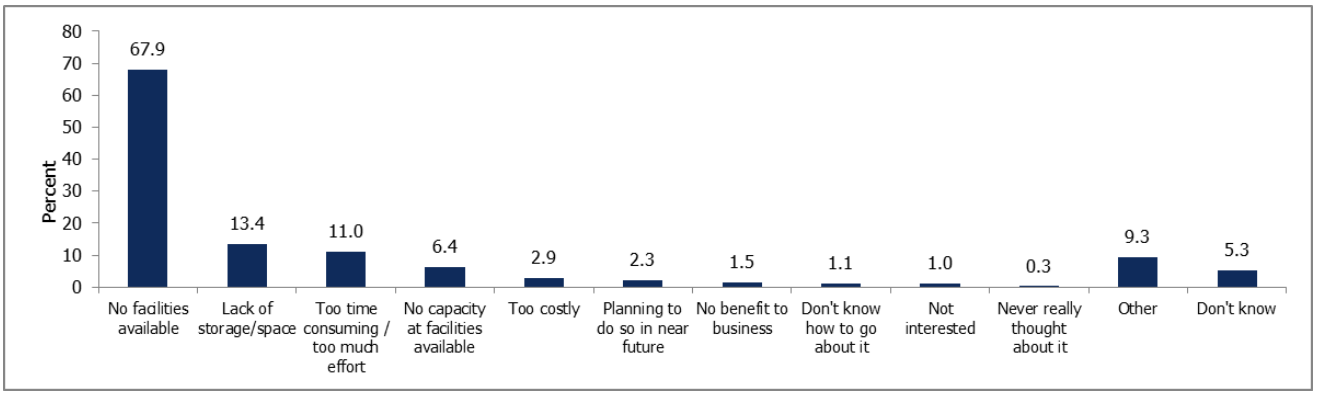


Table 65 Stated reasons for not recycling or reusing more by division in the Scottish health and social work activities sector

	Human health activities (base=55)	**Residential care activities** (base=65)	**Social work activities without accommodation** (base=90)
No facilities available	61.7	64.8	74.0
Lack of storage/space	20.1	10.1	11.7
Too time consuming/too much effort	14.6	10.1	9.3
No capacity at facilities available	0	7.8	9.3
Too costly	3.6	2.1	3.0
Planning to do so in near future	1.8	2.7	2.3
No benefit to business	3.6	0	1.2
Don't know how to go about it	1.8	1.0	0.7
Not interested	0	1.7	1.2
Never really thought about it	0	1.0	0
Other	7.3	8.5	11.2
Don't know	7.3	8.5	1.8

20.2 Presence of environmental policies or procedures amongst health and social work business units

More than a fifth (22.9%) of business units surveyed stated that they do not have any formal or informal environmental policies or procedures in place. Respondents were most likely (55.8%) to indicate that their business has an informal commitment to reduce waste and more than three tenths (31.9%) stated that their business has an environmental policy in place. Only 7.8% stated that they have introduced targets for recycling within their workplace.

Figure 40 Stated type of environmental policy or procedure in place amongst Scottish health and social work business units (base 334, multiple response)

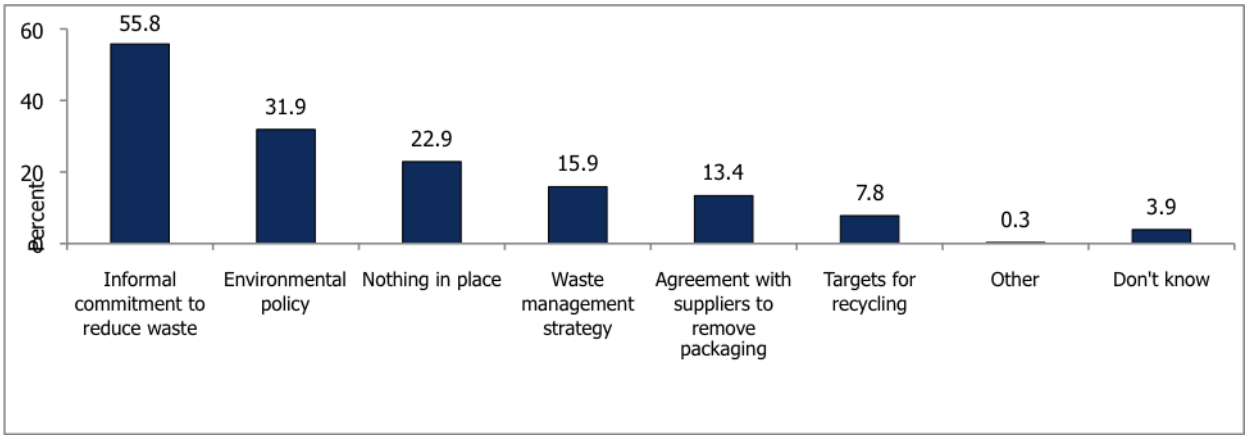


Table 66 Stated type of environmental policy or procedure in place by division in the Scottish health and social work activities sector

Division (base)	Informal commitment to reduce waste	Environment policy	Nothing in place	Waste management strategy	Agreement with suppliers to remove packaging	Targets for recycling	Other	Don't know
Human health activities (88)	54.3	17.6	26.2	13.1	14.9	5.6	0	2.3
Residential care activities (84)	51.8	29.9	25.7	21.7	14.1	7.6	1.3	12
Social work activities without accommodation (162)	58.6	40.9	19.6	14.4	12.2	9.1	0	0.6

20.3 Encouraging health and social work business units to recycle more waste

The following chart illustrates than nearly nine in ten (88.9%) of business units in the health and social work activities sector believe that it is very important that business units recycle or reuse their business waste. Nearly all agreed that this is at least somewhat important.

Figure 41 Stated importance of recycling or reusing Scottish health and social work business waste (base 338)

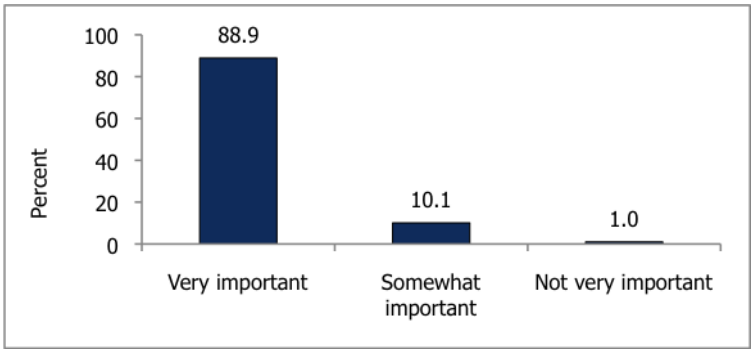
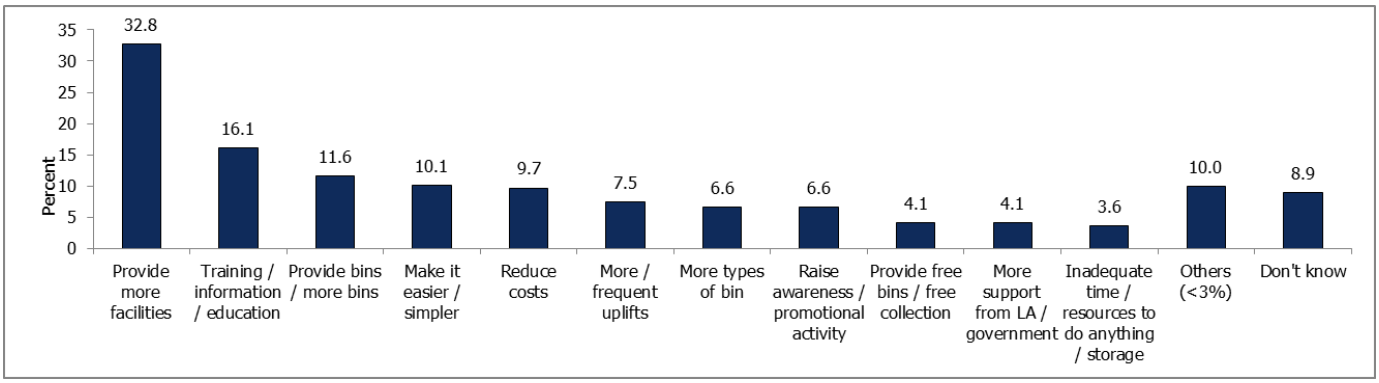


Table 67 Stated importance of recycling or reusing by division in the Scottish health and social work activities sector

Division (base)	Very important	Somewhat important	Not very important
Human health activities (89)	80.8	18.1	1.1
Residential care activities (87)	78.1	19.3	2.5
Social work without accommodation (162)	99.4	0.6	0

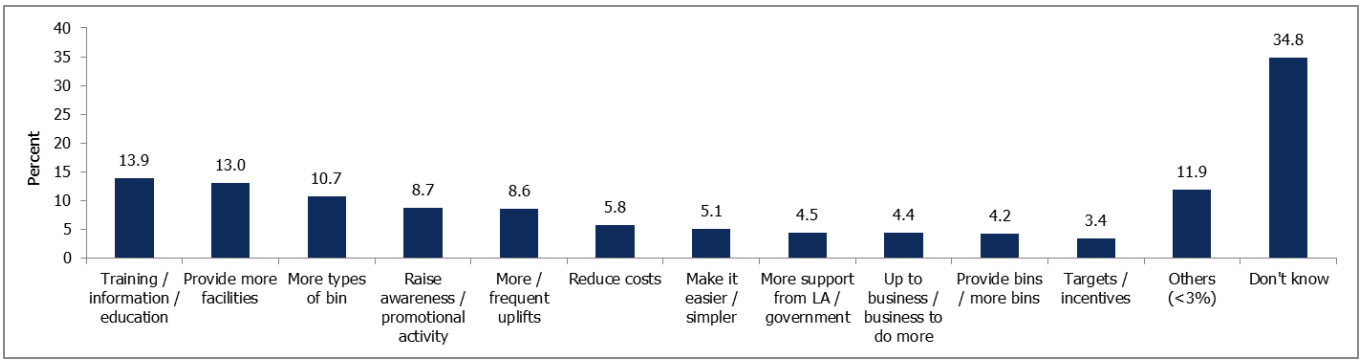
Nearly a third (32.8%) of respondents felt that they would need to have easy access to (more) facilities if they were to be encouraged to recycle more of their business waste. Six in ten (16.1%) felt that they would be encouraged to recycle more if there was more information and training of recycling issues.

Figure 42 Suggested ways of encouraging Scottish health and social work businesses to recycle more waste (base 339, multiple response)



Finally, respondents were asked what would be needed in order for them to implement more efficient general mixed waste management processes. Of those that offered a suggestion, the most common responses made were for the provision of more training or information (13.9%) on general waste issues and more facilities (13.0%).

Figure 43 Suggested ways of improving general mixed waste management processes amongst Scottish health and social work activities business units (base 302, multiple response)



21 Implications for the study sectors and resource management sector

The study was completed to understand more about the composition of residual mixed waste disposed of by key sectors of industry and commerce in Scotland. The purpose was to identify opportunities to increase levels of waste diversion from landfill and to address a known weakness in existing data. This research has made an important contribution to knowledge on waste composition in the three sectors concerned and provides a sound evidence base from which to move forward.

21.1 Opportunities for increased recovery of mixed waste

The results of the composition analysis have provided an insight into the quantities and types of materials within the mixed residual waste stream. Across all of the sectors a high proportion (>85%) of the mixed residual waste stream consists of materials that are already widely recycled or could potentially be recycled.

Waste (Scotland) Regulations, passed by the Scottish Parliament in May 2012, require all businesses in Scotland to separate paper and card, plastic, metal, and glass for recycling by 2014. Businesses that produce more than 50kg of food waste per week will also need to separate this for collection by January 2014, and businesses producing between 5kg and 50kg of food waste per week will be asked to follow suit from 2016.

The top five waste steams occurring in the highest proportions across the sectors were food waste, paper, card, dense plastic and plastic film. These waste streams will be targeted through the new regulations and are evident and visually obvious targets. Facilities for recycling these waste streams are a natural extension of the household based collection services that are established with householders. Employees and customers know these materials are recyclable through their own household waste experience and therefore there is employee motivation and also the operational potential to extend household based collection services.

The exceptions across the sectors were:

- Motor industry: 30.4% miscellaneous combustibles (consisting mainly of rubber) - see section 21.3.
- Pre-primary education: 7.2% sanitary waste. The high proportion of sanitary waste found in this division compared to other parts of the education sector is to be expected due to the care of young children using nappies.
- Other education: 7.3% glass. The proportion of glass found within the rest of the education sector was less than 2%, probably indicative of a high level of recycling taking place. The higher proportion of glass in the mixed waste in this sector suggests that recycling facilities and contracts for glass are not as readily available within this division of the education sector.

Across all the sectors a high proportion of the paper waste consisted of hand towel waste (25.9% wholesale, retail and motor; 41.3% education sector; 48.3% health sector). Anecdotally the weight of hand towels can vary greatly according to how wet they are when the analysis was conducted. Targeting this waste stream presents opportunities to reduce a substantial proportion of the mixed waste stream. Currently, hand towels are not a recyclable waste stream for reasons including health concerns.

Food waste is a key waste stream to be targeted due to the contribution it makes to biodegradable waste entering landfill. The proportion of food waste was between 20-30% across the majority of the sectors; the exceptions were:

- 3.6% for the motor division. The lower proportion of food waste found in this business area is likely to be as a result of a low occurrence of food preparation activities within this division.
- 36.1% for higher education. This proportion of food waste found in the higher education division was higher than any other of the other education divisions. Different catering arrangements can have a considerable impact on food waste arisings. Results from a study on the food waste arising in schools (South Ayrshire Schools Food and Recycling Waste Audit, 2011, Zero Waste Scotland) found that food waste arisings vary depending on the meal arrangements (produced on site, received from other schools, export meals to other schools). It is likely that the higher education section will exhibit similar variability depending on the in-house catering arrangements. The results should also be considered within the context sample size possible within this study.
- 13.1% for human health. The proportion of food waste found in the human health division is half that found in residential care and social work sectors. This result is potentially associated with the use of macerators in hospitals although no information is currently available to verify this presumption.

Certain widely recyclable materials (glass, textiles, ferrous metal and non-ferrous metal) made up less than 3% of the waste found across the sectors suggesting that, while there is still room for increased recovery, recycling of these materials is well established. There were a few exceptions as follows highlighting potential opportunities for improvement:

- Glass: other education - see above.
- Textiles: human health activities - 5.6%.
- Ferrous metal: motor industry - 7.2%,
- Ferrous metal: secondary and higher education - 3.7 and 5.7% respectively.

21.2 Opportunities for increased waste prevention and reuse

Food waste made up a large proportion of the waste stream across all the sectors, and with unavoidable food waste between 15-33% there are considerable opportunities for waste prevention and minimisation.

It should be noted, that unlike householder waste, the food waste generated by the commercial and industrial sector is not necessarily within the control of the organisations concerned. Food is brought onto premises by employees, students, patients and customers. However, where businesses are involved in food retail and food preparation there are particular opportunities to reduce the amount of avoidable food waste arising. In addition, employers can be involved in education and awareness raising amongst both employees and customers.

As highlighted above hand towels were a noteworthy waste stream and present an opportunity for waste minimisation. The cost analysis highlighted the potential savings available to businesses from reducing the amount of unused paper entering the waste stream.

Other waste streams including textiles, WEEE and furniture were generally present in small proportions in the waste stream but nonetheless present opportunities for both waste prevention and reuse.

21.3 Regulatory issues

The study has found that waste streams which are under separate regulatory control are entering the mixed residual waste stream:

- Over 30% of the motor industry waste stream was miscellaneous combustible materials, of which 82% was rubber, in some cases this was further defined by the waste analysis team as shredded rubber, possibly from tyres. These results indicate that rubber is entering the mixed waste stream and hence landfill despite the landfill ban in place on tyres. This highlights a potential lack of awareness within the industry.
- WEEE: although a small proportion of the waste stream, small amounts of WEEE were found across all the sectors. The most commonly found items were cables and extension leads, chargers and head-phones, suggesting that there is a lack of awareness that small WEEE items should not be disposed of in the mixed waste stream.
- Clinical waste: although a small proportion of the waste stream, small amounts of clinical waste were found across all of the sectors. The NHS has robust procedures for ensuring segregation of clinical waste before it enters the mixed waste stream.
- Hazardous waste: although a relatively insignificant amount of the waste stream, small amounts of hazardous waste were found across all the sectors. Batteries were not separately classified and made up a proportion of the hazardous waste stream. This is an additional recyclable waste stream, which it has not been possible to include in the figures presented on recycling.
- Animal by-products: Animal by-products are divided into three categories according to their potential risk to human and animal health. There are different rules for disposing of waste in each category. Within the categories considered by this study there is the potential for the production of Category 3 material. Category 3 material is low risk material and includes meat and fish from retailers, former foodstuffs of animal origin and catering waste. All categories of animal by-product waste should be kept separate from other waste streams and disposed of at approved premises. Category 3 material must be disposed of by incineration, rendering followed by incineration or landfill, anaerobic digestion, alkaline hydrolysis plant or composting or biogas plant. Category 3 material cannot be taken to landfill except for catering waste. In addition, former foodstuffs could be sent direct to landfill until 31 July 2011. Although the waste analysis team was not required to provide detail of the exact type of food waste (except for foods disposed of in a whole or unused state), there was evidence of this type of waste amongst the mixed waste that was collected and sorted. At least one key retailer has put in place a contract for food waste recycling since the composition analysis was completed.

21.4 Benefits of realising opportunities

The carbon equivalent emissions associated with available waste management options were calculated based on the waste composition analysis and the tonnage estimates. The analysis shows that significant carbon equivalent emissions savings can be achieved through recycling and/or preventing waste. Although there are challenges with recycling certain waste streams and it is difficult for any individual business unit to prevent many types of waste, the results demonstrate that significant carbon savings can be made through recycling materials, which are widely recycled.

The direct landfill costs if all the mixed residual waste was disposed of to landfill amount to millions of pounds for each of the three sectors studied. Working with waste contractors, businesses have an opportunity to reduce the amount of mixed waste and potentially reduce the associated costs. Targeting dry materials such as card and dense plastic, which are high volume materials and were found to make up a large proportion of the mixed waste stream, presents a particular opportunity to reduce the volume of mixed waste generated.

Considerable costs were also found to be associated with the volume of unused paper and food being disposed of across all the sectors. If this waste could be prevented, for example by making better use of paper and planning, storing and portioning food more effectively, savings can be made in direct costs (the amount paid for the food or paper that was not used) and potentially in waste management costs. Even where the food waste generated is not in the control of the organisation (e.g. where food is brought onto the premises by staff or students) it is in the business's interests to attempt to reduce it as there are still costs incurred in its disposal.

21.5 How the data will be used going forward

The data generated from this study will be used to inform actions needed to ensure Scotland achieves its targets of 70% recycling all waste by 2025, with just 5% going to landfill.

Zero Waste Scotland is already working with the three sectors covered by this study and going forward will be exploring the ways in which it can help support increased waste prevention and recycling.

Support for waste prevention, recycling and sector cost savings will need to be developed taking account of the current position and circumstances within each sector. Working in partnership with the sectors and with key stakeholders such as the NHS Waste Management Steering Group and the Scottish Retail Consortium will be a key aspect of delivery.

The sections below identify the areas in which ongoing support will be required to realise the opportunities identified by the study and the actions that Zero Waste Scotland is already taking forward in relation to these.

21.5.1 Education and awareness

Consistently in the telephone survey the majority of the organisations stated that it is very important to recycle or reuse more of their waste. Achieving individual and organisational behaviour change will require education and awareness-raising activities across all the sectors.

Zero Waste Scotland incorporates behaviour change elements into all of its business support activities and will continue to do so to ensure successful implementation of the Waste (Scotland) Regulations.

21.5.2 Organisational support

A high proportion of the organisations surveyed stated that they were recycling or reusing at least some of their waste but only a small proportion stated that they were recycling or reusing all of it. A commitment to improvement was indicated across the sectors with a high proportion either having a formal environmental policy in place or an informal commitment to reduce waste. Across all the sectors the materials most widely recycled were stated to be paper and card with food waste least likely to be recycled. Some of the reasons stated for not recycling included that it would take too much effort or be too time consuming.

Zero Waste Scotland provides support to businesses to help them reduce waste, recycle more and use resources sustainably. This includes generic support, advice and training, particularly focused on small and medium sized enterprises as well as sector-specific programmes. This extends to supporting the leadership role of the public sector via good practice in procurement.

Additionally, Zero Waste Scotland is involved in creating a single 'one stop' Scottish Energy and Resource Efficiency Service (SERES) for businesses, with other partner organisations. It is also considering options to progress a 'zero waste pledge' for Scottish companies, which will be consulted on by the Scottish Government as part of its Waste Prevention Programme.

21.5.3 Infrastructure and market development

Across all the sectors the stated materials most widely recycled were paper and card, with food waste least likely to be recycled, reflecting the availability of recycling contracts for different materials. In addition, the most common reason stated for not recycling more waste was lack of facilities. As highlighted in section 21.1, the Scottish Government intends to introduce regulatory measures to drive the segregation of recyclable materials. Introduction of greater segregation within the sectors will require access to suitable contracts for collection. Similarly, infrastructure for collection and processing needs to be in place. The availability of good quality data is essential to support this further development of local resource management facilities and infrastructure.

The results have illustrated the scale of collection required and the distribution of the materials across organisations of different sizes. A considerable proportion of the waste is generated by SMEs and smaller organisations. For instance, in the motor industry 60% of the waste was generated by business units, which have 0-9 employees. This distribution of waste presents a logistical and operational challenge for the resource management industry where small amounts of waste are being generated by a large number of small organisations. These challenges to collection need to be addressed within suitable solutions being available at all organisational scales.

Zero Waste Scotland is already supporting the roll out of food waste collections from homes and businesses. A £4m investment programme was made available in 2011/12, and an additional £5m is available in 2012/13. The organisation also offers a range of management and business support options for commercial organisations involved in the collection, sorting and reprocessing of waste materials, including targeted financial support.

To support the implementation of the Waste (Scotland) Regulations, it will support innovation in collection systems, especially those that enable greater uptake of recycling services by SMEs. ZWS has also updated its Business Re-use and Recycling Directory which helps businesses to find appropriate recycling service providers in their area.

To maintain collections of recyclable materials sustainable markets need to be established and available. The regulatory measures being developed by the Scottish Government are intended to maximise the quality of materials available for recycling and provide greater certainty for investment in infrastructure.

Zero Waste Scotland is providing support to organics reprocessing facilities to improve the quality of their compost, digestate and biogas output as well as ongoing work to improve market confidence in compost and digestate outputs derived from food waste, including with the agriculture sector.

ZWS is also developing a programme of work with Materials Recovery Facility operators to help them increase the throughput and quality of materials they sort, to meet the requirements of the Waste (Scotland) Regulations.

22 A review of lessons learned from the project

This part of the report identifies the experiences of the research team in delivering a large scale compositional analysis of commercial and industrial mixed waste in Scotland and offers learning on improvements that were either implemented during the course of the study or may benefit future similar projects.

This was a challenging and difficult to implement research project that has provided a detailed analysis of the composition of residual waste for three sectors of Commercial & Industrial waste; Retail and Wholesale, Education and Health. As result of these findings and the contributions from peers and statistical expertise, this project has identified opportunities for Zero Waste Scotland to influence the composition of residual business waste and provided an evidence-based analysis of the materials that were found to make up this waste stream. Policy makers and the waste industry now have the opportunity to make decisions based on actual waste analysis fieldwork that has been credibly scaled up to provide the most accurate assessment of C&I residual waste arisings and analysis ever undertaken in Scotland.

The research team conducting the work at Zero Waste Scotland have delivered a statistically robust and detailed analysis of the composition of residual waste in these three sectors together with the best estimates of grossed up tonnages that aligns with and builds upon the best of previous research data. We would like to acknowledge the inputs from staff representing SEPA, SESA, the Scottish Government, Zero Waste Scotland, WRAP, Caledonian Environment Centre, Glasgow University and the research team at Exodus Research and WastesWorks in the successful delivery of this project.

22.1 Sampling and databases

- Issues with using IDBR data in sampling framework.
- Proportion of successful telephone matches.
- Timings v process requirements.

As is identified in other areas of this report, a sample of Scottish businesses was designed to be reflective of the population in Scotland by standard industrial classification (SIC2007). A sample of 20,000+ businesses that conformed to the desired SIC codes was requested from the Inter-Departmental Business Register (IDBR). Because a telephone survey was an integral part of the work and the IDBR contains very few telephone numbers, a commercial database provider was contracted to find as many as possible, but only one third could be found. It was necessary to supplement these records with web searches and other databases to find additional telephone records (for example local government databases of schools and other educational establishments).

In a significant number of cases it became apparent that the official IDBR data on business units was at least in part out of date. The IDBR is a database of more than 2 million businesses administered by the Office of National Statistics (ONS) and is updated and populated with data from VAT and PAYE returns, Dun & Bradstreet, Companies House and the Business Register Survey. The data was taken from the 2010 version but the register does have some discrepancies that the ONS seek to correct by frequent updates. The data is known to be the

least reliable for SME's particularly for very small operations. The issue of the data being up to date was immediately obvious to NHS staff reviewing the sample of suggested sites and an alternative approach was taken to select a sample of NHS facilities. The research team asked senior NHS managers to put forward business units that were representative of the NHS areas of Scotland under investigation and suitable to take part in the waste analysis. Some sites were discounted as there were access and Health & Safety implications. However the final sample consisted of a range of NHS facilities with differing waste receptacles including compactors that were representative of the area under investigation.

When grossing up the data to national levels in this report, the IDBR data has been used as despite the issues referred to above it was considered the most complete dataset available. Other NHS databases to provide current estimates of the number of business units operating were of limited value as information on the SICs and size were not available. The conclusion therefore is that overall the IDBR data remains the best basis for sample selection and statistical scaling up in studies of this type due to the collection of data using a standardised methodology and the availability of turnover and employee numbers. However it is possible that some business sectors may have more accurate databases, but some risk lies in their use if the data is not rigorously maintained or it is in any way incomplete.

Accessing Office of National Statistics IDBR data is time consuming and the data request application must be sponsored by a recognised government department. Furthermore, data security and confidentiality protocols and agreements with all parties having full or partial access to the data have to be signed and returned to the ONS before data can be released. Researchers should build in sufficient time for these processes into project planning – perhaps as much as 6-8 weeks.

22.2 Telephone recruitment of business units

- Over recruitment to tackle drop outs and operational issues.
- Adverse weather risk assessments.
- Small populations in sub SIC codes.
- Internal communication needs.

During the telephone recruitment stage of the research, 863 businesses were recruited within the SIC codes as allocated by the sample design, although some of these dropped out or were not used. In general businesses were reasonably easy to recruit once they had participated in the questionnaire and were asked for consent to be put forward to the waste analysis phase. It is not known whether any bias was introduced by the propensity of businesses agreeing or declining to take part. Approximately 33% of all businesses contacted participated in the questionnaire and of these under 10% did not proceed to provide full consent for waste analysis – often this was simply because a specified individual had authority and was not available. We would recommend that future studies over-recruit by more than 10% to build in some flexibility and allow for drop outs.

Some issues occurred (although not unexpectedly) where populations in a particular sub SIC code were low and drop outs were difficult to replace. For example in sub SIC code 85.5 – (Educational support activities) only two businesses agreed to take part and following waste analysis one resulted in a missed collection and the other

was not used because the waste was collected erroneously from a nearby business. Additional resources were required to ensure that the whole breakdown of SIC codes had sufficient populations of recruited and compliant businesses and sufficient substitutes to provide a contingency. Three changes in procedures may alleviate this problem in future; firstly ensure that the recruitment phase for low populations takes place at the beginning of the process. Secondly specify more records from which to sample where low populations occur and lastly consider sourcing alternative databases where these exist.

The scheduled telephone surveys were delayed by adverse weather, as at some points nearly all schools and many retail businesses were closed or operating below normal hours. In addition the heavy snow disrupted operations at the ONS delaying data provision. This occurred in December 2010/January 2011 and extended the recruitment phase by several weeks. Conducting winter fieldwork in Scotland is an operational factor that must be included in risk assessment and appropriately planned for. Ironically the project team had focussed planning for the main weather-related risks during the waste analysis phase in January and February when operational staff would have been in vehicles collecting and sorting waste across a wide geographical area; the impact on the telephone recruitment phase was not clearly identified. The risk assessment was focussed on how the weather might influence the outward facing tasks rather looking at a 360° view on how businesses might be affected. However, the focus on planning for additional resources or safe working practices for waste sorting/ collection staff should not be understated.

Recruitment of sites from large retail chains was slow and problematic because agreement to take part often had to be obtained from a senior manager in a head office function. This was delayed further by the need for a number of WRAP Key Account Managers to contact their contacts within the big retailers to introduce the process. In retrospect it would have been better to allow more time for communications before the project and internal political sensitivities identified and addressed in the project planning.

22.3 Waste audits

- Inaccurate information arising from telephone surveys.
- Contact with normal waste contractors.
- Team communications and technology.
- Health and safety issues for unusual containers.
- Paladins and misinformation.

Businesses taking part in the research were visited by a waste auditor, who was responsible for physically identifying the waste receptacles, confirming any access problems and obvious Health & Safety issues on site. It was apparent from the outset of this task that the information provided by the telephone survey was inaccurate in approximately a quarter of cases and the on site inspection helped clarify the numbers of bins, collections and usage. It was not anticipated that the telephone survey would yield such inaccurate information particularly when the bin sizes, days of collection and frequency would be so critical. This was attributed to waste being not front of mind for many businesses and this disconnect should be considered for future studies. While without a doubt the audit contribution qualified this data, in some cases the information gathered still proved at odds with waste collection contractors when consulted. Although this was planned, contact with waste contractors did not

prove possible at all times operationally and it is recommended that adequate time is allowed to enable the normal waste contractor to be contacted to verify collection services to a business unit prior to the scheduled collection for compositional analysis.

In a small proportion of cases, communications between the various members of the teams were ineffective and at some times the operational staff had little time to react to what was a fluid environment with businesses dropping out and being replaced. It would have been better to have formalised the processes for all the individual steps that are required to deliver each waste analysis from recruitment to delivery of the individual business report so this could be consistently applied to each business. In addition the use of technology such as PDAs to provide updated information for operational staff and to receive information on collections would be very helpful for future work.

Some health and safety issues were encountered that could have been better dealt with in the planning stage had more time been allocated. For example some businesses disposed of differing waste streams via multiple receptacles e.g. an 1,100L bin for office waste and a skip for wood and glass waste. Although this issue was identified in the project planning it was not apparent until fieldwork commenced that the waste analysis contractor had H&S issues with staff sampling from some types of container and operational issues arose as alternative arrangements had not been made. A lesson learnt for future work would be for all units presenting as unusual containers, or those with known health and safety risk to have individual plans made for collection. In a small number of cases, the waste contractor rejected a business unit that would have caused significant operational or logistical problems; this approach introduces bias into the sampling and it would have been preferable to find a workable solution to include such business units in the research.

Finally, some confusion was created by respondents to the telephone survey describing containers as paladins when they were simply normal 1,100/2,400l bins. This terminology caused some issues over whether these units could be included particularly if not corrected by the waste auditor. Future projects should be clear over terminology in describing receptacle types and be aware of the potential for misinformation.

22.4 Waste Analysis Collections

- Drop outs and technology.
- More time needed in planning.

In general there were only a small number of businesses drop outs during the recruitment phase; slightly more businesses dropped out during waste analysis fieldwork. Where cases dropped out during waste analysis fieldwork these were swiftly replaced on a case-by-case basis by using additional contractor resources. The intention was to ensure that the sample of 750 businesses was always available to the waste analysis contractor and wherever possible these were accommodated.

However the delays in the project meant that difficult decisions needed to be made day to day and in practice the waste analysis team were asked to be more adaptive than ever originally envisaged. It is recommended that the waste analysis teams are updated daily on their rounds and updated in the evening of each day on any

changes/recruited units – this will require that teams have appropriate technology/hardware and software to operate and access updates online.

The project was scheduled to have six weeks of fieldwork to provide samples from 750 businesses. The waste analysis teams completed 704 businesses units at the end of the fieldwork, although additional resource was necessary to achieve this. Some of the collections were missed due to local authority contractors collecting the waste before the analysis team could attend and some instances of communications breakdowns contributed to these problems. The burden on the teams to catch up on missed collections contributed to the difficulty in achieving the sample sizes required. It is recommended that more time is given to the set up timings to enable waste contractors to be informed of waste analysis collections and for the sample of businesses going forward to waste analysis to settle. As it was the timings of this project were such that replacement of drop outs and rescheduling of missed collections occurred throughout the project fieldwork which was an administrative and operational pressure that could have been reduced. As mentioned before, using modern technology such as PDA's to reschedule diaries and to report collections as they are completed could reduce the potential for error and enable fieldwork to be more efficient.

22.5 Seasonal variation

- How to adjust for seasonality.
- Future research.

This study was designed to capture one week's worth of waste during February and March 2011 and as such only captures a snapshot of the waste disposed of by business units which may not be representative of the waste disposed of over a year. Ideally the project would be repeated at different times of the year to measure the seasonal aspect more thoroughly.

In addition it would be worth considering measurement of changes week on week by undertaking a longitudinal study incorporating a small number of representative business units through which mixed waste is collected and analysed throughout a year and the results applied to the larger study. This approach would however be considerably more expensive.

22.6 Businesses with shared receptacles

- Separating mixed collections.
- Potential bias in use of red sacks.

Many UK businesses operate from communal offices or shopping areas and have some form of shared waste disposal. It was necessary that waste from the individual business units was identified amongst the mixed waste by issuing red sacks marked with an ID number to businesses to place their waste in for the week where they were scheduled for waste analysis.

In practice, some problems occurred as a few businesses dropped out stating that it was too much work or became suspicious that they were being scrutinised. Some collections were rejected as the ID numbers were missing and it is not known to what extent the businesses normal behaviour was changed by the use of the red

sacks thereby introducing bias. However, aside from errors relating to distribution and use, without this process a large number of businesses would have been excluded from the project.

22.7 Retailers

- Time for communications to large retailers.
- Backhauled retail waste.
- Obtaining weights for a whole weeks waste arisings.
- Large retailers claim to be recycling large proportions of waste.

A number of issues arose in including the major retailers in the project. As referred to earlier, in the recruitment phase, a number of communications were necessary centrally from WRAP to key contacts at retailers that had signed up to the Courtauld Agreement and as a consequence the research team were unable to recruit these businesses until late into the recruitment phase. In practice recruitment of large retailers was still taking place just prior to the waste analysis, which allowed little time to understand the volumes of waste and factor into the waste analysis diary some very frequent and large sample. Further work should consider the time requirements for recruiting large retailers and build the communications necessary to do this early on in the project plan.

In addition, many of the large retail chains have back haul arrangements whereby waste is collected by delivery vehicles and removed to a central depot for processing and recycling. Three of the chains that utilise this methodology allowed sampling from their stores, however the volumes of waste from some stores and frequency of collection required (daily in some cases) was not fully appreciated at the start of the project and later posed considerable logistical challenges for waste analysis. In particular measuring the weights of a whole week's worth of business waste from some large retailers that would normally remove waste daily by back haulage proved difficult and a process of modelling based on sub-samples collected was necessary in some cases. This issue was identified in planning but proved inconsistent in some cases for operational reasons. Future projects could design a protocol for weighing large samples that are destined to be sub-sampled for compositional analysis.

Most of the large retail grocery chains declined to participate in waste analysis arguing they have established recovery operations for waste – as referred to elsewhere in this report. One of these recovers all waste to a Materials Recovery Facility (MRF) where materials are recovered for recycling at a rate in excess of 75%. It would be useful for future work to work more closely with retailers to obtain more precise data on tonnages and the proportions of waste being recycled. On this occasion time or confidentiality issues prevented more data being produced.

22.8 Waste containers and receptacles

- Inaccuracies by not analysing all waste in the container.
- Health and safety concerns pose operational issues.
- Compacted waste.
- Bulky waste going to landfill and waste analysis methodology.

Business waste is stored in a huge variety of containers and some businesses utilise skips (both open and closed), compactors and paladins. These containers presented the greatest difficulty for the waste analysis teams as health and safety concerns prevent a person entering the skip to empty them for analysis. Operatives were provided with hooks and poles to remove waste but the success of this in practical terms is contingent on rubbish being bagged up and not falling apart on removal. The alternative is for the skip to be emptied by the waste removal contractor and sorted or sub-sampled as appropriate.

Businesses with compactors were included in this project and several approaches were used to sample from these containers. Firstly where practical it was agreed with the site operators for waste to be stored in an alternative container – this seemed practical but also led to operators requesting more frequent collections than anticipated, some health and safety issues and some difficulties when sub-sampling large volumes of waste and obtaining overall weights (see part 22).

Compacted waste can be difficult to sort and even dangerous for the sorters as it is hard to safely separate by hand and some items may break into sharp objects. This was overcome through liaison and assistance from the waste operators. For example one waste operator that runs a Materials Recovery Facility was able to provide a sample of the compacted waste, by running the compacted waste through a waste de-compactor and enabling a sub-sample to be coned and quartered. Any future research should not underestimate the planning and negotiation required to set up an alternative methodology and the legitimate logistical and health and safety issues these may raise and the time elements to service any arrangements made.

Bulky waste was not included within the scope of this study as the emphasis was on mixed waste but in a number of businesses this is a significant waste arising that often ends up in landfill. Some bulky waste is broken up and appears in the mixed waste stream, other businesses may utilise a skip for periodic removal. In observations of both retail units and at NHS hospitals waste items such as mattresses, waste wood, glass and furniture were placed in skips and staff on the site stated they thought these items went to landfill. To gain a better understanding of the weight and volumes of bulky items and their disposal route, we recommend that further study on occasional/seasonal/bulk waste arisings is undertaken probably as a longitudinal study of a sample of the main SIC codes where these materials occur. Alternatively the business units themselves may have records of bulky items disposed of that can be obtained more cost effectively than by waste analysis; for example do NHS sites know how many mattresses they dispose of?

As mentioned before bulky waste stored in skips can be difficult to handle, operational issues arise about safely analysing some materials and specialist equipment is required to lift, empty and weigh the contents. However with some improvements to the waste analysis methodology it should be possible to design a protocol for effectively measuring these arisings in a cost efficient manner.

22.9 Sub-sampling

- Protocol for sub-sampling.
- Operational issues.

A written protocol was agreed for sub-sampling as it became apparent from the survey and audit information that many sites were producing a volume of waste too large to sort within the available study resources. Where weights exceeded 500kgs, cone and quartering methodology was employed to select a sub-sample (this is reproduced in Appendix D). However some difficulties were experienced in obtaining values for weights of the whole weeks' worth of waste (not just the sub-sample) and in some cases this data was modelled using container volumes and observed waste. This was a particular problem where materials were in closed skips and not routinely weighed by the waste operator.

Sub-sampling waste where large arisings are observed is a practical and sensible approach; however, a clear sampling protocol must be observed. Some comment has been made regarding the practicalities of all the required steps being applied consistently in the field; for example bagged waste should be emptied prior to being sub-sampled. Future studies should think carefully about how any sub-sampling protocol is to be implemented operationally and in particular whether sufficient time is allocated to take all the necessary steps when pressure for sample volumes is also high.

22.10 Geographical spread

- Balancing sampling businesses randomly with logistical or geographical constraints.

A previous report in the hospitality sector (The Composition of Waste Disposed of by the UK Hospitality Industry, WRAP, July 2011) placed a geographical limit from the sort site that businesses could be selected from, which effectively greatly reduced the numbers of businesses that were willing and able to take part. The waste analysis contractor did not place such a restriction and was exceedingly accommodating in this regard. However, the project did require additional resources to complete the waste analysis and in part the large distances that their teams covered may have contributed to this. Future studies should consider clustering of the samples during the planning stage although this may compromise the desired random sample in favour of more practical considerations.

22.11 Sort sites

- Organise your sort sites early.

Very few problems were encountered in this phase of the fieldwork although it is important that liaison with local authority staff and operators at sort sites is started early in the project as suitable space is always at a premium in these facilities and that communication is maintained throughout. The project team performed well in this regard not least because of the very accommodating attitude of the local authorities and waste operators

involved and the contacts and experience of the waste analysis contractor. It is important that future projects tackle sort site acquisition early in the project as it an important logistical factor in determining the units that take part or be included.

22.12 Waste Transfer Notes

- Remember waste transfer notes for business waste are a legal requirement.

In the intensive work that was carried out to set up the project, the project team omitted to consider whether waste transfer notes (WTNs) should be provided. Historically most waste composition studies have been conducted on household waste and the waste is transferred for sorting and disposal to the regular waste contractor i.e. the local authority; as such there has been no requirement for the issue of WTNs. All future studies concerning the composition analysis of business waste should require waste analysis contractors to issue WTNs.

22.13 Grossing up

- Grossing up to national level can use a number of methodologies and the tonnages can vary considerably based on the approach taken.
- Independent statistical advice should be considered.

The compositional data represented one week's worth of data and to gross this up to represent the mixed waste disposed of over a year, several approaches were used. This included multiplying the material waste weights by 52 weeks, the number of weeks of business opening and a combination of the two to adjust for key materials such as food waste. Ultimately, following a peer review and discussions within the project group, it was agreed that it would be appropriate to use estimates employed in a recent study (Commercial and Industrial Waste Survey 2009, Defra, December 2010). Appendix J gives full details of the various approaches used and their advantages and disadvantages.

22.14 Material categories

- Consider whether material classifications for the waste analysis of business waste need developing.

The waste compositional analysis utilised material categories arising from standard classifications developed by WRAP in previous work. A peer review has suggested that this materials classification has been developed from classifications used in UK household waste and it may be the case that future studies should consider further sub-classification of waste streams and materials that occur in the commercial sector.

22.15 Wet waste

- Ensure that sample and weights are not contaminated with water as a result of analysis activity.

Some of the observed weights may be influenced by absorbed water, which pertains in particular where paper

products such as hand towels are presented. However it is supposed that this week's 'snapshot' during the eight weeks of fieldwork is reasonably representative of the occurrence of wet waste and most containers encountered were closed and not open to the elements. There is no evidence that the water was introduced as a result of the project being undertaken and all collections were made in closed vehicles and sorted undercover at sort sites.

23 Recommendations from peer reviewers for further work

23.1 Telephone survey

The telephone survey generated useful data on waste management practices within the study sectors, the full analysis of which was not possible within the resources available for this study. Additional analysis of the dataset could support and inform future work through further comparing the telephone survey data to the composition data for business units. Zero Waste Scotland will make the anonymous data available on request; please contact susie.stevenson@zerowastescotland.org.uk

23.2 Resource Efficiency Roadmaps

The outputs of this study could be used as the basis for the development of Resource Efficiency Roadmaps for the three study sectors. Based on a supply chain approach, these could identify opportunities for resource efficiency and cost savings with the sectors, and opportunities for the resource management industry in Scotland to develop a range of added-value services.

23.3 Businesses with high employee numbers

There is an opportunity for Zero Waste Scotland to work closely with large organisations, which were not included in large numbers in this study, especially those with multi-sites to identify and benchmark arisings and composition. These could be used internally to monitor individual stores and also, with permission from the retailers and using anonymous results, to allow benchmarking across companies in the sector.

23.4 Longitudinal studies

A highlighted weakness of the methodology adopted in this study was that it only provided a 'snapshot' in time of the composition and tonnage of wastes arising. As such, the methodology does not provide a complete picture of variations in waste composition as a result of seasonal impacts or periodic and unusual waste production. Consideration could be given to developing longitudinal surveys over a period of 2-3 years to provide an estimate of the impact on overall commercial and industrial waste production of seasonal and 'periodic' activities for these sectors.

It should be practicable to design a robust and cost effective method for estimating waste quantities and composition without the need to carry out costly compositional analysis. It is recommended that a feasibility study be carried out to assess the cost effectiveness and potential reliability and robustness of a longitudinal study. These studies could be developed working closely with the waste management companies.

23.5 Regional analysis

While the sampling locations were selected to cover a large area of Scotland, the sampling framework was not specifically designed to enable a robust analysis of regional differences. Future studies should therefore give consideration to collection of data suitable for examination of any regional differences.

While outside the resources available within the current study, with further analysis a geographical breakdown of the national estimates could be generated using employment data. This could be a useful addition to the analysis for planning purposes.

23.6 Systematic review of commercial and industrial analysis studies

Studies have been carried out over a period of years on commercial and industrial waste arisings. This could be an opportune time to carry out a systematic review of studies and methods for estimating the quantities and composition of commercial and industrial wastes. For example, in terms of waste data collection implications, rather than estimating waste quantities through periodic, large-scale 'snapshot' studies, it may be more cost effective to gather the data through a series of small-scale ongoing studies, possibly carried out in collaboration with the resource management sector. A feasibility study could be carried out to develop recommendations on the viability and cost effectiveness of such an approach. Approaches that have been developed by WRAP to support data collection and resource efficiency measures in other sectors should be reviewed to assess their adaptability to enhancing data quality for the sectors in Scotland. A number of tools already developed by WRAP, for example, the Net Waste Tool for CD&R wastes, might be easily adaptable to estimating waste quantities and composition for C&I wastes. In addition, WRAP is a partner to the European-funded EDOC project which is testing the feasibility of developing an electronic, real-time Duty of Care transfer note system; if successful this should assist in providing data on quantities of waste, albeit that composition is unlikely to be well recorded.

Appendix A Glossary of terms

Business unit

This refers to the individual business sites; a business may have more than one unit with each unit identified by its postal address.

Confidence interval

A confidence interval (CI) expresses the precision of the results of a study. The CIs within this research shows the range within which there is 95% confidence of the results compared to those that would have been measured via a census. The narrower the interval, the more precise the estimate.

IDBR

The contact data of business units approached in this study was taken from a Scottish extract of the Inter Departmental Business Register (IDBR, March 2010). The IDBR is maintained by ONS and is a database of all registered enterprises operating in the UK i.e. enterprises that are registered for VAT and/or PAYE. It covers 99% of economic activity in the UK. Those excluded are small sole traders or partnerships with no employees and an annual turnover of less than £68,000.

Landfill tax

The UK Landfill Tax was introduced in 1996 as a key mechanism in enabling the UK to meet its targets set out in the Landfill Directive for the landfilling of biodegradable waste. The amount of tax levied is calculated according to the weight of the material disposed of and whether it is active or inactive waste. The landfill site operator is responsible for paying landfill tax. However, operators will pass the cost on to businesses and local councils on top of normal landfill fees. The current standard rate of landfill tax for active wastes is £56 per tonne and this will increase by £8 per tonne each year until at least 2014.

Mixed waste

For the purposes of this study '**mixed waste'** from the commercial organisations included in the waste composition analysis is defined as:

- Waste categorised as 20 03 01 by European Waste Catalogue (EWC) code.
- Waste categorised as 15 01 06 unless collected in a dedicated recycling container.
- Bulky waste: any item over 25 kilograms, which fitted in the receptacles provided by the waste collection contractor. Although categorised as bulky waste, if these items were placed in the containers provided to the organisations and they were included in the study.
- Catering waste mixed with other wastes. Catering waste is waste food from restaurants, catering facilities and kitchens.
- Former foodstuffs mixed with other wastes. Former foodstuffs are foods of animal origin, or foods that contain products of animal origin, that are no longer intended for human consumption.

The definition of '**mixed waste'** excludes:

- Any separately collected waste: according to the definition above; separately collected fractions of municipal waste are further categorised under EWC code 20 01.
- Waste categorised as 15 01 06 collected in a dedicated recycling container.
- Bulky waste: as per the definition above, any article of waste which did not fit in the receptacles provided by the waste collection contractor.
- Animal by-products: animal by-products should be separately collected and sent to approved premises for treatment or disposal; the exceptions are catering waste, which can be sent to landfill, and former foodstuffs, which can go direct to landfill until 31 July 2011.

Number of employees

The estimated number of business units by size is based on ONS data, which uses point-in-time estimates of full and part time employees on the payroll. It is a head count and not a full time equivalent measure.

SIC	The Standard Industrial Classification (2007) used to classify business units throughout Scotland (and the rest of the UK) by type.
(SIC) Division, 2-digit	The mid-level classification of business units denoted by two numerical digits (e.g. 86: Human health activities).
(SIC) Group, 3-digit	The lowest level classification of business units denoted by three numerical digits (e.g. 86.1: Hospital activities).
(SIC) Sector	The high level classification of business units, usually denoted by a letter (e.g. Q: Human health and social work activities).
Statistical significance	If the results of a test have statistical significance, it means that they are not likely to have occurred by chance alone. In such cases, there is confidence that a real difference is being observed.

Appendix B Sampling approach

Overview of the research requirements

The research consists of three parts of fieldwork as follows:

- An interview with business units to capture data on their perceptions of and behaviour towards waste related matters and, importantly, to obtain permission from 750 units to participate in the next two parts. Given previous strike rates experienced in similar work, Exodus anticipates that contact information for 25,000 business units will be required from the Inter-Departmental Business Register (IDBR) for this part of the research.
- A waste audit of 750 business sites to view the mixed waste containers and obtain additional information regarding seasonality and abnormality of waste.
- A compositional analysis of the waste disposed of in the mixed waste containers by the 750 business sites. The waste will be categorised, weighed and costed (where applicable – i.e. for waste items that have a value/are unused).

The organisation that will conduct the waste audits and compositional analyses (WastesWork) is able to analyse a maximum of 750 business sites within circa 6 geographical locations with sort site facilities throughout Scotland in the specified timescales and budgetary constraints.

Exodus Research (the lead contractor for this work) wishes to ensure that the 750 business sites are statistically representative and that the ensuing data is valid, bearing in mind that there are logistical constraints in the collection and analysis of waste materials that must be taken into account.

The types of business to be researched

The research is to focus on three key business sectors, which have been identified by the project team as important with respect to waste management issues. These three groups are defined by their SIC Division (which consists of SIC groups) as given in the following table.

Table 68 SIC Divisions and Groups within each Sector to be researched

Sector	Division	Group	
1	WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES		
	45	Wholesale and retail trade and repair of motor vehicles and motorcycles	
		45.1	Sale of motor vehicles
		45.2	Maintenance and repair of motor vehicles
		45.3	Sale of motor vehicle parts and accessories
		45.4	Sale, maintenance and repair of motorcycles and related parts and accessories
	46	Wholesale trade, except of motor vehicles and motorcycles	
		46.1	Wholesale on a fee or contract basis
		46.2	Wholesale of agricultural raw materials and live animals
		46.3	Wholesale of food, beverages and tobacco
		46.4	Wholesale of household goods
		46.5	Wholesale of information and communication equipment
		46.6	Wholesale of other machinery, equipment and supplies
		46.7	Other specialised wholesale
		46.9	Non-specialised wholesale trade
	47	Retail trade, except of motor vehicles and motorcycles	
		47.1	Retail sale in non-specialised stores
		47.2	Retail sale of food, beverages and tobacco in specialised stores
		47.3	Retail sale of automotive fuel in specialised stores
		47.4	Retail sale of information and communication equipment in specialised stores
		47.5	Retail sale of other household equipment in specialised stores
		47.6	Retail sale of cultural and recreation goods in specialised stores
		47.7	Retail sale of other goods in specialised stores
		47.8	Retail sale via stalls and markets
		47.9	Retail trade not in stores, stalls or markets
2	EDUCATION		
	85	Education	
		85.1	Pre-primary education
		85.2	Primary education
		85.3	Secondary education
		85.4	Higher education
		85.5	Other education
		85.6	Educational support activities
3	HUMAN HEALTH AND SOCIAL WORK ACTIVITIES		
	86	Human health activities	
		86.1	Hospital activities
		86.2	Medical and dental practice activities
		86.9	Other human health activities
	87	Residential care activities	
		87.1	Residential nursing care activities
		87.2	Residential care activities for learning disabilities, mental health and substance abuse
		87.3	Residential care activities for the elderly and disabled
		87.9	Other residential care activities
	88	Social work activities without accommodation	
		88.1	Social work activities without accommodation for the elderly and disabled
		88.9	Other social work activities without accommodation

The profile of the businesses that are included within the compositional analysis must be representative of all organisations in Scotland within each of the three sectors to allow the results to be meaningful and grossed up for a national picture.

Determining the number of units to be researched within each business Sector

Table 2 (on the next page) outlines the number of business units (source: Office for National Statistics, Annual Business Inquiry, Scotland by Division 2008), within each of the three business sectors under investigation. The maximum number of business units that can be included in the waste audits and compositional analyses is 750. The question is; how should these 750 units be split according to the relevant business sectors and sub levels (SIC Divisions/Groups)?

In considering this, we have investigated two possible scenarios. The first is where the 750 business units are selected to be representative proportionally to the population, therefore 68.0% of the business sites will fall within Sector 1. Within these, 65.7% will belong to the retail trade (SIC 47). This approach results in overall 95% confidence intervals as follows:

- Sector 1; ±4.3%
- Sector 2; ± 11.1%
- Sector 3; ± 7.6%

The second scenario is where the 750 business units are selected to optimise the 95% confidence intervals within each of the three Sectors at ±6.1%. This results in Sector sample sizes as follows:

- Sector 1; 255
- Sector 2; 245
- Sector 3; 250

Within each of these sectors the sample is split proportionally according to the SIC Division or Group so that of the 255 business units within Sector 1, 168 fall within the retail category. Exodus recommended that this scenario (scenario 2) is used for this research.

Table 69 Number of units within the Sectors

Sector		SIC Division /group	Total units in Scotland	%	SCENARIO 1 Split in proportion to SECTOR size		SCENARIO 2 Split to maximise SECTOR CI	
					750 split	95 % SECTOR CI	750 split	95 % SECTOR CI
1	**WHOLESALE/ RETAIL/MOTOR**	**45, 46, 47**	**37,040**	**68.0%**	**510**	**4.3%**	**255**	**6.1%**
	Motor	45	5,120	13.8%	70		35	
	Wholesale	46	7,585	20.5%	104		52	
	Retail	47	24,340	65.7%	336		168	
2	**EDUCATION**	**85**	**5,615**	**10.3%**	**77**	**11.1%**	**245**	**6.1%**
	Pre-primary	85.1	445	7.9%	6		19	
	Primary	85.2	2,515	44.8%	35		111	
	Secondary	85.3	715	12.7%	10		31	
	Higher	85.4	215	3.8%	3		9	
	Other	85.5	1,660	29.6%	22		73	
	Educational support	85.6	55	1.0%	1		2	
3	**HEALTH AND SOCIAL WORK**	**86, 87, 88**	**11,835**	**21.7%**	**163**	**7.6%**	**250**	**6.1%**
	Human Health	86	3,940	33.3%	54		83	
	Residential	87	2,345	19.8%	33		50	
	Social work (non-residential)	88	5,555	46.9%	76		117	

Note: Columns may not sum due to rounding; some cells with less than five businesses may also be supressed, making it appear that totals do not sum

To enable more accurate representation of all business units in Scotland, the units to be included within the waste audit and compositional analyses will also be selected to be representative according to their size (number of employees). The following table gives the breakdown (in percentages) of size within each of the SIC Divisions/Groups to be researched and this will be used to quota the sample of business units.

Table 70 Percentage of business units within the Sectors by number of employees

	Motor, wholesale and retail				Education				Health and social work			
	45	46	47	851	852	853	854	855	856	86	87	88
0 employees	17.4%	13.7%	11.1%	0.0%	0.0%	0.7%	0.0%	7.9%	9.1%	1.1%	0.2%	0.0%
1-9 employees	65.7%	65.9%	69.7%	49.4%	21.8%	29.4%	52.3%	73.4%	81.8%	57.2%	44.7%	60.8%
10-49 employees	14.2%	17.9%	16.6%	48.3%	68.3%	13.3%	15.9%	16.0%	9.1%	29.8%	39.1%	32.9%
50-249 employees	2.7%	2.4%	2.1%	2.2%	9.7%	52.4%	13.6%	2.7%	0.0%	8.9%	15.7%	5.8%
250+ employees	0.0%	0.2%	0.5%	0.0%	0.2%	4.2%	18.2%	0.0%	0.0%	2.9%	0.2%	0.5%
total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Columns may not sum due to rounding; some cells with less than five businesses may also be supressed, making it appear that totals do not sum

In calculating the actual sample sizes to be recruited to the waste audit/compositional analyses of business units within each of the two digit SIC categories, the proportion of business units will be further selected to be proportional to the population of business units within each at three digit SIC (these calculations result in the recommended sampling frames for the three sectors provided in part 5 of this document).

Determining the sort site locations

For logistical reasons it is important that the business units that are recruited to the waste audit and compositional analyses part of the research are clustered to enable the efficient collection of the waste. Using the data provided by the ONS, Exodus has identified eight local authorities (excluding Highlands and Islands as requested by the project team) that have a high propensity of business units within the Sectors to be researched. The table below shows the number of business units within each local authority according to the number of employees and the Sector; entries in blue illustrate the highest number achieved within each Sector (column) and entries in red are those that are of high value.

Table 71 Number of business units by Sector and number of employees within different local authorities

Local Authority	Sizeband	Motor, Wholesale and Retail			Education						Health and Social Work Activities		
		45	46	47	85.1	85.2	85.3	85.4	85.5	85.6	86	87	88
Aberdeen City	0-49	170	465	910	10	55	15	10	90	0	130	80	230
	50-249	10	15	25	0	15	10	5	0	0	15	25	5
	250+	0	0	10	0	0	0	5	0	0	5	0	0
Aberdeenshire	0-49	335	395	975	10	145	15	5	100	5	135	105	285
	50-249	0	5	25	0	15	15	0	0	0	20	20	5
	250+	0	0	5	0	0	0	0	0	0	0	0	0
Angus	0-49	125	155	500	0	50	5	5	25	0	90	65	105
	50-249	0	0	5	0	5	10	0	0	0	10	10	0
	250+	0	0	0	0	0	0	0	0	0	5	0	0
Clackmannanshire	0-49	35	50	175	0	20	0	0	20	0	25	10	40
	50-249	0	0	0	0	5	5	0	0	0	5	0	0
	250+	0	0	0	0	0	0	0	0	0	0	0	0
Dumfries & Galloway	0-49	195	255	830	0	105	5	0	50	0	115	85	190
	50-249	0	0	15	0	10	15	0	0	0	10	5	5
	250+	0	0	0	0	0	0	0	0	0	5	0	0
Dundee City	0-49	130	190	695	15	40	10	5	35	0	130	95	160
	50-249	5	0	15	0	5	10	5	5	0	15	5	10
	250+	0	0	5	0	0	0	5	0	0	5	0	0
East Ayrshire	0-49	115	140	440	25	60	5	5	30	0	100	35	95
	50-249	5	0	5	0	0	10	0	0	0	5	5	10
	250+	0	0	5	0	0	0	0	0	0	0	0	0
East Dunbartonshire	0-49	85	110	320	5	35	0	0	20	0	70	35	80
	50-249	5	0	5	0	5	10	0	0	0	0	5	0
	250+	0	0	5	0	0	0	0	0	0	0	0	0

Local Authority	Sizeband	Motor, Wholesale and Retail			Education						Health and Social Work Activities		
		45	46	47	85.1	85.2	85.3	85.4	85.5	85.6	86	87	88
East Lothian	0-49	95	100	360	5	35	0	0	25	0	55	40	80
	50-249	0	0	5	0	5	5	0	0	0	10	10	0
	250+	0	0	0	0	0	0	0	0	0	0	0	0
East Renfrewshire	0-49	45	105	325	15	20	0	0	25	0	60	25	60
	50-249	0	0	0	0	5	10	0	0	0	0	0	5
	250+	0	0	0	0	0	0	0	0	0	0	0	0
City of Edinburgh	0-49	320	585	2,515	30	100	30	30	195	5	335	200	630
	50-249	20	5	55	0	30	25	15	5	0	30	25	35
	250+	0	0	15	0	0	5	15	0	0	15	0	5
Falkirk	0-49	155	195	570	5	45	5	5	45	0	75	55	90
	50-249	5	5	15	0	10	10	0	0	0	10	5	5
	250+	0	0	5	0	0	0	0	0	0	0	0	0
Fife	0-49	350	405	1,480	20	190	25	5	70	5	245	135	260
	50-249	5	5	25	0	20	25	0	0	0	15	20	15
	250+	0	0	5	0	0	0	0	0	0	5	0	0
Glasgow City	0-49	385	925	3,105	110	195	35	20	190	5	480	210	825
	50-249	20	35	75	0	5	35	5	10	0	50	45	50
	250+	0	0	15	0	0	5	10	0	0	20	0	0
Inverclyde	0-49	55	60	340	5	30	5	0	20	0	45	30	85
	50-249	0	0	5	0	0	10	0	0	0	5	10	5
	250+	0	0	0	0	0	0	0	0	0	0	0	0
Midlothian	0-49	95	80	235	5	20	0	0	20	0	40	45	70
	50-249	0	5	5	0	15	5	0	0	0	0	5	0
	250+	0	0	0	0	0	0	0	0	0	0	0	0
Moray	0-49	135	120	455	0	45	5	5	30	0	60	45	95
	50-249	0	0	5	0	5	10	0	0	0	5	5	5
	250+	0	0	0	0	0	0	0	0	0	0	0	0
North Ayrshire	0-49	100	125	560	5	65	10	0	25	0	85	40	85
	50-249	0	0	5	0	5	10	0	0	0	5	10	15
	250+	0	0	5	0	0	0	0	0	0	0	0	0
North Lanarkshire	0-49	270	390	1,085	30	140	15	5	120	0	140	90	200
	50-249	10	20	20	0	0	25	0	5	0	25	20	25
	250+	0	5	10	0	0	0	0	0	0	5	0	0
Perth & Kinross	0-49	195	280	825	5	70	5	5	40	0	105	65	140
	50-249	5	5	15	0	10	15	0	0	0	10	10	5
	250+	0	0	0	0	0	0	0	0	0	0	0	0
Renfrewshire	0-49	135	235	670	15	75	5	0	50	0	95	50	170
	50-249	10	0	15	0	5	10	0	0	0	10	10	20
	250+	0	0	5	0	0	0	0	0	0	0	0	0
Scottish Borders	0-49	170	215	625	5	65	5	5	35	5	100	45	135
	50-249	0	0	5	0	0	10	0	0	0	15	5	15
	250+	0	0	0	0	0	0	0	0	0	0	0	0

Local Authority	Sizeband	Motor, Wholesale and Retail			Education						Health and Social Work Activities		
		45	46	47	85.1	85.2	85.3	85.4	85.5	85.6	86	87	88
Shetland Islands	0-49	30	45	125	10	35	5	5	15	0	15	0	45
	50-249	0	0	0	0	5	0	0	0	0	0	0	10
	250+	0	0	0	0	0	0	0	0	0	0	0	0
South Ayrshire	0-49	135	170	640	5	45	5	0	30	0	105	25	85
	50-249	5	5	10	0	5	10	0	0	0	10	15	10
	250+	0	0	5	0	0	0	0	0	0	0	0	0
South Lanarkshire	0-49	300	485	1,200	35	150	10	5	55	15	145	70	175
	50-249	5	15	30	0	0	20	0	0	0	10	20	25
	250+	0	0	5	0	0	0	0	0	0	5	0	0
Stirling	0-49	100	180	570	10	40	5	0	30	0	70	40	80
	50-249	5	0	10	0	5	10	0	0	0	10	5	0
	250+	0	0	0	0	0	0	0	0	0	0	0	0
W. Dunbartonshire	0-49	80	65	360	20	30	0	0	20	0	35	20	75
	50-249	0	0	0	0	5	5	0	0	0	10	5	5
	250+	0	0	5	0	0	0	0	0	0	0	0	0
West Lothian	0-49	165	255	655	10	55	5	0	40	0	85	55	110
	50-249	5	10	10	0	25	0	0	0	0	0	15	10
	250+	0	5	5	0	0	0	0	0	0	0	0	0

Note: Columns may not sum due to rounding; some cells with less than five businesses may also be supressed, making it appear that totals do not sum

It is therefore recommended that the following eight local authorities are approached to make arrangements to use suitable sort sites for the collection and analysis of business waste, which allows for a suitably high concentration of business types and rural/urban locations:-

- Aberdeen City
- Aberdeenshire
- Dundee City
- City of Edinburgh
- Fife
- Glasgow City
- North Lanarkshire
- South Lanarkshire

Recommended sample

The following tables illustrate the sample sizes within each of the three Sectors of business units to be included within the waste audit/compositional analysis stage. Within each sector, the business units have been selected to optimise the confidence intervals at sector level with the following total sample sizes (see part 3):

- Sector 1; 255;
- Sector 2; 245; and
- Sector 3; 250.

And to represent the population of business units in Scotland according to sub-sector level (three digit SIC), location and size (number of employees). Adherence to this sample will result in data that is representative of business units that can be grossed up to national levels without the need for any weighting of data (although modelling will still be required to take account of any special circumstances such as seasonality or unusual circumstances within the mixed waste collected). It should be noted that there may be discrepancies due to rounding errors.

Table 72 Sector 1 business units to be included in the waste audits/compositional analyses stage

	TOTAL units	Local Authority								Number of employees				
		Aberdeen	Aberdeen City	Dundee	Edinburgh	Fife	Glas gow	North Lanarkshire	South Lanark shire	0	1-9	10-49	50-249	250 +
SECTOR 1	255	22	24	15	47	31	63	25	28	30	173	45	6	1
45 (motor)	35	3	5	2	5	5	6	4	5	6	23	5	1	0
46 (wholesale)	52	6	5	3	7	5	13	6	7	6	35	10	1	0
47 (retail)	168	13	14	10	35	21	43	15	17	18	116	29	4	1
45.1	10	1	1	1	1	2	2	1	1	2	5	2	1	0
45.2	20	2	3	1	3	3	3	2	3	3	14	3	0	0
45.3	5	0	0	0	1	1	1	1	1	1	3	1	0	0
45.4	1	0	0	0	0	1	0	0	0	0	1	0	0	0
46.1	7	1	1	0	1	1	1	1	1	2	4	1	0	0
46.2	1	0	0	0	0	0	1	0	0	0	1	0	0	0
46.3	9	1	1	1	1	1	2	1	1	1	5	2	1	0
46.4	9	1	0	0	2	1	3	1	1	1	7	1	0	0
46.5	3	0	0	0	1	0	1	1	0	0	2	1	0	0
46.6	8	2	1	0	1	1	1	1	1	1	5	2	0	0
46.7	12	1	1	1	2	1	2	2	2	1	8	3	0	0
46.9	4	1	0	0	1	0	1	0	1	1	3	0	0	0
47.1	38	3	3	2	7	5	10	4	4	5	21	9	2	1
47.2	24	2	2	1	4	4	7	2	2	3	18	3	0	0
47.3	2	0	1	0	0	0	0	1	0	0	1	1	0	0
47.4	5	1	0	0	1	1	1	0	1	0	4	1	0	0
47.5	18	2	2	1	3	2	4	2	2	2	13	3	0	0
47.6	11	1	1	1	2	1	3	1	1	1	7	3	0	0
47.7	62	5	5	4	15	7	16	4	6	4	46	10	2	0
47.8	1	0	0	0	1	0	0	0	0	0	1	0	0	0
47.9	7	1	1	0	2	1	1	0	1	2	5	0	0	0

Table 73 Sector 2 business units to be included in the waste audits/compositional analyses stage

	TOTAL units	Local Authority								Number of employees				
		Aberdeen	Aberdeen City	Dundee	Edinburgh	Fife	Glasgow	North Lanarkshire	South Lanark shire	0	1-9	10-49	50-249	250 +
SECTOR 2	245	19	29	11	42	34	53	31	26	5	105	105	28	2
85.1 (pre-primary)	19	1	1	1	2	1	8	2	3	0	9	10	0	0
85.2 (primary)	111	7	17	4	13	21	20	14	15	0	26	76	9	0
85.3 (sec'dary)	31	3	3	2	5	4	7	4	3	0	11	4	15	1
85.4 (higher)	9	1	0	1	4	1	2	0	0	0	4	2	2	1
85.5 (other)	73	7	8	3	17	6	17	10	5	5	53	13	2	0
85.6 (support)	2	0	0	0	1	0	0	0	1	0	2	0	0	0

Table 74 Sector 3 business units to be included in the waste audits/compositional analyses stage

	TOTAL units	Local Authority								Number of employees				
		Aberdeen	Aberdeen City	Dundee	Edinburgh	Fife	Glasgow	North Lanarkshire	South Lanark shire	0	1-9	10-49	50-249	250 +
SECTOR 3	250	20	23	17	52	29	69	21	19	1	140	84	22	3
86 (Human health)	83	6	7	6	16	11	23	7	7	1	48	24	7	3
87 (Residential)	50	4	5	4	10	7	11	5	4	0	22	20	8	0
88 (Social work)	117	9	12	7	26	11	35	9	8	0	70	40	7	0
86.1	12	1	1	1	2	3	2	1	1	0	2	4	4	2
86.2	47	4	3	3	9	5	14	4	5	0	33	14	0	0
86.9	24	2	2	2	4	3	7	2	2	1	14	6	3	0
87.1	8	1	1	0	1	1	2	1	1	0	1	3	4	0
87.2	1	0	0	0	0	0	1	0	0	0	0	1	0	0
87.3	23	2	2	3	4	3	4	3	2	0	13	8	2	0
87.9	18	1	2	1	4	3	4	1	2	0	8	8	2	0
88.1	20	1	2	1	4	2	7	1	2	0	10	8	2	0
88.9	97	8	10	6	23	9	28	7	6	0	60	32	5	0

Appendix C Questionnaires used for the telephone interviews

Estimation of the Composition of Mixed Waste from Scottish Industry and Commerce:
Telephone Questionnaire; SECTOR 1 Retail, wholesale and motor

INTRODUCTION..
The interview will cover questions on the procedures your business unit has in place to deal with its waste and recycling. Would you be the person within the firm to talk to about this?

Yes	1	**CONTINUE**	
No; other within unit	2	**Ask for contact details of appropriate person. Update datasheet. Thank & Close**	
No; Head Office	3		

The interview will take about 15 minutes to complete depending on your answers and will be conducted in accordance with the Market Research Society's Code of Conduct, which guarantees confidentiality and anonymity. Under no circumstances will any individual or firm be identified, nor will your responses be attributed to you or your business.

REASSURANCES IF NECESSARY

Should you have any queries regarding the bona fides of Exodus Research, please do not hesitate to contact either:
Lorrayne Ventour at Exodus Research on 01934 751009 (www.exodusresearch.com)
Polly Griffiths at Zero Waste Scotland on 0141 273 1458
The Market Research Society's National Freephone on 0500 39 69 99

Business and contact information

Reference number	*Pre-populated*		
Name of Business	*Pre-populated*		
Telephone number	*Pre-populated*		
Contact name			
Address 1	*Pre-populated*		
Address 2	*Pre-populated*		
Address 3	*Pre-populated*		
Town	*Pre-populated*	Post Code	*Pre-populated*
Local Authority	*Pre-populated*	3-digit SIC Code	*Pre-populated*
N° of employees at site	0 ☐ 1-9 ☐ 10-49 ☐ 50-249 ☐ 250+ ☐ *Pre-populated*		
Date of interview		Time of interview	
Name of researcher			

SECTION 1: Background

1. I understand that your business unit is involved in {SIC CODE}; How would you briefly describe what you do?			
45.1	Sale of motor vehicles	1	
45.2	Maintenance and repair of motor vehicles	2	
45.3	Sale of motor vehicle parts and accessories	3	
45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	4	
46.1	Wholesale on a fee or contract basis	5	
46.2	Wholesale of agricultural raw materials and live animals	6	
46.3	Wholesale of food, beverages and tobacco	7	
46.4	Wholesale of household goods	8	
46.5	Wholesale of information and communication equipment	9	
46.6	Wholesale of other machinery, equipment and supplies	10	
46.7	Other specialised wholesale	11	
46.9	Non-specialised wholesale trade	12	
47.1	Retail sale in non-specialised stores	13	
47.2	Retail sale of food, beverages and tobacco in specialised stores	14	
47.3	Retail sale of automotive fuel in specialised stores	15	
47.4	Retail sale of information and communication equipment in specialised stores	16	
47.5	Retail sale of other household equipment in specialised stores	17	
47.6	Retail sale of cultural and recreation goods in specialised stores	18	
47.7	Retail sale of other goods in specialised stores	19	
47.8	Retail sale via stalls and markets	20	
47.9	Retail trade not in stores, stalls or markets	21	
Description of business activities			

2. Can I just check that there are still {number of employees} employees based at your business site? CODE ONE			
0 employees	1	50-249 employees	4
1-9 employees	2	250+ employees	5
10-49 employees	3		

3. In a typical week, what are your business/office/opening hours each day? WRITE IN NUMBER OF HOURS OR RANGE OF HOURS				
Monday		Friday		
Tuesday		Saturday		
Wednesday		Sunday		
Thursday		Varies/other write in)		

4. In a typical year, how many days is your site open for business? WRITE IN NUMBER OR TICK ALL THAT APPLY				
Number of days open				
Every day	1	Not on any bank holiday	4	
Not on Weekends	2	Not on any public holiday	5	
Not on Sundays	3	Other (write in)	6	

SECTION 2: Recycling/reuse of business waste

6. Does your business site currently recycle or reuse (including donating or selling for reuse) any of its waste?		
Yes, both recycle and reuse	1	*Go to Q7 (ask both recycle and reuse)*
Yes, recycle only	2	*Go to Q7 (ask recycle only, code 4 at reuse)*
Yes, reuse only	3	*Go to Q7 (ask reuse only, code 4 at recycle)*
No, neither recycle nor reuse	4	*Code 4 at Q7 (recycle and reuse) and go to Q9*
Don't know	5	*Go to Q8*

7. Overall….
(a) How much of the waste that could be recycled does your business unit recycle?
(b) How much of the waste that could be reused does your business unit reuse or donate/sell for reuse?

	(a) Recycle	**(b) Reuse**
All or most of it	1	1
Some of it	2	2
None of it	3	3
Don't know	4	4

8. Which of the following materials does your business currently recycle and/or reuse?
…..Are there other recyclable materials that you do or do not currently recycle or reuse?

	Not applicable no such waste	Waste is RECYCLED (code amount below)				Waste is REUSED (code amount below)				Waste is neither recycled nor reused	Don't know
		All/ most	Some	None	D/K amount	All/ most	Some	None	D/K amount		
Paper	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Card	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Plastic film	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Dense plastics (e.g. bottles)	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Textiles	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Combustible waste (e.g. wooden crates,	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Metals; cans	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Electrical appliances	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Printer cartridges	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Furniture	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Non-combustible	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Glass	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Green waste	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Food waste	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Domestic batteries	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Other	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5

IF ALL/MOST WASTE IS RECYCLED/REUSED GO TO Q10 OTHERWISE GO TO Q9

9. What is the main reason for not recycling or reusing more of the waste from your business site? DO NOT PROMPT. WRITE IN VERBATIM AND CODE ALL THAT APPLY		
There are no facilities available	1	
No spare capacity at facilities available	2	
Lack of space or storage	3	

9. What is the main reason for not recycling or reusing more of the waste from your business site? DO NOT PROMPT. WRITE IN VERBATIM AND CODE ALL THAT APPLY		
There is no benefit to the business in recycling/reusing	4	
It would be too time consuming/take too much effort	5	
Never really thought about it	6	
Don't know how to go about it	7	
Planning to recycle/reuse in near future	8	
Not interested in recycling/reusing waste	9	
Other	10	
Don't know	11	

10. Which, if any of the following does your business unit have in place? READ OUT, TICK ALL THAT APPLY				
An environmental policy		1	*Go to Q12*	
Targets for recycling		2	*Go to Q12*	
A waste management strategy		3	*Go to Q12*	
Agreement with suppliers to take away packaging		4	*Go to Q12*	
Informal commitment to reducing waste/environmental impacts		5	*Go to Q12*	
DO NOT READ OUT	*Nothing in place*	7	*Go to Q12*	
	Other (specify)	8	*Go to Q12*	
	Don't know	9	*Go to Q12*	

12. How important do you think it is for business units to recycle and reuse their waste? CODE ONE				
Very important	1	*Not at all important*	4	
Somewhat important	2	*Don't know*	5	
Not very important	3			

13. What do you think could be done to help you [and/or] other businesses in Scotland to recycle or reuse more of their waste? WRITE IN VERBATIM		
Nothing, it is up to the business	1	
Nothing, I am not interested	2	
Don't know	3	

SECTION 3: Residual/general mixed waste issues

14. Does your business site currently pay for the removal of any of its general mixed waste?		
Yes	1	*Go to Q15*
No	2	*Go to Q16*
Don't know	3	*Go to Q16*

15. Which organisation(s) currently remove the general mixed waste from your business site?		
Contractor name		
Local authority	1	
Don't know	2	

16. What types of containers does your site use to dispose of its general mixed waste and - are any of these shared with other businesses and how many of each are there/do you tend to use per week ?					
	Not used	Used, sole use	Used shared use	Don't know	Number used (average number per week for sacks)
Sacks/stickers	1	2	3	4	
Clinical sacks	1	2	3	4	
240 litre bin (2 wheeled)	1	2	3	4	
360 litre bin (2 wheeled)	1	2	3	4	
660 litre bin (4 wheeled)	1	2	3	4	
770 litre bin (4 wheeled)	1	2	3	4	
950 litre bin (4 wheeled)	1	2	3	4	
1,100 litre bin (4 wheeled)	1	2	3	4	
1,280 litre bin (4 wheeled)	1	2	3	4	
Paladin	1	2	3	4	
Bales	1	2	3	4	
10/14 m^3 skip	1	2	3	4	
25/45 m^3 skip without compactor	1	2	3	4	
25/45 m^3 skip with compactor	1	2	3	4	
Other	1	2	3	4	
(specify)	1	2	3	4	
Don't know	5				

17. And on which days of the week are the {containers used at Q16} emptied? TICK ALL THAT APPLY FOR EACH CONTAINER USED							
	Mon	Tues	Weds	Thurs	Fri	Sat	Don't know days
Sacks/stickers	1	2	3	4	5	6	7
Clinical sacks	1	2	3	4	5	6	7
240 litre bin	1	2	3	4	5	6	7
360 litre bin	1	2	3	4	5	6	7
660 litre bin	1	2	3	4	5	6	7
770 litre bin	1	2	3	4	5	6	7
950 litre bin	1	2	3	4	5	6	7
1,100 litre bin	1	2	3	4	5	6	7
1,280 litre bin	1	2	3	4	5	6	7
Paladin	1	2	3	4	5	6	7
Bales	1	2	3	4	5	6	7
10/14 m3 skip	1	2	3	4	5	6	7
25/45 m3 skip without compactor	1	2	3	4	5	6	7
25/45 m3 skip with compactor	1	2	3	4	5	6	7
Other	1	2	3	4	5	6	7
(specify)	1	2	3	4	5	6	7
Don't know container	1	2	3	4	5	6	7

18. And how full do the {containers used at Q16} tend to be when emptied? TICK ONE FOR EACH CONTAINER USED							
		Full	About three quarters full	About half full	About a quarter full	Little/no waste	Don't know
Sacks/stickers		1	2	3	4	5	6
Clinical sacks		1	2	3	4	5	6
240 litre bin		1	2	3	4	5	6
360 litre bin		1	2	3	4	5	6
660 litre bin		1	2	3	4	5	6
770 litre bin		1	2	3	4	5	6
950 litre bin		1	2	3	4	5	6
1,100 litre bin		1	2	3	4	5	6
1,280 litre bin		1	2	3	4	5	6
Paladin		1	2	3	4	5	6
Bales		1	2	3	4	5	6
10/14 m3 skip		1	2	3	4	5	6
25/45 m3 skip without compactor		1	2	3	4	5	6
25/45 m3 skip with compactor		1	2	3	4	5	6
Other		1	2	3	4	5	6
(specify)		1	2	3	4	5	6
Don't know container		1	2	3	4	5	6

19. Do any of the sinks within your business unit have macerators fitted? TICK ONE			
Yes	1	*Go to Q20*	
No	2	*Go to Q21*	
Don't know	3	*Go to Q21*	

20. Are the sink macerators used to get rid of food or kitchen waste? TICK ONE				
Yes	1	*Don't know*	3	
No	2			

21. What do you think could be done to help you [and/or] other businesses in Scotland to implement more efficient general mixed waste management processes? WRITE IN VERBATIM		
Nothing, it is up to the business	1	
Nothing, I am not interested	2	
Don't know	3	

SECTION 4: NEXT STAGE

22. The Scottish Government/Zero Waste Scotland is very interested in identifying the different types and amounts of waste that are disposed of by businesses like yours throughout Scotland. This will help government provide support to organisations to manage their waste and resources better, reduce costs and reduce their environmental impacts.
We are recruiting 750 business units throughout Scotland to be involved in this process, which will involve one week's worth of general mixed waste taken away and sorted into separate material types. When completed, all of the waste will be disposed of in a responsible manner at no cost or inconvenience to your business. To thank you for your help with this, your business will receive a report, which provides information on the types and weights of waste thrown away. Please be assured that the process is completely confidential and anonymous. There will be no impact to your business, except we would like to visit your site before the waste is taken away to take a look at the waste containers you use and confirm a few details – we will aim to take no more than around 10 minutes of your time and all information and data collected will be completely anonymous and confidential.
As already mentioned, on completion of the project, you will receive a report which provides information on the waste disposed of by your organisation and aggregated, anonymised data for others within your area of business; this will include guidance on how to reduce your waste, environmental impacts and financial costs. Again, all of the information relating to your organisation will be kept in the strictest confidence and will only be reported collectively with that from other organisations. Would you be interested in taking part in this research?

Definitely	1	*Go to Q23*	
Maybe/don't know	2	*Go to Q23*	
No	3	*THANK AND CLOSE*	

23. Thank you. Would you be the best person to talk to about arranging this? [IF NO ASK FOR APPROPRIATE PERSON TO TALK TO]. Thank you. We will be in touch with you to make arrangements shortly. WRITE IN CONTACT DETAILS

Do not wish to take part	1	
Do not know appropriate person	2	
Name		
Telephone number		
Email		

THANK & CLOSE

Estimation of the Composition of Mixed Waste from Scottish Industry and Commerce:
Telephone Questionnaire; SECTOR 2 Health

INTRODUCTION..
The interview will cover questions on the procedures your business unit has in place to deal with its waste and recycling. Would you be the person within the firm to talk to about this?

Yes	1	**CONTINUE**	
No; other within unit	2	**Ask for contact details of appropriate person. Update datasheet. Thank & Close**	
No; Head Office	3		

The interview will take about 15 minutes to complete depending on your answers and will be conducted in accordance with the Market Research Society's Code of Conduct, which guarantees confidentiality and anonymity. Under no circumstances will any individual or firm be identified, nor will your responses be attributed to you or your business.

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Polly Griffiths at Zero Waste Scotland on 0141 273 1458
The Market Research Society's National Freephone on 0500 39 69 99

Business and contact information

Reference number	*Pre-populated*		
Name of Business	*Pre-populated*		
Telephone number	*Pre-populated*		
Contact name			
Address 1	*Pre-populated*		
Address 2	*Pre-populated*		
Address 3	*Pre-populated*		
Town	*Pre-populated*	Post Code	*Pre-populated*
Local Authority	*Pre-populated*	3-digit SIC Code	*Pre-populated*
N° of employees at site	0 ☐ 1-9 ☐ 10-49 ☐ 50-249 ☐ 250+ ☐ *Pre-populated*		
Date of interview		Time of interview	
Name of researcher			

SECTION 1: Background

1. I understand that your business unit is involved in {SIC CODE}; How would you briefly describe what you do?			
86.1	Hospital activities	22	
86.2	Medical and dental practice activities	23	
86.9	Other human health activities	24	
87.1	Residential nursing care activities	25	
87.2	Residential care activities for learning disabilities, mental health and substance abuse	26	
87.3	Residential care activities for the elderly and disabled	27	
87.9	Other residential care activities	28	
88.1	Social work activities without accommodation for the elderly and disabled	29	
88.9	Other social work activities without accommodation	30	
Description of business activities			

2. Can I just check that there are still {number of employees} employees based at your business site? CODE ONE			
0 employees	1	50-249 employees	4
1-9 employees	2	250+ employees	5
10-49 employees	3		

3. In a typical week, what are your opening hours each day? WRITE IN NUMBER OF HOURS OR RANGE OF HOURS				
Monday		Friday		
Tuesday		Saturday		
Wednesday		Sunday		
Thursday		Varies/other write in)		

4. In a typical year, how many days is your site open? WRITE IN NUMBER OR TICK ALL THAT APPLY				
Number of days open				
Every day	1	Not on any bank holiday	4	
Not on Weekends	2	Not on any public holiday	5	
Not on Sundays	3	Other (write in)	6	

5. In a typical week, how many in-patients/residents do you have on site? WRITE IN NUMBER		
Number		
Don't know	1	

SECTION 2: Recycling/reuse of business waste

6. Does your business site currently recycle or reuse (including donating or selling for reuse) any of its waste?		
Yes, both recycle and reuse	1	*Go to Q7 (ask both recycle and reuse)*
Yes, recycle only	2	*Go to Q7 (ask recycle only, code 4 at reuse)*
Yes, reuse only	3	*Go to Q7 (ask reuse only, code 4 at recycle)*
No, neither recycle nor reuse	4	*Code 4 at Q7 (recycle and reuse) and go to Q9*
Don't know	5	*Go to Q8*

7. Overall….
(a) How much of the waste that could be recycled does your business unit recycle?
(b) How much of the waste that could be reused does your business unit reuse or donate/sell for reuse?

	(a) Recycle	(b) Reuse
All or most of it	1	1
Some of it	2	2
None of it	3	3
Don't know	4	4

8. Which of the following materials does your business currently recycle and/or reuse?
…..Are there other recyclable materials that you do or do not currently recycle or reuse?

	Not applicable no such waste	Waste is RECYCLED (code amount below)				Waste is REUSED (code amount below)				Waste is neither recycled nor reused	Don't know
		All/ most	Some	None	D/K amount	All/ most	Some	None	D/K amount		
Paper	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Card	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Plastic film	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Dense plastics (e.g. bottles)	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Textiles	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Combustible waste (e.g. wooden crates)	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Metals: cans	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Electrical appliances	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Printer cartridges	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Furniture	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Non-combustible	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Glass	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Garden waste	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Food waste	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Domestic batteries	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Other (1)	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Other (2)	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5

IF ALL/MOST WASTE IS RECYCLED/REUSED GO TO Q10 OTHERWISE GO TO Q9

9. What is the main reason for not recycling or reusing more of the waste from your business site? DO NOT PROMPT. WRITE IN VERBATIM AND CODE ALL THAT APPLY

There are no facilities available	1
No spare capacity at facilities available	2
Lack of space or storage	3
There is no benefit to the business in recycling/reusing	4
It would be too time consuming/take too much effort	5
Never really thought about it	6
Don't know how to go about it	7
Planning to recycle/reuse in near future	8
Not interested in recycling/reusing waste	9
Other	10
Don't know	11

10. Which, if any of the following does your business unit have in place? READ OUT, TICK ALL THAT APPLY			
An environmental policy		1	
Targets for recycling		2	
A waste management strategy		3	
Agreement with suppliers to take away packaging		4	
Informal commitment to reducing waste/environmental impacts		5	
DO NOT READ OUT	*Nothing in place*	7	
	Other (specify)	8	
	Don't know	9	

12. How important do you think it is for business units to recycle and reuse their waste? CODE ONE				
Very important	1	*Not at all important*	4	
Somewhat important	2	*Don't know*	5	
Not very important	3			

13. What do you think could be done to help you [and/or] other businesses in Scotland to recycle or reuse more of their waste? WRITE IN VERBATIM		
Nothing, it is up to the business	1	
Nothing, I am not interested	2	
Don't know	3	

SECTION 3: Residual/general mixed waste issues

14. Does your business site currently pay for the removal of any of its general mixed waste?		
Yes	1	*Go to Q15*
No	2	*Go to Q16*
Don't know	3	*Go to Q16*

15. Which organisation(s) currently remove the general mixed waste from your business site?		
Contractor name		
Local authority	1	
Don't know	2	

16. What types of containers does your site use to dispose of its general mixed waste and
- are any of these shared with other businesses and
- how many of each are there (or do you tend to use per week for sacks)?

	Not used	Used, sole use	Used shared use	Don't know	Number used (average number per week for sacks)
Sacks/stickers	1	2	3	4	
Clinical sacks	1	2	3	4	
240 litre bin (2 wheeled)	1	2	3	4	
360 litre bin (2 wheeled)	1	2	3	4	
660 litre bin (4 wheeled)	1	2	3	4	
770 litre bin (4 wheeled)	1	2	3	4	
950 litre bin (4 wheeled)	1	2	3	4	
1,100 litre bin (4 wheeled)	1	2	3	4	
1,280 litre bin (4 wheeled)	1	2	3	4	
Paladin	1	2	3	4	

16. What types of containers does your site use to dispose of its general mixed waste and **- are any of these shared with other businesses and** **- how many of each are there (or do you tend to use per week for sacks)?**					
	Not used	Used, sole use	Used shared use	Don't know	Number used (average number per week for sacks)
Bales	1	2	3	4	
10/14 m3 skip	1	2	3	4	
25/45 m3 skip without compactor	1	2	3	4	
25/45 m3 skip with compactor	1	2	3	4	
Other	1	2	3	4	
Don't know	5				

17. And on which days of the week are the {containers used at Q16} emptied? TICK ALL THAT APPLY FOR EACH CONTAINER USED							
	Mon	Tues	Weds	Thurs	Fri	Sat	Don't know days
Sacks/stickers	1	2	3	4	5	6	7
Clinical sacks	1	2	3	4	5	6	7
240 litre bin	1	2	3	4	5	6	7
360 litre bin	1	2	3	4	5	6	7
660 litre bin	1	2	3	4	5	6	7
770 litre bin	1	2	3	4	5	6	7
950 litre bin	1	2	3	4	5	6	7
1,100 litre bin	1	2	3	4	5	6	7
1,280 litre bin	1	2	3	4	5	6	7
Bales	1	2	3	4	5	6	7
Paladin	1	2	3	4	5	6	7
10/14 m3 skip	1	2	3	4	5	6	7
25/45 m3 skip without compactor	1	2	3	4	5	6	7
25/45 m3 skip with compactor	1	2	3	4	5	6	7
Other	1	2	3	4	5	6	7
Don't know container	1	2	3	4	5	6	7

18. And how full do the {containers used at Q16} tend to be when emptied? TICK ONE FOR EACH CONTAINER USED						
	Full	About three quarters full	About half full	About a quarter full	Little /no waste	Don't know
Sacks/stickers	1	2	3	4	5	6
Clinical sacks	1	2	3	4	5	6
240 litre bin	1	2	3	4	5	6
360 litre bin	1	2	3	4	5	6
660 litre bin	1	2	3	4	5	6
770 litre bin	1	2	3	4	5	6
950 litre bin	1	2	3	4	5	6
1,100 litre bin	1	2	3	4	5	6
1,280 litre bin	1	2	3	4	5	6
Bales	1	2	3	4	5	6
Paladin	1	2	3	4	5	6
10/14 m3 skip	1	2	3	4	5	6

18. And how full do the {containers used at Q16} tend to be when emptied? TICK ONE FOR EACH CONTAINER USED							
		Full	About three quarters full	About half full	About a quarter full	Little /no waste	Don't know
25/45 m3 skip without compactor		1	2	3	4	5	6
25/45 m3 skip with compactor		1	2	3	4	5	6
Other		1	2	3	4	5	6
(specify)		1	2	3	4	5	6
Don't know container		1	2	3	4	5	6

19. Do any of the sinks within your business unit have macerators fitted? TICK ONE		
Yes	1	*Go to Q20*
No	2	*Go to Q21*
Don't know	3	*Go to Q21*

20. Are the sink macerators used to get rid of food or kitchen waste? TICK ONE	
Yes	1
No	2
Don't know	3

21. What do you think could be done to help you [and/or] other businesses in Scotland to implement more efficient general mixed waste management processes? WRITE IN VERBATIM	
Nothing, it is up to the business	1
Nothing, I am not interested	2
Don't know	3

SECTION 4: NEXT STAGE

22. The Scottish Government/Zero Waste Scotland is very interested in identifying the different types and amounts of waste that are disposed of by businesses like yours throughout Scotland. This will help government provide support to organisations to manage their waste and resources better, reduce costs and reduce their environmental impacts.
We are recruiting 750 business units throughout Scotland to be involved in this process, which will involve one week's worth of general mixed waste taken away and sorted into separate material types. When completed, all of the waste will be disposed of in a responsible manner at no cost or inconvenience to your business. To thank you for your help with this, your business will receive a report, which provides information on the types and weights of waste thrown away. Please be assured that the process is completely confidential and anonymous. There will be no impact to your business, except we would like to visit your site before the waste is taken away to take a look at the waste containers you use and confirm a few details – we will aim to take no more than around 10 minutes of your time and all information and data collected will be completely anonymous and confidential. As already mentioned, on completion of the project, you will receive a report which provides information on the waste disposed of by your organisation and aggregated, anonymised data for others within your area of business; this will include guidance on how to reduce your waste, environmental impacts and financial costs. Again, all of the information relating to your organisation will be kept in the strictest confidence and will only be reported collectively with that from other organisations. Would you be interested in taking part in this research?

Definitely	1	*Go to Q23*
Maybe/don't know	2	*Go to Q23*
No	3	*THANK AND CLOSE*

23. Thank you. Would you be the best person to talk to about arranging this? [IF NO ASK FOR APPROPRIATE PERSON TO TALK TO]. Thank you. We will be in touch with you to make arrangements shortly. WRITE IN CONTACT DETAILS	
Do not wish to take part	1
Do not know appropriate person	2
Name	
Telephone number	
Email	

THANK & CLOSE

Mixed Waste from Scottish Industry: Telephone Questionnaire; SECTOR 3 Education

INTRODUCTION...
The interview will cover questions on the procedures your business unit has in place to deal with its waste and recycling. Would you be the person within the firm to talk to about this?

Yes	1	**CONTINUE**	
No; other within unit	2	**Ask for contact details of appropriate person. Update datasheet. Thank & Close**	
No; Head Office	3		

The interview will take about 15 minutes to complete depending on your answers and will be conducted in accordance with the Market Research Society's Code of Conduct, which guarantees confidentiality and anonymity. Under no circumstances will any individual or firm be identified, nor will your responses be attributed to you or your business.

REASSURANCES IF NECESSARY

Should you have any queries regarding the bona fides of Exodus Research, please do not hesitate to contact either:
Lorrayne Ventour at Exodus Research on 01934 751009 (www.exodusresearch.com)
Polly Griffiths at Zero Waste Scotland on 0141 273 1458
The Market Research Society's National Freephone on 0500 39 69 99

Business and contact information

Reference number	*Pre-populated*		
Name of Business	*Pre-populated*		
Telephone number	*Pre-populated*		
Contact name			
Address 1	*Pre-populated*		
Address 2	*Pre-populated*		
Address 3	*Pre-populated*		
Town	*Pre-populated*	Post Code	*Pre-populated*
Local Authority	*Pre-populated*	3-digit SIC Code	*Pre-populated*
N° of employees at site	0 ☐ 1-9 ☐ 10-49 ☐ 50-249 ☐ 250+ ☐ *Pre-populated*		
Date of interview		Time of interview	
Name of researcher			

SECTION 1: Background

1. I understand that your business unit is involved in {SIC CODE}; How would you briefly describe what you do?			
85.1	Pre-primary education	31	
85.2	Primary education	32	
85.3	Secondary education	33	
85.4	Higher education	34	
85.5	Other education	35	
85.6	Educational support activities	36	

1. I understand that your business unit is involved in {SIC CODE}; How would you briefly describe what you do?	
Description of business activities	

2. And can I just check that there are still {number of employees} employees based at your business site? CODE ONE			
0 employees	1	50-249 employees	4
1-9 employees	2	250+ employees	5
10-49 employees	3		

3. In a typical week, what are your business/office/opening hours each day? WRITE IN NUMBER OF HOURS OR RANGE OF HOURS				
Monday		Friday		
Tuesday		Saturday		
Wednesday		Sunday		
Thursday		Varies/other write in)		

4. In a typical year, how many days is your site open for business? WRITE IN NUMBER OR TICK ALL THAT APPLY				
Number of days open				
Every day	1	Not on any bank holiday	4	
Not on Weekends	2	Not on any public holiday	5	
Not on Sundays	3	Other (write in)	6	

5A. In a typical term, how many children/students do you have on site? WRITE IN NUMBER		
Number		
Don't know	1	

5B. And does your school have any student/staff accommodation ON SITE?									
Yes	**1**	**Number of individuals in accommodation**							
No	2	**Is the general waste collected with that from school?**	Yes	1	No	2	D/K	3	

SECTION 2: Recycling/reuse of business waste

6. Does your business site currently recycle or reuse (including donating or selling for reuse) any of its waste?		
Yes, both recycle and reuse	1	*Go to Q7 (ask both recycle and reuse)*
Yes, recycle only	2	*Go to Q7 (ask recycle only, code 4 at reuse)*
Yes, reuse only	3	*Go to Q7 (ask reuse only, code 4 at recycle)*
No, neither recycle nor reuse	4	*Code 4 at Q7 (recycle and reuse) and go to Q9*
Don't know	5	*Go to Q8*

7. Overall….
(a) How much of the waste that could be recycled does your business unit recycle?
(b) How much of the waste that could be reused does your business unit reuse or donate/sell for reuse?

	(a) Recycle	**(b) Reuse**
All or most of it	1	1
Some of it	2	2
None of it	3	3
Don't know	4	4

8. Which of the following materials does your business currently recycle and/or reuse? …..Are there other recyclable materials that you do or do not currently recycle or reuse?											
	N/A, no such waste	Waste is RECYCLED (code amount below)				Waste is REUSED (code amount below)				Neither recycled nor reused	Don't know
		All/ most	Some	None	D/K amount	All/ most	Some	None	D/K amount		
Paper	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Card	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Plastic film	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Dense plastics (e.g. bottles)	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Textiles	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Combustible waste (e.g. wood crates, pallets, carpets, rubber)	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Metals; cans	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Electrical appliances	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Printer cartridges	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Furniture	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Non-combustible waste	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Glass	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Green waste	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Food waste	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Domestic batteries	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
Other	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5
(specify)	1	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	4	5

IF ALL/MOST WASTE IS RECYCLED/REUSED GO TO Q10 OTHERWISE GO TO Q9

9. What is the main reason for not recycling or reusing more of the waste from your business site? DO NOT PROMPT. WRITE IN VERBATIM AND CODE ALL THAT APPLY		
There are no facilities available	1	
No spare capacity at facilities available	2	
Lack of space or storage	3	
There is no benefit to the business in recycling/reusing	4	
It would be too time consuming / take too much effort	5	
Never really thought about it	6	
Don't know how to go about it	7	
Planning to recycle/reuse in near future	8	
Not interested in recycling/reusing waste	9	
Other	10	
Don't know	11	

10. Which, if any of the following does your business unit have in place? READ OUT, TICK ALL THAT APPLY				
An environmental policy		1	*Go to Q12*	
Targets for recycling		2	*Go to Q12*	
A waste management strategy		3	*Go to Q12*	
Agreement with suppliers to take away packaging		4	*Go to Q12*	
Informal commitment to reducing waste / environmental impacts		5	*Go to Q12*	
Part of the eco-schools program (eco-campus program if higher education*)*		6	*Go to Q11A*	
DO NOT READ OUT	*Nothing in place*	7	*Go to Q12*	
	Other (specify)	8	*Go to Q12*	
	Don't know	9	*Go to Q12*	

11A. Which, if any of the following levels of award has your organisation achieved? READ OUT, TICK ONE				
ECO-SCHOOL	*ECO-CAMPUS*			
Bronze award	*Bronze award*	1	*Go to Q11B*	
Silver award	*Silver Award*	2	*Go to Q11B*	
First green flag	*Gold Award*	3	*Go to Q11B*	
Second green flag		4	*Go to Q11B*	
Third green flag		5	*Go to Q11B*	
Fourth green flag	*Platinum award*	6	*Go to Q12*	
None yet achieved		7	*Go to Q11B*	
Don't know		8	*Go to Q11B*	

11B. Is your organisation continuing to work towards your next award? CODE ONE				
Yes	1	*Don't know*	3	
No	2			

12. How important do you think it is for business units to recycle and reuse their waste? CODE ONE				
Very important	1	*Not at all important*	4	
Somewhat important	2	*Don't know*	5	
Not very important	3			

13. What do you think could be done to help you [and/or] other businesses in Scotland to recycle or reuse more of their waste? WRITE IN VERBATIM		
Nothing, it is up to the business	1	
Nothing, I am not interested	2	
Don't know	3	

SECTION 3: Residual/general mixed waste issues

14. Does your business site currently pay for the removal of any of its general mixed waste?		
Yes	1	*Go to Q15*
No	2	*Go to Q16*
Don't know	3	*Go to Q16*

15. Which organisation(s) currently remove the general mixed waste from your business site?		
Contractor name		
Local authority	1	
Don't know	2	

16. What types of containers does your site use to dispose of its general mixed waste and - are any of these shared with other businesses and how many of each are there/do you tend to use per week ?					
	Not used	Used, sole use	Used shared use	Don't know	Number used (average number per week for sacks)
Sacks/stickers	1	2	3	4	
Clinical sacks	1	2	3	4	
240 litre bin (2 wheeled)	1	2	3	4	
360 litre bin (2 wheeled)	1	2	3	4	
660 litre bin (4 wheeled)	1	2	3	4	
770 litre bin (4 wheeled)	1	2	3	4	
950 litre bin (4 wheeled)	1	2	3	4	
1,100 litre bin (4 wheeled)	1	2	3	4	
1,280 litre bin (4 wheeled)	1	2	3	4	
Paladin	1	2	3	4	
Bales	1	2	3	4	
10/14 m^3 skip without compactor	1	2	3	4	
10/14 m^3 skip with compactor	1	2	3	4	
25/45 m^3 skip without compactor	1	2	3	4	
25/45 m^3 skip with compactor	1	2	3	4	
Other	1	2	3	4	
Don't know	5				

17. And on which days of the week are the {containers used at Q16} emptied? TICK ALL THAT APPLY FOR EACH CONTAINER USED							
	Mon	Tues	Weds	Thurs	Fri	Sat	D/K days
Sacks/stickers	1	2	3	4	5	6	7
Clinical sacks	1	2	3	4	5	6	7
240 litre bin (2 wheeled)	1	2	3	4	5	6	7
360 litre bin (2 wheeled)	1	2	3	4	5	6	7
660 litre bin (4 wheeled)	1	2	3	4	5	6	7
770 litre bin (4 wheeled)	1	2	3	4	5	6	7
950 litre bin (4 wheeled)	1	2	3	4	5	6	7
1,100 litre bin (4 wheeled)	1	2	3	4	5	6	7
1,280 litre bin (4 wheeled)	1	2	3	4	5	6	7
Paladin (4 wheeled)	1	2	3	4	5	6	7
Bales	1	2	3	4	5	6	7
10/14 m^3 skip without compactor	1	2	3	4	5	6	7
10/14 m^3 skip with compactor	1	2	3	4	5	6	7
25/45 m^3 skip without compactor	1	2	3	4	5	6	7
25/45 m^3 skip with compactor	1	2	3	4	5	6	7
Other	1	2	3	4	5	6	7
Don't know container	1	2	3	4	5	6	7

18. And how full do the {containers used at Q16} tend to be when emptied? TICK ONE FOR EACH CONTAINER USED							
	Full	About three quarters full	About half full	About a quarter full	Little/no waste	Don't know	
Sacks/stickers	1	2	3	4	5	6	
Clinical sacks	1	2	3	4	5	6	
240 litre bin	1	2	3	4	5	6	
360 litre bin	1	2	3	4	5	6	
660 litre bin	1	2	3	4	5	6	
770 litre bin	1	2	3	4	5	6	
950 litre bin	1	2	3	4	5	6	
1,100 litre bin	1	2	3	4	5	6	
1,280 litre bin	1	2	3	4	5	6	
Paladin	1	2	3	4	5	6	
Bales	1	2	3	4	5	6	
10/14 m^3 skip without compactor	1	2	3	4	5	6	
10/14 m^3 skip with compactor	1	2	3	4	5	6	
25/45 m^3 skip without compactor	1	2	3	4	5	6	
25/45 m^3 skip with compactor	1	2	3	4	5	6	
Other (specify)	1	2	3	4	5	6	
	1	2	3	4	5	6	
Don't know container	1	2	3	4	5	6	

19. Do any of the sinks within your business unit have macerators fitted? TICK ONE			
Yes	1	*Go to Q20*	
No	2	*Go to Q21*	
Don't know	3	*Go to Q21*	

20. Are the sink macerators used to get rid of food or kitchen waste? TICK ONE				
Yes	1	*Don't know*	3	
No	2			

21. What do you think could be done to help you [and/or] other businesses in Scotland to implement more efficient general mixed waste management processes? WRITE IN VERBATIM		
Nothing, it is up to the business	1	
Nothing, I am not interested	2	
Don't know	3	

SECTION 4: NEXT STAGE

22. The Scottish Government/Zero Waste Scotland is very interested in identifying the different types and amounts of waste that are disposed of by businesses like yours throughout Scotland. This will help government provide support to organisations to manage their waste and resources better, reduce costs and reduce their environmental impacts.
We are recruiting 750 business units throughout Scotland to be involved in this process, which will involve one week's worth of general mixed waste taken away and sorted into separate material types. When completed, all of the waste will be disposed of in a responsible manner at no cost or inconvenience to your business. To thank you for your help with this, your business will receive a report which provides information on the types and weights of waste thrown away. Please be assured that the process is completely confidential and anonymous. There will be no impact to your business, except we would like to visit your site before the waste is taken away to take a look at the waste containers you use and confirm a few details – we will aim to take no more than around 10 minutes of your time and all information and data collected will be completely anonymous and confidential.
As already mentioned, on completion of the project, you will receive a report which provides information on the waste disposed of by your organisation and aggregated, anonymised data for others within your area of business; this will include guidance on how to reduce your waste, environmental impacts and financial costs. Again, all of the information relating to your organisation will be kept in the strictest confidence and will only be reported collectively with that from other organisations. Would you be interested in taking part in this research?

Definitely	1	*Go to Q23*	No	3	*THANK AND CLOSE*	
Maybe/don't know	2	*Go to Q23*				

23. {Thank you.} Would you be the best person to talk to about arranging this? [IF NO ASK FOR APPROPRIATE PERSON TO TALK TO]. Thank you. We will be in touch with you to make arrangements shortly. WRITE IN CONTACT DETAILS

Do not wish to take part	1	
Do not know appropriate person	2	
Name		
Telephone number		
Email		

THANK & CLOSE

Appendix D Fieldwork protocol

Summary methodology and protocol for the analysis of waste samples

Commercial and industrial waste composition in Scotland - 2011

Introduction

This document provides a brief overview of the methodology used by WastesWork for collecting and hand sorting solid waste samples for the 'Commercial and industrial waste composition in Scotland' project.

Preparation

Prior to any waste analysis taking place, the designated WastesWork fieldwork manager will contact the sort site operator to discuss health and safety issues specific to the site. He/She will also ask for information on the area to be used for the hand sort (including facilities and procedures for cone and quartering sampling) and the preferred frequency and method of disposal for the samples.

Where applicable, business units will be offered alternative containers for the storage of waste – for example, red sacks for businesses that normally dispose of their waste themselves, use compactors or have shared bins. The sacks will be provided to units in a timely manner with information on when to start and stop using them, so that a full week's worth of mixed waste can be collected.

Collection of sample

A proforma will be drawn up detailing the name of each business unit to be collected that day, the address of the business, and any additional useful information, e.g. where the bins are sited, number of bins and the sizes, (the collection times will be verified by WastesWork with the collection crew supervisors). Only residual waste will be collected and arrangements will be made so that a full week of waste is collected (unless instructions are different). Where required a Duty of Care waste transfer note can be supplied to the business. WastesWork is licensed to carry waste.

The day before collection, the team leader will call the businesses that require a collection and reconfirm arrangements. In order to cause least disruption the samples of waste will be collected on the usual day of collection and as close as possible to the normal collection time. The WastesWork team will arrive in the area as early as possible before the normal collection time.

The team will be in a white Luton van. The team wear high visibility vests as part of our H&S protocol, these vests have WastesWork printed on the back. Each person has an ID badge with information about WastesWork. Prior to this waste analysis exercise each business has participated in a telephone questionnaire survey and a waste audit. They have been made fully aware of the aims of the project and how they will be involved.

The team will use the information from the previously carried out waste audit to identify the correct containers from which to collect waste. Separate bagged waste will have been collected in easily identifiable red bags. Any particular collection requirements will have been identified in advance from the waste audit information. The team will 'sense check' the waste for collection to minimise the risk of collecting waste from the incorrect organisation. If there is any uncertainty over the waste to be collected this will be discussed with the fieldwork manager.

All waste will be collected and transferred into bulk bags. Each bag will be identified using plastic tags marked with a unique ID number. The bulk bags will be loaded onto the Luton using a tailgate lift. Once the whole sample has been collected from an area it will be taken to the sort site where it is weighed and then hand-sorted. The collection area will be left as found with all containers replaced closed and in their original positions.

In some cases only a sub-sample of the waste will be sorted. The procedure for collection remains the same; in **every** case **all waste** on **all collection days** should be collected and weighed. Where the waste is weighed in the container prior to removal from site then the weight of the empty container must also be recorded.

In the case of some very large sites the waste may be collected and delivered directly by the organisation's waste contractor. Arrangements will be made via the organisation contact and the waste contractor.

Analysis Procedures

The team will sort the whole sample from each organisation unless a requirement for cone and quartering sampling has been identified beforehand.

1. A safe working area will be identified and if necessary coned off, and the sorting equipment set up.
2. The waste should be unloaded taking account of relevant health and safety procedures.
3. If the bags have been collected from more than one organisation they will be segregated accordingly. All bags will be identified from the plastic identification tags.
4. The frequency of collection will be clearly noted on the sort sheet. There will be one sort sheet completed for each collection frequency period. So for example, a business that has its waste collected three times a week will have three sort sheets completed over the course of the week – each marked 'one of three', two of three' 'three of three' as applicable – where the three sort sheets collectively provide information on a full week's worth of waste.
5. The source of the waste will be clearly noted on the sort sheet. Businesses that keep their canteen waste separate from their general waste will have these two sources of waste hand sorted separately. For schools this will also include separate collections for litter.
6. Weigh the total arisings before starting the hand sort analysis, and record the weight on the sort sheet in standard units (KGs to three decimal places).
7. Place the waste onto the sorting screen and sort into the main categories listed in the classification system.
8. Sort each of the main categories into the sub-categories listed on the sort sheet.
9. Weigh all sub-categories and record the weight of each on the sort sheet. Where a sub-category is too light to register, it should be recorded as zero. Categories that are absent should be left blank rather than entered as zero.
10. A note will be made of any items which are unusual or where there is any doubt about how they should be categorised.
11. The supervisor must remind the sort staff of the following specific health and safety requirements for this activity:
    - Bags must not be opened by poking a finger into the bag and then ripping it open instead a knife must be used to cut along one side of the bag.
    - Any potentially hazardous items which are identified must be reported immediately to the supervisor – examples include solvents, syringes, oils and sharp objects.
    - Small particles should not be forced through the screen because of the possible dangers caused by sharp objects.
12. When the analysis has been completed the team leader will check the sort sheet for completeness, including that the weight of the total sample and sub-samples are within 2%. Only once these checks have been completed can the sample can be disposed of. This will be done through facilities provided by a licensed waste disposal contractor. The supervisor will ensure, before the analysis work begins, that the waste disposal contractor has provided sufficient collection capacity for the overall quantity of waste being analysed. The supervisor is responsible for ensuring that the registered waste disposal contractor removes the waste as soon as possible after the analysis work has been completed.
13. At the end of each day there will be a discussion between the team leaders and the fieldwork manager of any issues arising.

Procedure for cone and quartering

In some cases the volume of waste will dictate that cone and quartering sub-sampling is required. The following criteria should be used to determine if a sub-sample is an acceptable approach:

- Large sites: an organisation is generating more than 500kg of waste per collection and has a collection on more than one day a week.
- Very large sites: the site has been identified in advance as a very large waste producer. In these cases alternative collection arrangements will have been organised.

In **every** case **all waste** on **all collection days** should be collected and weighed.

The site manager will advise on the area to be used for the cone and quartering.

1. The driver will be asked to tip their load onto the tipping floor; the best method for doing this will be discussed with the site manager.
2. The material will be formed into a uniform, homogeneous pile under supervision of the waste analysis supervisor. In some cases a front-end loader will be required. It is very important that the sample is not crushed in any way as this can make hand sorting too hazardous.
3. The pile will be divided into two by a straight line through the centre of the pile.
4. The pile will be further divided by a second line roughly perpendicular to the first.
5. Either pair of opposite quarters will be removed, leaving half the original sample.
6. Steps 6 though 8 are repeated until the required sample weight remains.
    - Large sites: the total sample across each collection day should total 500kg e.g. if waste is collected on two days then the sample must be at least 250kg per collection.
    - Very large sites: the required sample weight is at least 500kg.
7. The weight of the sub-sample will be recorded on the sort sheet.
8. The sample will be hand sorted according to the procedure above.

Waste categories

Waste will be sorted into the categories and sub-categories outlined on the project sort sheet. Two categories that need further explanation are food waste and what should be classified as sanitary/personal hygiene waste.

The **food** waste categories are:

- Food that is unused, whole or in pack (including raw meat and fish).
- Sandwiches (partially consumed inc wraps, rolls, burger in bun, chicken in a bun).
- Fruit and vegetables (partially consumed).
- Unavoidable food waste (e.g. egg shells, teabags, peelings, cores, skins but excluding meat bones).
- Fish /Meat and Fish/meat bones (unavoidable meat and fish bones and gristle).
- Cooked food (curry, chips, pizza).
- Other partially consumed food items (cakes, biscuits).

Sanitary product/disposable nappies: This category should include disposable sanitary protection items such as nappies, sanitary towels, tampons and similar items of human hygiene waste. No human hygiene waste should be included in the 'other clinical waste' category. All team members will be provided with a key to aid identification of clinical waste. NB no yellow clinical waste bags should be opened; instead they should be weighed in their entirety and recorded as clinical waste. Separate disposal arrangements will be made for clinical waste.

<u>If any item is too difficult to classify, list it with a weight, it can be reclassified at the data entry stage.</u>

Reporting

Following analysis, the completed sort sheets will be transferred to Exodus for data entry into SPSS/Microsoft Excel spreadsheets. The waste analysis team will hold the carbon copies of the sort sheets to reduce the risk of losing data.

Health and safety

Our health and safety policy covers all of the activities involved in the collection and analysis of waste. All staff involved in this type of work must read, understand and sign a copy of the policy.

PPE

The following list of protective clothing, deemed suitable for waste analysis, has been compiled according to the Personal Protective Equipment (PPE) at Work Regulations (1992):

- Suitable overalls.
- Protective gloves.
- Luminous vest.
- Boots with steel toe-caps and steel soles.
- Safety helmet.
- Dust mask.
- Ear defenders.
- Safety glasses.

All staff must be provided with, or have access to, all of this safety equipment. WastesWork must ensure that all staff, including support staff, are aware of this list of personal protective equipment, and that all of the above items of equipment must be provided to staff.

WastesWork will ensure that all staff use, as a minimum, protective gloves and boots with steel toe-caps and steel soles at all times when sampling or analysing waste. The supervisor must ensure that all staff wear a luminous vest when they are working in an area where there are moving vehicles, for example when collecting waste from households.

Injections

WastesWork will ensure that all staff, including support staff working on any of the collection or analysis activities have received the following injections or inoculations:

- Tetanus.
- Polio.
- Hepatitis A.

All staff must also receive injections for hepatitis B. Three injections are required over a period of 6 months for the inoculation to fully take effect. All full time staff must have received the full course of injections. Temporary staff will receive, as a minimum, the initial injection, and receive additional injections as required, depending on the amount of time that they are employed for.

WastesWork will ensure that all staff, including support staff, are aware of the number of inoculations required for full protection against hepatitis B.

Initial training

WastesWork will provide training on the following issues before a member of staff starts work:

- Working with different types of container, such as plastic sack, recyclables box and wheeled bin.
- Lifting of large or heavy items.
- The procedure for opening sacks by using a knife to cut along one side of a bag (and stressing that bags should not be opened by poking through the bag using fingers).
- Identification of any hazardous materials in the samples including procedure for dealing with clinical waste.
- Awareness of other activities in the area where the work is being conducted.
- Use of electrical equipment in the working area.

- Procedure for obtaining first aid.
- Procedure for dealing with any serious accident or other emergency situation, such as a fire in the area where work is being conducted.
- Other general procedures, such as washing hands and face before eating, drinking or smoking, and not eating, drinking or smoking in close proximity to the waste.

All staff will be provided with the health and safety policy and it will be explained to them, point by point. The supervisor will ensure that staff understand all the procedures and the implications of failing to comply with the health and safety requirements. If the supervisor feels that a staff member has not adequately taken on board the information, that member of staff will not be permitted to handle waste until such a time as the supervisor is confident in them. If necessary, an informal test should be arranged. Every member of staff will be required to sign to say they have been provided with the information, and will adhere to it.

Training on operational procedures

Training will be provided to staff on the following:

- Acceptable behaviour when working in view of the general public.
- Background to the project, its purpose and approach.
- How to deal with queries from the general public.

The operational procedures should be provided and explained to staff. It is the supervisor's responsibility to ensure that all staff are familiar with the procedures to be used, and to provide suitable training as necessary. A certain amount of on-the-job training is acknowledged to be inevitable, for example as rare categories of waste arise. New staff should be given two dummy loads of waste to sort before being allowed to sort project waste, and should be closely supervised for the first two days. This is likely to involve the supervisor and the new member of staff working at the same sorting table and/or jointly weighing waste items. It is important to check sorting procedures regularly to ensure that standards do not decrease through operator fatigue.

Equipment for commercial waste analysis

The following is the minimum equipment that must be provided to any team working on either collection or analysis of samples:

- Appropriate health and safety equipment.
- Fully charged mobile phone.
- First aid kit for dealing with minor injuries such as cuts.
- Clipboards, notebooks and pens.
- Shovels and brooms.
- Staff identification badges.

Contact names and telephone numbers for dealing with emergency situations must be provided.

The following is the minimum additional equipment that must be provided to any team working on analysis of samples:

- Electronic scales able to weigh a sample of up to 100kg to an accuracy of a minimum of 0.1kg.
- 10 mm screen.
- Knife for opening bags.
- Magnet for differentiating metals.
- Sufficient sample analysis sort sheets for the number of samples expected to be analysed during a working day.
- Containers for holding and weighing sorted materials.
- Containers for collecting any clinical waste.

- Sharps boxes.
- A flat surface e.g. a door for weighing large or bulky items.

Appendix E Categories of mixed waste used in the compositional analysis

Date:		**Sort site:**		**Collection date:**
Business ID		**Collection ------ of --------**	**Waste type: Canteen☐ Other ☐**	**Total residual weight (KG):**

PRIMARY CATEGORY	SUB-CATEGORY	WEIGHT (KGS)	EXODUS USE ONLY
Paper	Newspapers		
	Magazines, directories and catalogues		
	USED A4 type paper including letters		
	UNUSED A4 type paper including unused exercise books		
	Other recyclable paper		
	Envelopes		
	Hand towels		
	Other non-recyclable paper		
Card	Card plates and cups		
	Liquid cartons		
	Corrugated cardboard		
	Other card		
Plastic film	Single use carrier bags		
	Long-life carrier bags		
	Other film		
Dense Plastic	PET bottles		
	HDPE bottles		
	Other bottles		
	Polystyrene including cups		
	Other dense plastic		
Textiles	Reusable Fabrics		
	Non reusable fabrics including used mop heads		
	Shoes, boots, slippers and other outer footwear		
Misc. Combustible	Rubber		
	Man made and treated wood		
	Pallets and other untreated wood		
	Carpet/underlay		
	Unclassified		
Misc. non-combustible	Ceramics		
	Hardcore		
	Unclassified		
Glass	Glass bottles and jars		
	Other glass		
FE metal	FE cans		
	Other ferrous		
Non FE metal	Non FE cans		
	Other non-ferrous		
Green waste	Soft, woody including cut flowers		
Food waste	Food that is unused, whole or in pack [LIST BELOW]		
	Sandwiches – partially consumed		
	Fruit and vegetables – partially consumed		
	Unavoidable food waste (e.g. banana skin, teabags)		
	Meat and meat bones		
	Cooked food		
	Other partially consumed food items		
	Drinks/milk (exclude packaging)		
Fines	Particles passing a 10mm screen		
Liquids (excluding milk/drinks) excluding packaging			
WEEE	LIST ITEMS BELOW		
Hazardous	LIST ITEMS BELOW- including battery types		
Sanitary product/disposable nappies			
Other clinical waste			
Furniture	LIST ITEMS BELOW		

Appendix F Proportion and estimated annual weight of materials found in the mixed waste of business units in the motor, wholesale and retail sector 2011

Waste type	% of mixed waste	Tonnes per year
Food that is unused, whole or in pack	11.8	21,310
Other film	9.4	16,870
Corrugated cardboard	8.7	15,740
Hand towels	5.1	9,230
Other dense plastic	4.8	8,580
Other non-recyclable paper	3.7	6,660
Other card	3.6	6,510
Unavoidable food waste (e.g. banana skins, teabags)	3.6	6,570
Green waste	3.5	6,370
Rubber	3.3	5,880
Cooked food	3.3	5,900
Other recyclable paper	3.2	5,800
Magazines, directories and catalogues	3.1	5,640
Carpet/underlay	2.5	4,570
Newspapers	2.0	3,620
Pallets and other untreated wood	2.0	3,660
Used A4 type paper including letters	1.9	3,460
Other partially consumed food items	1.9	3,380
Other ferrous metal	1.8	3,200
Fines (particles passing a 10mm screen)	1.7	2,980
Polystyrene including cups	1.5	2,730
Unclassified miscellaneous combustibles	1.5	2,790
Glass bottles and jars	1.4	2,450
Meat, fish and meat/fish bones	1.1	1,980
Drinks/milk (excluding packaging)	1.1	2,040
Non-reusable fabrics including used mop heads	1.0	1,710
Ferrous cans	1.0	1,810
Man-made and treated wood	0.9	1,640
Other glass	0.9	1,580
PET bottles	0.8	1,480
HDPE bottles	0.8	1,480
Unclassified miscellaneous non-combustibles	0.8	1,480
WEEE	0.7	1,270
Envelopes	0.6	1,010
Liquid cartons	0.6	1,040
Single use carrier bags	0.5	850

Waste type	% of mixed waste	Tonnes per year
Sandwiches - partially consumed	0.5	970
Fruit and vegetables - partially consumed	0.5	820
Card plates and cups	0.4	760
Non-ferrous cans	0.4	810
Hardcore	0.3	480
Other non-ferrous metal	0.3	550
Long-life carrier bags	0.2	410
Re-usable fabrics	0.2	320
Liquids (excluding drinks, milk and packaging)	0.2	370
Furniture	0.2	400
Unused A4 type paper including unused exercise books	0.1	230
Other bottles	0.1	120
Shoes, boots, slippers and other outer footwear	0.1	220
Ceramics	0.1	260
Hazardous	0.1	130
Sanitary products, disposable nappies	0.1	200
Clinical waste	<0.1	80
Total	*100*	*180,370*

Note: Columns may not sum due to rounding

Appendix G Proportion and estimated annual weight of materials found in the mixed waste of business units in the education sector 2011

Waste type	% of mixed waste	Tonnes per year
Hand towels	10.3	8,770
Cooked food	8.8	7,450
Other film	7.7	6,580
Corrugated cardboard	5.1	4,310
Other dense plastic	5.1	4,330
Other non-recyclable paper	4.1	3,480
Unavoidable food waste (e.g. banana skins, teabags)	4.1	3,450
Other recyclable paper	3.5	3,020
Liquid cartons	3.4	2,930
Fines (particles passing a 10mm screen)	3.4	2,890
Drinks/milk (excluding packaging)	3.3	2,820
PET bottles	3.2	2,710
Used A4 type paper including letters	3.1	2,600
Food that is unused, whole or in pack	2.9	2,470
Sandwiches - partially consumed	2.6	2,240
Magazines, directories and catalogues	2.3	1,920
Other card	2.3	1,970
Ferrous cans	1.9	1,580
Green waste	1.9	1,630
Fruit and vegetables - partially consumed	1.8	1,550
Glass bottles and jars	1.6	1,390
Other partially consumed food items	1.5	1,250
Liquids (excluding drinks, milk and packaging)	1.3	1,070
Newspapers	1.2	1,040
Non-reusable fabrics including used mop heads	1.0	830
Unclassified miscellaneous combustibles	1.0	830
Other ferrous metal	0.9	780
Furniture	0.9	770
HDPE bottles	0.8	670
Man-made and treated wood	0.8	680
Polystyrene including cups	0.7	570
Unclassified miscellaneous non-combustibles	0.7	620
Non-ferrous cans	0.7	560
Other non-ferrous metal	0.6	550
WEEE	0.6	530
Card plates and cups	0.5	470
Pallets and other untreated wood	0.5	430

Waste type	% of mixed waste	Tonnes per year
Envelopes	0.4	310
Single use carrier bags	0.4	350
Re-usable fabrics	0.4	350
Carpet/underlay	0.4	330
Meat, fish and meat/fish bones	0.4	330
Sanitary products, disposable nappies	0.4	360
Ceramics	0.3	280
Other glass	0.3	240
Hazardous	0.3	290
Shoes, boots, slippers and other outer footwear	0.2	190
Unused A4 type paper including unused exercise books	0.1	120
Long-life carrier bags	0.1	70
Other bottles	0.1	50
Rubber	0.1	70
Hardcore	0.1	50
Clinical waste	<0.1	20
Total	*100*	*85,120*

Note: Columns may not sum due to rounding

Appendix H Proportion and estimated annual weight of materials found in the mixed waste of business units in the health and social work activities sector 2011

Waste type	% of mixed waste	Tonnes per year
Hand towels	14.6	15,580
Other film	10.5	11,200
Unavoidable food waste (e.g. banana skins, teabags)	6.9	7,330
Cooked food	5.8	6,180
Other dense plastic	4.8	5,130
Newspapers	3.6	3,890
Other non-recyclable paper	3.6	3,800
Corrugated cardboard	3.3	3,490
Other card	3.3	3,500
Magazines, directories and catalogues	3.0	3,200
Non-reusable fabrics including used mop heads	2.9	3,080
Used A4 type paper including letters	2.5	2,650
Ferrous cans	2.5	2,640
Unclassified miscellaneous combustibles	2.4	2,590
Food that is unused, whole or in pack	2.3	2,410
Other recyclable paper	2.2	2,300
PET bottles	1.7	1,780
Drinks/milk (excluding packaging)	1.7	1,790
Sanitary products, disposable nappies	1.7	1,780
Glass bottles and jars	1.6	1,730
HDPE bottles	1.5	1,650
Sandwiches - partially consumed	1.5	1,610
Fines (particles passing a 10mm screen)	1.4	1,520
Re-usable fabrics	1.3	1,340
Ceramics	1.3	1,380
Unclassified miscellaneous non-combustibles	1.3	1,370
Other partially consumed food items	1.2	1,330
Envelopes	0.7	760
Card plates and cups	0.7	780
Polystyrene including cups	0.7	730
Fruit and vegetables - partially consumed	0.7	790
Green waste	0.6	660
Clinical waste	0.6	600
Liquid cartons	0.5	510
Other ferrous metal	0.5	550
Non-ferrous cans	0.5	510

Waste type	% of mixed waste	Tonnes per year
Other non-ferrous metal	0.5	570
Meat, fish and meat/fish bones	0.5	490
Single use carrier bags	0.4	400
Rubber	0.4	440
Carpet/underlay	0.4	380
WEEE	0.4	370
Man-made and treated wood	0.3	280
Liquids (excluding drinks, milk and packaging)	0.3	350
Pallets and other untreated wood	0.2	250
Furniture	0.2	240
Unused A4 type paper including unused exercise books	0.1	70
Shoes, boots, slippers and other outer footwear	0.1	150
Hardcore	0.1	90
Other glass	0.1	120
Hazardous	0.1	130
Long-life carrier bags	<0.1	50
Other bottles	<0.1	50
Total	*100*	*106,570*

Note: Columns may not sum due to rounding

Appendix I Example of modelling approaches used to estimate one week's worth of mixed waste

PROBLEM (WAT=Waste Analysis Team)	**APPROACH**	**Unusual waste treatment**
Business waste collected twice a week. 2nd sheet (21/3 Monday) is C&Q. The total weight is 272 and the WAT sorted 250.7Kgs, which represents 92.1%	Divide the individual weights on the 21st by 92.1 and multiply by 100 to get an estimate of full collection waste.	
Council picked up on Weds 23rd March. WAT picked up on 24th.	Business is open 5 days a week same hours. We have 1 days waste so multiply by 5 to get estimate of 1 week's waste.	
Normal collection is Tuesday and Thursday but WAT collected 2 x Thursday so we only have waste for Tues and Weds on each sort sheet.	Take an average of two sheets to give average Tues and Weds waste. Unit is open 5 days a week for same hours so divide again by 2 and then multiply by 5 to get estimate for one week's waste.	Exclude WEEE (assortment leads) from the model of 5/2.
Regular collections Wednesday and Saturday. WAT missed Weds collection. So data for Weds, Thurs and Fri only.	Unit is open 5 days a week (Mon-Fri, same hours) so we will divide by 3 and multiply by 5 to estimate a full week's waste.	3 days waste included HHW (strip lights and batteries). These are likely to be infrequent so have been excluded from the 5/3 model.
Normally collected Tuesdays and Fridays. Normal contractor previously collected on Friday 11th March. WAT collected on Tuesday 15th March (this is waste for Fri to Mon, inclusive). WAT also collected on Thurs 17th. We have 6 days waste.	Business open 5 days (Mon to Fri, same hours). We have waste for 4 working days, so divide by 4 and multiply by 5 to get estimate for 1 week's waste.	4 day's waste contained misc combustible (extractor fan filters). Due to business activities these are likely unusual, so will be excluded from the 5/4 model.
Normally collected Tuesday and Friday. WAT collected on Friday and missed the Tuesday collection. We have waste for 3 days.	Unit is open 5 days a week (M-F, same hours) so we will divide by 3 and multiply by 5 to estimate a full week's waste.	
Normally 2 collections. Both days were C&Q. first sheet has total weight of 860.9Kgs and sorted weight of 368.7Kgs, which is 42.8%. The 2nd sheet has a total of 1028.9Kgs and sorted weight of 511.5Kgs which is 49.7%.	For the first sheet divide everything by 42.8 and multiply by 100. For the second sheet divide by 49.7 and multiply by 100. Add these together to get an estimate for one full week's waste.	
964.86Kgs of waste was collected. This was C&Q and 503.14Kgs was sorted	Divide by 503.14 and multiply by 964.86 to get estimate for full collection.	
Normally 3 times a week. Sheets 1 and 2 are one collection, which have not been sub-sampled. Sheets 3 and 4 are one collection, which have been sub-sampled. The total weight of sheets 3 and 4 is 367.52Kgs and the total sort is 325.94Kgs. This is 88.7%.	Need to add up each element of waste from sheets 3 and 4, then divide by 88.7 and multiply by 100. Last sheet was not sorted. The total weight was 412.92Kgs. So we will add up sheets 1, 2, 3 and 4, calculate individual totals for each element of waste then use these to estimate sheet 5.	All sheets have small amounts of WEEE and HHW so this is likely to be usual, therefore will be included in the modelling for sheet 5.
Normally picked up Monday and Friday. Last picked up on Monday 28th Feb. Picked up by WAT on Wed 2nd March.	Open 5 days (Mon-Fri, same hours) so we will divide by 2 and multiply by 5.	Toner cartridges and batteries thrown away in 2 days. This is unlikely to be frequent so we have not factored it using the 5/2 modelling, but is included as a factor of 1.
Normally 3 collections. Third collection (1st sheet) was sub-sampled by 91.8% and this was C&Q. The second collection (2nd sheet) was all sorted. And the first collection (3rd sheet) was all done.	Divide the first sheet (3rd collection) by 91.8 and multiply by 100, for each item to get the full collection total, then add 3 collections together for estimate of whole week.	

PROBLEM (WAT=Waste Analysis Team)	**APPROACH**	**Unusual waste treatment**
Normally collected M,W,F. Previous collection was 18th Feb. WAT collected 21st and 25th. We have 5 days waste.	Open 24/7 (residential). We have 5 days so will divide by 5 and multiply by 7.	Unusual WEEE (motor for hoist, circuit board clip board) and HHW (lead acid battery). As these are unusual items they will be excluded from the 7/5 model.
Normally collected on Monday and Thursday. Contractor last picked up on Monday 28th. WAT picked up on 2nd March.	Open 5 days a week (M-F, same hours) so we will divide by 2 and multiply by 5.	In 2 days waste included more than 9Kgs of FE metal (not cans) that is likely to be unusual. Therefore, this will be excluded from the 5/2 model.
Normally collected on Wednesday. Council last picked up 9th March. WAT picked up 15th March, so need to model for Tuesday.	Open 5 days a week (M-F, same hours) so we will divide by 4 and multiply by 5.	Over the 4 days waste included 1 computer mouse. Unlikely to be a regular occurrence so exclude WEEE from the model of 5/4.
Normal collection is Tuesday. WAT picked up on Fri.	Open 6 days a week (M-Sat, same hours). We have 3 days waste so will divide by 3 and multiply by 6.	Over 3 days circa 7Kg of fish meat and bones were found. The model 6/3 would gross this up to 14Kg, which may overestimate the situation so we will exclude fish meat and bones from the model (head office have indicated that fish meat and bone products are disposed of separately, though there will be instances where it inevitably ends up in the mixed waste.
Business normally disposes of waste to HWRC. They provided WAT with waste for 3 days (Tues to Thurs).	Business is open 7 days a week (Mon-Sat 9-8, Sun 9-1; total of 70 hours). Divide by 33 and multiply by 70.	None.
Normally collected Tues and Thurs. WAT collected Tues so need to model Tues and Weds.	Open 5 days a week (M-F, same hours). We have 3 days waste so divide by 3 and multiply by 5.	WEEE charger is excluded from 5/3 model.
Normally collected fortnightly. Normal contractor previously collected 28th Feb so have 2 week's worth of waste but only 80% of this was collected by WW	Divide by 2 then divide by 80 and multiply by 100	
2 skips normally collected twice a week. WAT collected and sorted a total of 255.4Kgs in both collections combined. No information on how the sub-sample was taken. Normal contractor say normal week collection is 1600Kgs.	Of a total of 1600Kgs we have sorted weight of 282.46Kgs, which represents 17.65% so we will divide by 17.65 and multiply by 100.	HHW lists just 2 batteries so these will be included in the model, but we will exclude the WEEE (digibox and unknown medical equipment) as it is unknown whether this is a usual occurrence.
Collected Tues and Fri. WAT missed 2nd collection and sub-sampled the 1st. The sub-sample was provided by normal contractor. No further information available.	Total sort weight is 165.33Kgs, normally the week's waste weighs 6.5 tonnes (stated by normal contractor). We have 2.54%, so divide by 2.54 and multiply by 100.	Normal contractor should have provided a representative sample. Very small amount of WEEE and HHW (less than 0.1Kgs each) so will be included in the modelling
Collected twice a week. One skip is collected twice a week and one is collected on an as needs basis. Normal contractor say skip 1 was collected on Tues with a total weight of 1040Kgs. Skip 1 was collected on Thurs with a weight of 3040Kgs of which a subsample was given to WW. Skip 2 was collected by Normal contractor with a total of 8000Kgs which represents 12 days waste.	Total waste for the week for skip one is 4080Kgs, of which 597.16Kgs was sorted (C&Q). Weekly waste for skip 2 is 4666.67Kgs (8000/12*7). Therefore total waste from both skips is 8746.67 for the week (normal contractor confirm they collect 8-9 tonnes per week on average). Apply the proportions by material type arising from the 597.16Kgs sub-sample to the 8746.67 to get the estimate breakdown of material type for the week. The estate manager at southern general states that the two skips are very similar with respect to content.	Some WEEE but very light and as this is a large hospital this will be included in the model.

PROBLEM (WAT=Waste Analysis Team)	**APPROACH**	**Unusual waste treatment**
Supposed to be collected 6 days a week, but WAT missed 5 collections. Collection was sub-sampled by C&Q.	We have 520.18 out of 4820Kgs (SK has said this is for whole week, not just 1 collection), so we have 10.79%. So we will divide by 10.79 and multiply by???	
This is collected 6 times a week (Mon-Sat). WAT collected and sorted 3 out of 6 collections. The other 3 collections were not sorted but the total was weighed.	Total waste for the week that was collected is 976.91Kgs, of which approx. 464.41Kgs was sorted. We will add up the individual material type weights for the 3 collections then apply the proportions to the 976.91 total to get an estimated breakdown by material type for the week.	Some WEEE but weight is insignificant so will be left into model.
Two collections, but first collection was tampered with (set fire to) so we will have to model from the second collection.	Open 5 days a week (Mon-Fri, same hours) so divide by 3 and multiply by 5 to estimate full week's waste. Exclude sheet 1. Use sheets 2 and 3.	Unusual WEEE, which has been excluded.
Normally collected on Tuesday. Normal contractor collected on 15 March. WAT collected on 21st March.	Open 7 days a week variable hours (total 60.5hrs). We have waste for 51.5hrs, so divide by 51.5 and multiply by 60.5.	None.
Council picked up 2 weeks before WW. So we have 2 week's waste.	Divide by 2 to get estimate of a week's waste.	This contains weight for batteries that has been halved as it is possible half the batteries were thrown away one week and then half the next.
2x 1100L bins, both of which contained 40% loose rubber, which was not collected.	Use Defra density weights (0.47).	
10% of the 660L bin was loose broken glass and uncollectable.	Use Defra density weights (0.57).	

Appendix J Modelling approach used to estimate annual tonnage of mixed waste for Scotland's business units

The key objective of the research was to provide a reliable estimate of the composition (the proportion that different material types account for) of the mixed waste disposed of by Scottish business units within the motor, wholesale and retail, education and health and social work activities sector. It was a further requirement that the total annual weight of the mixed waste disposed of within each sector was also estimated. Several different approaches were undertaken in order to provide best estimates of these weights:

- Model A: Annualising the weekly weight of mixed waste for each sampled business unit by a factor of 52.18 to give an estimated annual weight.
- Model B: As above, but multiplying the food waste elements found in the mixed waste of business units within the education sector by the stated number of weeks' opening to minimise any over-estimating of food waste outside of term time.
- Model C: Using estimates of expected annual mixed waste weight for different types of containers established in the Defra study (Commercial and Industrial Waste Survey 2009, Defra, December 2010) and applying these to each of the sampled business units.
- Model D: Using the estimated mean weights for business units by SIC and employee size band established in the Defra study (Commercial and Industrial Waste Survey 2009, Defra, December 2010).

The approach, strengths and weaknesses of each of these different models is explored in turn and the resulting tonnage estimates are given in Part J.5.

Each of the models required the estimation of the annual weight of mixed waste for the sampled business units to be 'grossed up' by the number of all businesses in Scotland. This was done by multiplying the estimated mean sample weights by the number of Scottish businesses according to the type (three-digit SIC) and employee size band. The following table gives the number of business units in Scotland according to the type of business (SIC 2007) and number of employees.

Table 75 Number of business units in Scotland by SIC and employee size bands (source: IDBR, ONS)

SIC	Description	Number of employees					
		0	1-9	10-49	50-249	250+	Total
451	Sale of motor	295	650	270	110	0	1330
452	Motor maintenance/repair	510	2170	300	15	0	3000
453	Motor vehicle parts	60	445	140	15	0	655
454	Motorcycles	25	95	15	0	0	135
461	Wholesale fee/contract	330	615	60	5	0	1010
462	Wholesale agriculture	40	165	50	0	0	260
463	Wholesale food/beverages/tobacco	175	725	270	70	10	1250
464	Wholesale household goods	160	815	165	30	5	1170
465	Wholesale IT	15	205	50	15	0	285
466	Wholesale other supplies	75	740	270	20	0	1105
467	Wholesale other specialised	95	1275	440	35	0	1845
469	Wholesale non-specialised	145	455	50	5	0	660
471	Retail non-specialised	710	3180	1355	260	115	5625
472	Retail food/beverages/tobacco	425	2595	370	5	0	3395
473	Retail fuel	15	285	150	0	0	450
474	Retail IT	25	485	60	0	0	575
475	Retail household equipment	270	1910	390	55	5	2620
476	Retail cultural/recreational	200	1140	330	15	0	1680
477	Retail other goods	725	6655	1330	160	10	8880
478	Retail stalls/markets	10	50	0	0	0	60
479	Retail not in store/stall/market	330	675	45	5	0	1055
851	Education pre-primary	0	220	215	10	0	445
852	Education primary	0	550	1720	245	5	2515
853	Education secondary	5	210	95	375	30	715
854	Education higher	0	115	35	30	40	215
855	Education other	130	1215	265	45	0	1660
856	Educational support	5	45	5	0	0	55
861	Hospital activities	0	80	155	205	90	530
862	Medical/dental practice	15	1500	705	10	5	2235
869	Other human health	30	675	315	135	20	1175
871	Residential nursing care	5	70	110	195	0	380
872	Residential learning disabilities/mental health/substance abuse	0	30	25	10	0	65
873	Residential elderly/disabled	0	535	380	90	0	1000
879	Residential other	0	415	405	75	5	900
881	Non-residential elderly/disabled	0	440	370	125	10	945
889	Non-residential other	0	2940	1460	195	15	4610

Note: Columns may not sum due to rounding

A similar approach for factoring up using SIC and employee size band was taken for the Defra (Commercial and Industrial Waste Survey 2009, Defra, December 2010) and WRAP studies (The Composition of Waste Disposed of by the UK Hospitality Industry, WRAP, July 2011). A statistical test of correlation was conducted to determine the extent to which there is a linear relationship between business type and size and the amount of mixed waste.

The following table shows the results of a correlation analysis to measure the extent to which the weight[13] of mixed waste by organisations within different SIC divisions is linearly related to the employee size band (i.e. does the weight increase as the size increases?). The results show that with the exception of pre-primary education and social work activities business units, there is a significant linear relationship and the conclusion is that business activity and size are a reliable predictor of mixed waste weight.

Table 76 Correlations of business type and size on mixed waste weight

Type of business	Correlation
Motor	0.71*
Wholesale	0.65*
Retail	0.63**
Pre-primary education	0.01
Primary education	0.47**
Secondary education	0.75**
Higher education	0.82**
Other Education	0.66**
Human health activities	0.59**
Residential care activities	0.34*
Social work activities without accommodation	0.18

*Correlation is significant at the 95% level
**Correlation is significant at the 99% level

J.1 Model A

Annualising the weekly weight of mixed waste for each sampled business unit by a factor of 52.18 to give an estimated annual weight.

Approach used

The weight (kg per week) of each waste sub-category material for each sampled business unit was multiplied by 52.18 to factor it up to one year's worth. Within each employee size band and 3-digit SIC these values were then averaged to produce mean kgs per annum.

For cells where there was not enough data to produce a mean, the value was estimated from the per capita weight of all businesses within the SIC. The mean weights were multiplied by the number of businesses in

[13] Based on reported weights estimated using Model C (Defra expected annual weights by container type).

Scotland within each size band and sic group (see Table J1) and the totals were divided by 1000 to give an estimate of the total tonnes per annum of waste thrown away by each sector.

Strengths of the approach

- The estimated tonnages are based on the actual weekly weights measured during the compositional analysis.
- The weights relate to Scottish specific data.

Weaknesses of the approach

- The compositional analysis provides information relating to a single week, a 'snapshot' which does not account for seasonal variability.
- The weights are based on a modest sample of businesses within each of the three sectors.
- The weights of all materials measured during the compositional analysis are annualised using a factor of 52.18, which does not account for any annual variation by material type.

Conclusion

Rejected: The annual estimates produced by this model were discussed with the peer expert group and it was agreed that the food waste disposed of within the education sector is over-represented and that in particular, this type of waste was unlikely to be present in significant quantities outside of term time. To address this, Model B was developed.

J.2 Model B

Annualising the weekly weight of mixed waste for each sampled business unit by a factor of 52.18 to give an estimated annual weight, but multiplying the food waste elements found in the mixed waste of business units within the education sector by the stated number of weeks' opening to minimise any over-estimating of food waste outside of term time.

Approach used

The weight (kg per week) of each non-food waste sub-category material for each sampled business unit was multiplied by 52.18 to factor it up to one year's worth. Each weekly weight relating to food waste was multiplied by the stated number of weeks for which the business unit normally opened (term-time). The non-food and food annual weights were then added to give a total annual weight for each of the sampled business units. Within each employee size band and 3-digit SIC these values were then averaged to produce mean kgs per annum.

For cells where there was not enough data to produce a mean, the value was estimated from the per capita weight of all businesses within the SIC. The mean weights were multiplied by the number of businesses in Scotland within each size band and sic group (see Table J1) and the totals were divided by 1000 to give an estimate of the total tonnes per annum of waste thrown away by each sector.

Strengths of the approach

- The estimated tonnages are based on the actual weekly weights measured during the compositional analysis.
- The weights relate to Scottish specific data.

Weaknesses of the approach

- The compositional analysis provides information relating to a single week, a 'snapshot'. which does not account for seasonal variability.
- The weights are based on a modest sample of businesses within each of the three sectors.
- The weight of all non-food waste materials measured during the compositional analysis are annualised using a factor of 52.18 which does not account for any annual variation by material type.

Conclusion

Rejected: This annual tonnage estimates produced by this model seemed low and this is likely due to the weights being based on the compositional data which can only represent a 'snapshot' in time.

J.3 Model C

Using the estimates of expected annual mixed waste weight for different types of containers established in the Defra study (Commercial and Industrial Waste Survey 2009, Defra, December 2010) and applying these to each of the sampled business units.

Approach used

The Defra study (Commercial and Industrial Waste Survey 2009, Defra, December 2010) involved a national survey of commercial and industrial waste arisings for business units in England. The methodology mainly involved the use of estimated tonnes per annum that each size of bin is likely, on average, to produce. Where available, an actual annual weight of waste for the business unit was used instead (and in the comparable sectors targeted in this survey, this was possible in ~30% of cases).

The data file for this study relating to the three sectors under investigation was provided to Exodus for the purposes of developing a model to estimate the annual tonnage of mixed waste disposed of by Scottish businesses. The data file was cleaned to remove waste that did not meet the project definition of waste and so excluded waste destined for recovery. The Defra methods of disposal categories included in the analysis were:

- Landfill.
- Thermal treatment (including energy recovery).
- Transfer station.
- Unknown.

The number of business units that were included in the analysis of the Defra study by sector were:

- Motor, wholesale and retail: 2,012 units.
- Education: 222 units.
- Health and social work activities: 167 units.

By examining the annual mixed weight for each sampled business unit, factoring in the frequency of collection and the observed 'fullness' of a container, it was possible to establish the 'expected' annual weight of waste per container type used to estimate the business waste. The equivalent expected weights (kgs per week) used in this model approach were:

- Refuse bag: 8.8kgs.
- 240L wheeled bin: 26.4kgs.
- 360L wheeled bin: 39.6kgs.
- 660L wheeled bin: 72.6kgs.
- 1,100L wheeled bin: 121.0kgs.
- 1,280L bin: 140.8kgs.
- 26.7m3 compaction unit: 2943.6kgs.
- 6.12m3 front end loader: 673.2kgs.

The expected annual weights were then applied to each of the Scottish sampled business units based on the number and type of containers used for mixed waste disposal (as verified during the on site audit). For Scottish containers that were not present in the Defra survey, an estimated per litre conversion factor was used based on the per litre estimate for similar containers; for example regardless of litre capacity, each wheeled bin is expected to produce 0.00572 tonnes of waste per litre per annum.

Within each 3-digit SIC and employee size band the mean expected kg per annum weight estimates were multiplied by the number of business in Scotland to estimate the total weight per annum within each sector for the whole of Scotland. As with the WRAP analysis of the hospitality sector (The Composition of Waste Disposed of by the UK hospitality Industry, WRAP, July 2011), where there was no information to establish a mean weight, the neighbouring cell mean was used.

Strengths of the approach

- The estimated tonnages are based on annual expected weights and as such will account for seasonal variability.
- The expected weights are already annualised and take account of the collection frequency and fullness.
- The weights relate to Scottish specific data; that is, the specific types of containers used by the sampled Scottish business units for mixed waste disposal.

Weaknesses of the approach

- The expected annual weights are based on on site visual assessments.

Conclusion

Accepted: These annual estimates are based on accepted expected estimates applied to Scottish specific data. However, due to the non-random sample of hospitals included in the compositional analysis it was agreed that the estimated annual tonnage relating to these businesses was over-estimated. The hospitals included in the compositional analysis were large organisations with a corresponding number and type of container not representative of all Scottish hospitals. The annual tonnage estimate for these businesses was reworked to take account of the number of patients serviced by each NHS Board as given in the following table:

Table 77 2010 mid-year populations by NHS Board *(* included in the compositional analysis)*
(sourcehttp://www.scotpho.org.uk/home/Populationdynamics/Population/DataPagesofPopulation/population_hbestimates.asp)

NHS Board	Population
Ayrshire & Arran	366,860
Borders	112,870
Dumfries & Galloway	148,190
Fife*	364,945
Forth Valley	293,386
Grampian	550,620
Greater Glasgow & Clyde*	1,203,870
Highland	310,830
Lanarkshire	562,477
Lothian*	836,711
Orkney	20,110
Shetland	22,400
Tayside*	402,641
Western Isles	26,190

This approach gives an estimated annual tonnage for hospital activities business units of 26,200, which is in line with the reported 26,288 tonnes for NHS domestic waste (2009-10 Annual National Environment Report, NHS National Services Scotland).

J.4 Model D

Using the estimated mean weights for business units by SIC and employee size band established in the Defra study (Commercial and Industrial Waste Survey 2009, Defra, December 2010). This approach was used to

estimate the annual tonnage of the UK hospitality sector in the recent WRAP report (The Composition of Waste Disposed of by the UK Hospitality Industry, WRAP, July 2011).

Approach used

The Defra study (Commercial and Industrial Waste Survey 2009, Defra, December 2010) involved a national survey of commercial and industrial waste arisings for business units in England. The methodology mainly involved the use of estimated tonnes per annum that each size of bin is likely, on average, to produce and for around 30% of the cases; the actual annual weight of waste was produced by the business unit.

The data file for this study relating to the three sectors under investigation was provided to Exodus for the purposes of developing a model to estimate the annual tonnage of mixed waste disposed of by Scottish businesses. The data file was cleaned to remove waste that did not meet the project definition of waste and so excluded waste destined for recovery. The Defra methods of disposal categories included in the analysis were:

- Landfill.
- Thermal treatment (including energy recovery).
- Transfer station.
- Unknown.

The number of business units that were included in the analysis of the Defra study by sector were:

- Motor, wholesale and retail: 2,012 units.
- Education: 222 units.
- Health and social work activities: 167 units.

The mean weights of business units by 3-digit SIC and employee size band were calculated; where there was no data to estimate the mean the neighbouring mean was used. The means were then multiplied by the number of business in Scotland to estimate the total weight per annum within each sector for the whole of Scotland.

Strengths of the approach

- The estimated tonnages are based on annual expected weights and as such will account for seasonal variability.
- The expected weights are already annualised and take account of the collection frequency and fullness.

Weaknesses of the approach

- The expected annual weights are based on on site visual assessments.
- The Defra study (Commercial and Industrial Waste Survey 2009, Defra, December 2010) did not include business units with less than 5 employees and the weights for these businesses was estimated from business with 5-9 employees.
- The mean weights relate to English business units and so are not based on Scottish specific data.

Conclusion

Rejected: The annual estimates are based on the mean weights relating to English business units and may not be strictly applicable to those in Scotland. For example, corresponding businesses in England and Scotland are likely to have different numbers and types of containers for mixed waste and so the overall means will differ.

J.5 The estimated annual tonnages for Models A-D by sector

The following table gives the annual estimates for mixed waste disposed of by Scottish business units within the three sectors. The different approaches are described in Parts J.1 to J.40; Model C was the agreed approach for estimating the tonnages which are reported within this document.

Table 78 Estimated annual tonnages of mixed waste by sector for the different modelling approaches

SECTOR	**Model A** Compositional analysis data x 52.18	**Model B** As Model A but food waste for educational sector is grossed up by stated weeks open	**Model C** DEFRA expected annual weights based on bin size and hospital activities adjusted for NHS Board populations	**Model D** DEFRA means by SIC and number of employees
Motor, wholesale retail	123,390	123,390	**180,370**	316,290
Education	44,590	37,280	**85,120**	112,070
Health and social work	117,240	117,240	**106,570**	262,680

Appendix K Recyclability of waste by material type

WASTE TYPE	SUBTYPE	Recycling
Glass	Glass bottles and jars	Widely recycled
	Other glass	Potentially recyclable
FE metal	FE cans	Widely recycled
	Other ferrous	Potentially recyclable
Non FE metal	Non FE cans	Widely recycled
	Other non-ferrous	Potentially recyclable
Plastic Film	Single use carrier bags	Widely recycled
	Long-life carrier bags	Widely recycled
	Other film	Potentially recyclable
Dense Plastic	PET bottles	Widely recycled
	HDPE bottles	Widely recycled
	Other bottles	Widely recycled
	Polystyrene including cups	Potentially recyclable
	Other dense plastic	Potentially recyclable
Textiles	Re-usable Fabrics	Potentially recyclable
	Non reusable fabrics	Potentially recyclable
	Shoes and other outer footwear	Potentially recyclable
Paper	Newspapers	Widely recycled
	Magazines & catalogues	Widely recycled
	USED A4 type paper including letters	Widely recycled
	UNUSED A4 type paper	Widely recycled
	Other recyclable paper	Widely recycled
	Envelopes	Widely recycled
	Hand towels	Potentially recyclable
	Other non recyclable paper	Not currently recyclable
Card	Card plates and cups	Potentially recyclable
	Liquid cartons	Widely recycled
	Corrugated cardboard	Widely recycled
	Other card	Widely recycled
Food waste	Food that is unused/ whole	Potentially recyclable
	Sandwiches; part consumed	Potentially recyclable
	Fruit & veg; part consumed	Potentially recyclable
	Unavoidable food waste	Potentially recyclable
	Fish, meat & bones	Potentially recyclable
	Cooked food	Potentially recyclable
	Other partially consumed food items	Potentially recyclable
	Drinks/milk (exclude packaging)	Not currently recyclable
Green waste	Soft, woody & cut flowers	Widely recycled
Waste electrical and electronic equipment (WEEE)		Widely recycled
Furniture		Potentially recyclable
Misc. Combustible	Rubber	Potentially recyclable
	Man made and treated wood	Potentially recyclable
	Pallets and other untreated wood	Potentially recyclable
	Carpet/underlay	Potentially recyclable
	Unclassified	-

WASTE TYPE	SUBTYPE	Recycling
Misc. Non-combustible	Ceramics	Potentially recyclable
	Hardcore	Potentially recyclable
	Unclassified	-
Hazardous waste		Not currently recyclable (*except batteries*)
Sanitary products/nappies		Potentially recyclable
Clinical		Not currently recyclable
Fines	Particles passing a 10mm screen	Not currently recyclable
Liquids	Liquids (exc milk/drinks)	Not currently recyclable

Appendix L Definition of commercial and industry mixed waste

L1 Relevant definitions

Article 3 of the Waste Framework Directive defines '**separate collection'** as the collection where a waste stream is kept separately by type and nature so as to facilitate a specific treatment.

As set out in Regulation 4 of the Controlled Waste Regulations 1992 '**bulky waste'** is defined as:

- any article of waste, which exceeds 25 kilograms in weight;
- any article of waste which does not fit, or cannot be fitted into:
    - a receptacle for household waste provided in accordance with section 46 of the Environmental Protection Act 1990; or
    - where no such receptacle is provided, a cylindrical container 750 millimetres in diameter and 1 metre in length;
    - categorised by European Waste Catalogue code, EWC 20 03 07.

L2 Study definition of mixed waste

For the purposes of the 'Composition of mixed waste from Scottish industry and waste' study '**mixed waste'** from the commercial organisations included in the waste composition analysis is defined as:

- Waste categorised as 20 03 01 by EWC code (see **Table 80**).
- Waste categorised as 15 01 06 (see **Table 80**) unless collected in a dedicated recycling container.
- Bulky waste: any item over 25 kilograms, which fitted in the receptacles provided by the waste collection contractor. Although categorised as bulky waste, these items were placed in the containers provided to the organisations and should be included in the study. The data analysis should highlight how frequently items of this nature were found.
- Catering waste mixed with other wastes. Catering waste is waste food from restaurants, catering facilities and kitchens.
- Former foodstuffs mixed with other wastes. Former foodstuffs are foods of animal origin, or foods that contain products of animal origin, that are no longer intended for human consumption. The study should highlight that these items can no longer be sent to landfill from July 2011.

The definition of '**mixed waste'** excludes:

- Any separately collected waste: according to the definition above; separately collected fractions of municipal waste are further categorised under EWC code 20 01.
- Waste categorised as 15 01 06 (see **Table 80**) collected in a dedicated recycling container.
- Bulky waste: as per the definition above, any article of waste, which did not fit in the receptacles provided by the waste collection contractor.

- Animal by-products: animal by-products should be separately collected and sent to approved premises for treatment or disposal; the exceptions are catering waste, which can be sent to landfill, and former foodstuffs, which can go direct to landfill until 31 July 2011. However, if any animal by-products are found in the analysis mixed with other wastes these should be included and reported.

Table 79 EWC Codes - Municipal Wastes

20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 01	**separately collected fractions (except 15 01)**
20 01 01	paper and cardboard
20 01 02	glass
20 01 08	biodegradable kitchen and canteen waste
20 01 10	clothes
20 01 11	textiles
20 01 13*	solvents
20 01 14*	acids
20 01 15*	alkalines
20 01 17*	photochemicals
20 01 19*	pesticides
20 01 21*	fluorescent tubes and other mercury-containing waste
20 01 23*	discarded equipment containing chlorofluorocarbons
20 01 25	edible oil and fat
20 01 26*	oil and fat other than those mentioned in 20 01 25
20 01 27*	paint, inks, adhesives and resins containing dangerous substances
20 01 28	paint, inks, adhesives and resins other than those mentioned in 20 01 27
20 01 29*	detergents containing dangerous substances
20 01 30	detergents other than those mentioned in 20 01 29
20 01 31*	cytotoxic and cytostatic medicines
20 01 32	medicines other than those mentioned in 20 01 31
20 01 33*	batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries
20 01 34	batteries and accumulators other than those mentioned in 20 01 33
20 01 35*	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components (6)
20 01 36	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35
20 01 37*	wood containing dangerous substances
20 01 38	wood other than that mentioned in 20 01 37
20 01 39	plastics
20 01 40	metals
20 01 41	wastes from chimney sweeping
20 01 99	other fractions not otherwise specified
20 02	**garden and park wastes (including cemetery waste)**
20 02 01	biodegradable waste

20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 02 02	soil and stones
20 02 03	other non-biodegradable wastes
20 03	*other municipal wastes*
20 03 01	**mixed municipal waste**
20 03 02	waste from markets
20 03 03	street-cleaning residues
20 03 04	septic tank sludge
20 03 06	waste from sewage cleaning
20 03 07	bulky waste
20 03 99	municipal wastes not otherwise specified

Table 80 EWC Codes - Waste Packaging

15	**WASTE PACKAGING; ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED**
15 01	**packaging (including separately collected municipal packaging waste)**
15 01 01	paper and cardboard packaging
15 01 02	plastic packaging
15 01 03	wooden packaging
15 01 04	metallic packaging
15 01 05	composite packaging
15 01 06	**mixed packaging**
15 01 07	glass packaging
15 01 09	textile packaging
15 01 10*	packaging containing residues of or contaminated by dangerous substances
15 01 11*	metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers
15 02	**absorbents, filter materials, wiping cloths and protective clothing**
15 02 02*	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances
15 02 03	absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02

Appendix M Example of the waste analysis communication sent to individual businesses

Dear (Name),

This is your individual report detailing our analysis of your business waste

You will remember that you kindly allowed us earlier this year to analyse a week's worth of the mixed waste produced by your business (ref ZWS/1234). By way of thanks, I am now sending you this free report, which details the findings for your participating business unit and the potential opportunities for you to reduce waste and recycle more, which could in turn save your business money. Rest assured, this data is completely confidential and your individual waste will not be identified in the final data or reports, which you will be able to view at www.zerowastescotland.org.uk/businesswaste.

Research background

The Scottish Government's Zero Waste Plan aims to recycle 70% of all waste by 2025, reducing the amount going to landfill to just 5%. Scottish households have already achieved much, and recently attention has been turning to increasing recycling, reuse and waste reduction among businesses. The project in which you have participated is a key part of our effort at Zero Waste Scotland to help businesses achieve this and to improve our understanding of business waste. You were one of 681 Scottish businesses who allowed a waste analysis firm to collect your mixed waste and analyse its various components, providing important information to help the Scottish Government and its partners put in place the means to recycle, reuse and reduce business waste.

Your waste analysis

When mixed waste was collected from your premises last February, it was found to weigh 192kg. If you produced this much mixed waste every week, this would cost a total of £640 each year in standard rate landfill tax from 1 April 2012, rising to £800 each year from 1 April 2014.

14% of your collected waste was made up of materials that are widely recycled in Scotland.

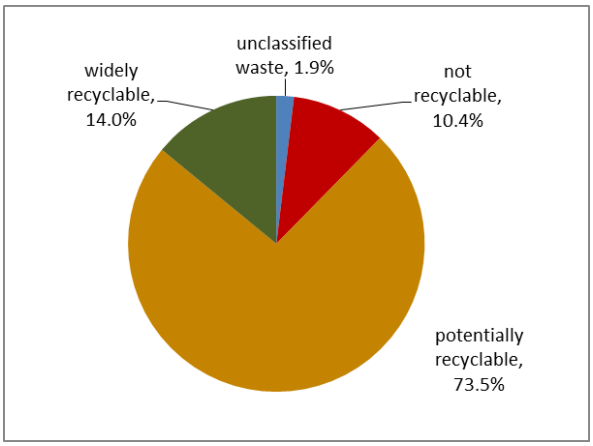
Reducing costs

As your report shows, there is an opportunity to reduce the proportion of your waste that goes to landfill by minimising, reusing or recycling more of your business waste. Landfill tax, which is already included in the waste collection cost to your business, was introduced in 1996 and has since increased to £56 per tonne; it is targeted to increase to £80 a tonne by 2014-15, making it an increasingly significant business cost. At Zero Waste Scotland, we have created a guide to working with your waste contractor which may help you identify opportunities to reduce costs - www.zerowastescotland.org.uk/workingwithyourwastecontractor.

Increasing recycling

The Scottish Government plans to introduce new regulations that will enforce the segregation of recyclable materials. These are likely to require all waste producers, including all businesses and public sector organisations, to segregate paper and card, glass, metals, and plastics – materials that made up 14% of the waste we collected from your business. In addition, those involved in food production, food retail and food preparation will also need to segregate their food waste, which can be recycled into a valuable resource through composting or anaerobic digestion.

The pie chart below illustrates the proportion of your mixed waste that is made up of materials that are 'widely recycled', 'potentially recyclable' and 'not currently recyclable' in Scotland. The ability to recycle will depend on suitable collections being available in your area from your council or commercial waste contractor. At Zero Waste Scotland, we are currently providing funding to help make food waste collections from homes and businesses more common. For advice on the collections that are available in your area, visit www.zerowastescotland.org.uk or call our helpline on 0808 100 2040.



Understanding your waste data sheet

At the end of this document you'll find a table showing detailed findings on the mixed (black bag) waste from your business unit that was collected, hand-sorted and analysed earlier this year. The table shows the individual waste streams (newspapers, plastic film or food) that were found and in what quantities. The materials which organisations will be required to segregate for collection are highlighted in grey at the top of the table, with food waste highlighted in blue. We have also identified those materials which are currently widely recycled in Scotland or which are potentially recyclable, depending on the availability of collections in your area.

What support is available?

Zero Waste Scotland provides support to businesses to help them reduce waste, recycle more and use resources sustainably. This includes generic support, advice and training, particularly focused on small and medium-sized enterprises as well as sector-specific programmes supporting the construction, hospitality and grocery retail supply chains. Zero Waste Scotland also manages a Business Recycling Directory which can help you find a business waste recycler near you. For more information:

- visit www.zerowastescotland.org.uk/businesssupport or
- contact our helpline on 0808 100 2040 / helpline@zerowastescotland.org.uk.

Feedback to the project team

We always welcome any comments or feedback on business waste issues and are delighted to receive any suggestions that might help the Scottish Government achieve its targets for recycling and reductions in landfill from within the business community. You can email us at helpline@zerowastescotland.org.ukor message us on Twitter (@BusinessWaste), Facebook (www.facebook.com/zerowastescotland), or visit the ZWS website at www.zerowastescotland.org.uk.

Once again, many thanks for your participation in this important project. I hope that you will find the data included here to be a useful tool in managing the waste from your business; please do not hesitate to contact us if you need any further support in helping us reduce the amount of Scottish waste that goes to landfill.

Yours sincerely,

Iain Gulland
Director of Zero Waste Scotland

WASTE TYPE	SUBTYPE	%	Weight (Kg)	Recycling
Glass	Glass bottles and jars	1.1%	11.0	Widely recycled
	Other glass			Potentially recyclable
FE metal	FE cans	0.4%	4.4	Widely recycled
	Other ferrous	<0.1%	0.4	Potentially recyclable
Non FE metal	Non FE cans	0.5%	5.1	Widely recycled

WASTE TYPE	SUBTYPE	%	Weight (Kg)	Recycling
	Other non-ferrous	0.1%	0.7	Potentially recyclable
Plastic Film	Single life carrier bags	0.6%	5.7	Widely recycled
	Long-life carrier bags	<0.1%	0.5	Widely recycled
	Other film	6.0%	61.2	Potentially recyclable
Dense Plastic	PET bottles	0.4%	3.7	Widely recycled
	HDPE bottles	0.2%	2.5	Widely recycled
	Other bottles	<0.1%	0.1	Widely recycled
	Polystyrene including cups	<0.1%	0.5	Potentially recyclable
	Other dense plastic	5.3%	54.2	Potentially recyclable
Textiles	Re-usable Fabrics			Potentially recyclable
	Non reusable fabrics	0.7%	6.7	Potentially recyclable
	Shoes and other outer footwear	0.1%	0.5	Potentially recyclable
Paper	Newspapers	1.3%	13.1	Widely recycled
	Magazines & catalogues	2.8%	28.8	Widely recycled
	USED A4 type paper including letters	0.4%	4.0	Widely recycled
	UNUSED A4 type paper	0.2%	2.1	Widely recycled
	Other recyclable paper	1.7%	17.0	Widely recycled
	Envelopes	0.1%	1.0	Widely recycled
	Hand towels	6.6%	67.1	Potentially recyclable
	Other non recyclable paper	1.1%	10.8	Not currently recyclable
Card	Card plates and cups	0.6%	6.2	Potentially recyclable
	Liquid cartons	0.1%	1.5	Widely recycled
	Corrugated cardboard	2.0%	20.8	Widely recycled
	Other card	1.7%	17.2	Widely recycled
Food waste	Food that is unused/ whole	39.8%	404.3	Potentially recyclable
	Sandwiches; part consumed	<0.1%	0.2	Potentially recyclable
	Fruit & veg; part consumed	0.3%	2.7	Potentially recyclable
	Unavoidable food waste	0.9%	9.4	Potentially recyclable
	Fish, meat & bones	2.0%	20.3	Potentially recyclable
	Cooked food	8.5%	86.7	Potentially recyclable
	Other partially consumed food items	0.3%	2.8	Potentially recyclable
	Drinks/milk (exclude packaging)	7.6%	77.3	Not currently recyclable
Green waste	Soft, woody & cut flowers	0.5%	5.3	Widely recycled
Waste electrical and electronic equipment (WEEE)				Widely recycled
Furniture				Potentially recyclable
Misc. Combustible	Rubber			Potentially recyclable
	Man made and treated wood	0.1%	0.8	Potentially recyclable
	Pallets and other untreated wood			Potentially recyclable
	Carpet/underlay	2.2%	22.0	Potentially recyclable
	Unclassified	0.5%	5.1	-
Misc. Non-combustible	Ceramics	<0.1%	0.2	Potentially recyclable
	Hardcore			Potentially recyclable
	Unclassified	1.4%	14.0	-
Hazardous waste				Not currently recyclable (except batteries)
Sanitary products/ disposable nappies		0.2%	1.8	Potentially recyclable
Clinical waste				Not currently recyclable
Fines	Particles passing a 10mm screen	1.5%	15.6	Not currently recyclable
Liquids	Liquids (exc milk/drinks)	<0.1%	0.4	Not currently recyclable

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