

Recyclate Recovery

**An Analysis of Scottish
Recycling Schemes – 2006/2007**



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Executive Summary

Scottish local authorities have made significant progress in increasing recycling rates, and have successfully achieved the target of 30% recycling and composting by 2008. However, with challenging new recycling targets being set by the Scottish Government and the drive towards Zero Waste, it will be essential to optimise recyclate recovery from both kerbside collection and recycling centres and points.

In spring 2008 Remade Scotland surveyed all 32 Scottish local authorities to gather data on recycling at both kerbside and recycling centres/point, with 28 full sets of data being gathered for the financial year 2006/7. The survey found that a total of 719,948.21 tonnes of recyclate were collected from the 28 local authorities in 2006/7, with kerbside collections contributing 58% of the total and recycling centres/points 42%. A total of 414,167 tonnes of recyclate was collected at the kerbside in 2006/7 from a combination of dry recyclate and organic waste collection schemes. This represents an encouraging 23% increase from the previous year. This increase can be attributed to a number of factors, including both the roll-out of kerbside schemes to an increasing percentage of households and the optimisation of yields from existing schemes.

	Dry Recyclate	Garden/Food Waste
% of total kerbside tonnage	54%	46%
No. of LAs offering scheme (out of 28)	28	27
% of hh with access to scheme	84%	76%
Average kg/hh/wk	2.36	2.81

The factors influencing high recovery rates for dry recyclate kerbside collections were again found to be collection frequency, collection capacity, the range of materials collected, and the collection frequency of residual waste. In order to optimise the performance of kerbside schemes, it is recommended that local authorities provide sufficient collection capacity, by increasing collection frequency where necessary, collect a wide range of materials and integrate the recycling collection with a fortnightly residual collection. Additional factors likely to improve recycling rates are the introduction of food waste collection and educational/promotional campaigns to increase participation and capture rates.

Factor	Effect
Recyclate Collection Frequency	Weekly collections 42% higher yields than fortnightly, 94% higher than every 4 weeks
Collection Capacity	Weekly capacity >101litres 71% higher yields than <50 litres
N^o of Materials Recycled	Multi material schemes with 4 or more materials produce 86% more material than single stream collections
Residual Waste Collection Frequency	Schemes with fortnightly residual collection produce 83% more dry recyclate than those with weekly residual

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1. Introduction

Scottish local authorities have made significant progress in increasing recycling rates, achieving the target of 30% recycling and composting by 2008. The current rate of 31.2% (SEPA, May 2008) suggests that further work needs to be done to meet the next target of 40% by 2010. An important factor in moving towards 40% and beyond will be continual improvements in the diversion rates from kerbside recycling collections. This report assesses the current level of recycling in Scotland and investigates factors associated with high recyclate recovery rates, particularly focusing on kerbside schemes. If optimal performances across all kerbside schemes are to be achieved, it is essential to understand the factors which underpin high performing schemes. This understanding can then be used to develop best practice guidance and inform effective public engagement strategies and supporting policies in order to maximise the amount of recyclate being recovered from the kerbside.

Remade Scotland undertook a survey of all 32 Scottish local authorities via an on-line collection platform to gather detailed information on recycling both at kerbside and at recycling centres and points. Full data sets were gathered for 28 authorities, the analysis of which forms the basis of this report.

The survey found that a total of 414,164 tonnes of recyclate was collected at the kerbside in 2006/7, with dry recyclate (224,741 tonnes) and organic waste (189,423 tonnes) contributing 54% and 46% respectively.

2. Background

In 2002, the then Scottish Executive established the Strategic Waste Fund (SWF) to provide additional ring-fenced financial support to assist Scottish Councils comply with the EU Directive on Landfill and meet national recycling targets. SWF monies were allocated following a bidding process and focused on waste minimisation, recycling and recovery. This resulted in Scottish municipal waste recycling performances increasing from around 4% in 2002/03 to 28.4% in 2006/07 at an additional cost of around £64M/yr.

In January 2008 the Scottish Government announced the removal of Strategic Waste Fund ring-fencing and transfer of the financial resources to Local Authorities through Grant Aided Expenditure. The Government also announced the establishment of a 'Zero Waste Fund' of over £154 million over the three years of the Spending Review (2008/9 to 2010/11), of which £100 million will be made available to local authorities. The intention is that the funding will be used to support recycling and composting infrastructure such as anaerobic digestion plants to treat source-segregated organic waste and treatment facilities which divert waste from landfill and have high environmental performance. How this funding is to be distributed is the subject of ongoing discussions between the Scottish Government and COSLA.

New national targets for recycling and composting were also announced, with an ambitious target of 60% by 2020, along with an aspirational 70% by 2025 (see

Figure 1). Additionally a limit of 25% was placed on the use of energy recovery technologies for the treatment of mixed waste (to be determined on a regional basis) and a maximum limit of 5% MSW to be disposed of to landfill by 2025. These new national targets present a significant challenge for all local authorities. This report looks at best practice in the kerbside collection of recyclables, and investigates the potential of optimising kerbside collections to meet future recycling targets.

Figure 1 – Recycling & Composting Targets

MSW recycled/composted (currently 31.2%):

- 40% by 2010
- 50% by 2013
- 60% by 2020
- 70% by 2025

MSW used to generate energy (currently 2%):

- 4% by 2010
- 14% by 2013
- 25% by 2020
- 25% by 2025

MSW going to landfill (currently 67%):

- 56% by 2010
- 36% by 2013
- 15% by 2020
- 5% by 2025

3. Methodology

A new on-line data collection platform was developed to collect data for the 2006/07 survey. Local authorities were asked to provide details on the number of households in their authority and the proportion served by dry and green waste kerbside recycling services. Data was collected on a scheme by scheme basis including quarterly tonnages, containment methods, materials accepted and collection frequencies, including any seasonal variations. Collection frequency was also established for the residual collection. An additional aspect of the survey this year was the inclusion of data from recycling centres and points. Further information was collated from the Wastedataflow and LAS (Landfill Allowance Scheme) figures from SEPA.

4. Results & Analysis

Scottish local authorities have made demonstrable progress in recycling from the kerbside from 2005/6 to 2006/7. The overall tonnage of material diverted from the kerbside from 28 local authorities in 2006/7 has increased from 336,488 to 414,164 tonnes, an increase of 23% (see Figure 2). Dry recyclate contribute a higher proportion of the increase than garden waste, with a 34% increase compared to 12%.

Figure 2: Change in Recyclate Recovered from 2005/6 to 2006/7

Material	Tonnes collected 2005/6	Tonnes collected 2006/7	Percentage Increase 2005/6 to 2006/7
Dry Recyclate	167,571	224,741	34%
Garden Waste	168,917	189,423	12%
Total Tonnage	336,488	414,164	23%

2006/7 has also seen many kerbside schemes being expanded to cover a higher percentage of households in each local authority area (see Figure 3). The increase is particularly noticeable in rural areas, where the percentage of households with access to a dry recyclate collection has increased from 63 to 79%, with an even more significant increase from 38 to 62% for garden waste collections. For the purposes of comparison the Convention of Scottish Local Authorities (CoSLA) has grouped the 32 unitary authorities into urban, mixed, and rural authorities, with mixed authorities comprising of a range of urban and rural areas. This allows local authorities to be compared to other authorities within their family group.

Mixed authorities have also increased their coverage of both dry and garden schemes, with many mixed authorities now covering the maximum realistic percentage of households, typically 90% of the total, albeit with notable exceptions such as Moray who only cover 63% of households for dry recyclate collection. Fewer schemes have been expanded in urban areas, with a slight increase in dry recyclate schemes, most notably for multi-occupancy properties, while garden waste coverage remains static, perhaps suggesting that schemes have already been rolled out to the majority of properties with gardens.

Figure 3: Change in Scheme Coverage from 2005/6 to 2006/7

Family Group	% households dry 2005/6	% households dry 2006/7	% households garden waste 2005/6	% households garden waste 2006/7
Urban	73	78	60	60
Rural	63	79	38	62
Mixed	83	90	80	85

4.1. Garden & Food Waste Collection

The collection and composting of garden and food waste from households is a direct way for local authorities to divert organic material from landfill, helping towards

compliance with early Landfill Directive targets. 27 from the 28 authorities surveyed have an organic waste collection, with Dumfries & Galloway being the exception. Of the remaining 4 authorities who were unable to provide a full dataset, Eilean Siar has a garden, food waste and paper/cardboard collection, which is then processed in their Anaerobic Digestion plant, Argyll & Bute a garden waste collection in parts of the district, Shetland Islands and Aberdeenshire have no garden waste collections although Aberdeenshire carries out residual waste composting.

Perth & Kinross and Eilean Siar are the only 2 authorities to collect food waste. However, this is likely to change in 2007/8 and onwards with the Scottish Government providing funding for a series of food waste trials. The collection of food waste is set to play a significant role in working towards both recycling and landfill diversion targets. With food waste contributing up to a third of residual household waste, and its ability to count towards BMW diversion from landfill, it is likely to become a key target for authorities in the drive towards higher recycling rates. Food waste can be collected either as a new single-stream collection, or alternatively combined with existing garden waste collection schemes. The Scottish Government funded trials include both types of scheme, and the results will help govern future policy in this area.

28 schemes were recorded in total, with Perth & Kinross operating a garden waste only collection and a combined food/garden waste trial.

4.1.1 Scheme Coverage

Garden waste collection schemes are offered to an average of 73% of households, with coverage ranging from 19% to 99%, as shown in Figure 4. There is a significant difference in coverage between these family groups, with mixed authorities offering collection to 85% of households, rural 62% and urban 60% (see Figure 5). The reasons for the differences are accounted for in urban areas with the higher number of properties without a garden, while in rural areas low population densities and a perhaps a higher emphasis on home composting rate are the causal factors. Indeed the 3 authorities, Shetland Islands, Aberdeenshire and Dumfries & Galloway, who don't provide a garden waste collection, are all rural.

Figure 4: Coverage of Garden Waste Collection Schemes by Council

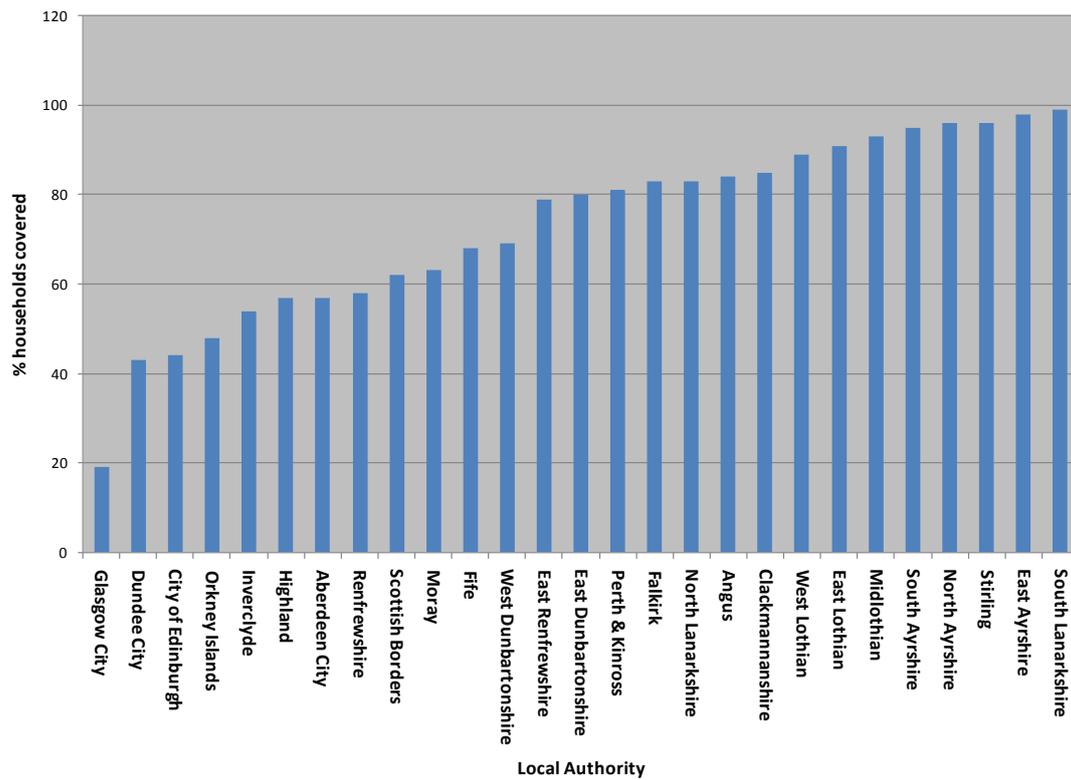
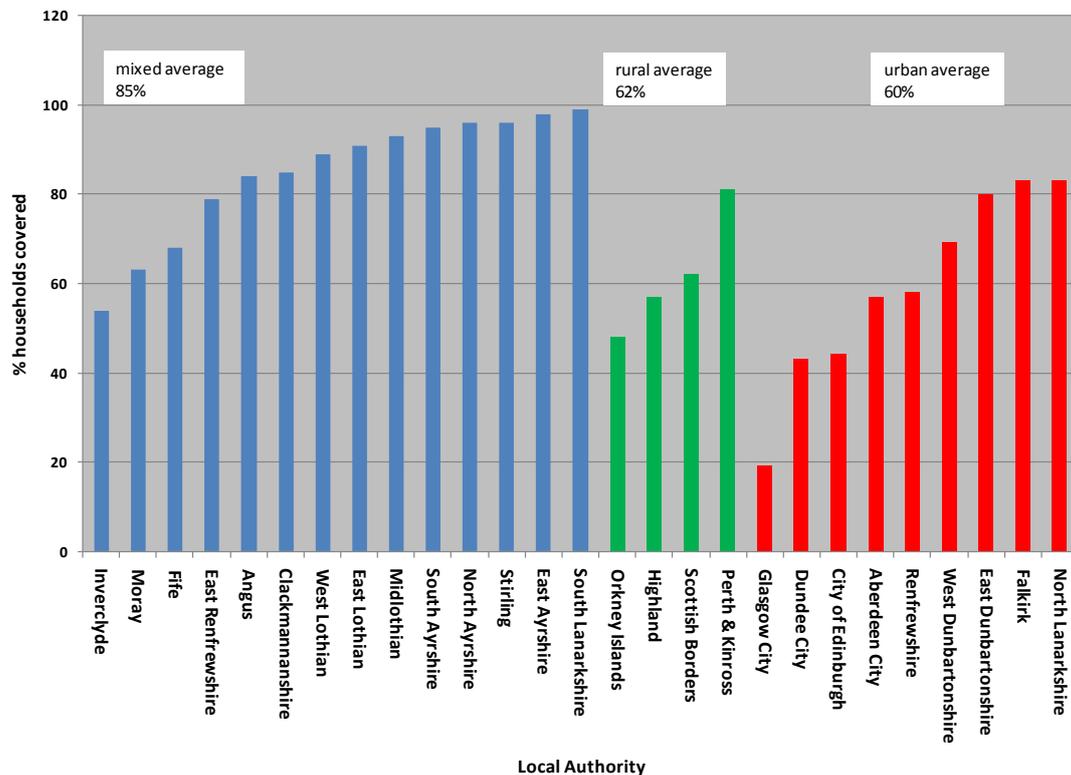


Figure 5: Coverage of Garden Waste Collection Schemes by Family Group



The number of households being offered a garden waste collection has increased from 2005/6 to 2006/7, with the percentage of households increasing from 65 to 73%. Rural authorities in particular have made significant progress in extending the coverage of schemes, for example Highland Council has extended their garden waste scheme from 23% of households at the start of 2005/6 to 57% by the end 2006/7.

4.1.2 Containment Method, Collection Frequency & Seasonality

The design of organic waste collection schemes varies according to factors such as method of containment, collection frequency and seasonality of collection (see Figure 6). 240 litre wheeled bins are the most common method of containment, with 89% of schemes choosing this option. Of the remaining 3 authorities, 2 don't provide a container, while 1 provides a 190 litre wheeled bin. The majority of garden waste collection schemes operate fortnightly (71%), followed by every 4 weeks (21%). Only 7% of collections are weekly, of which one is an on-demand service, where householders have to request an uplift. From 2005/6 to 2006/7 there has been a slight increase in the number of schemes being collected fortnightly and a slight drop in those being collected every 4 weeks.

Garden waste arisings are seasonal nature, in accordance with the growing seasons, with the majority of garden waste arising between the months of March and November. Reflecting this seasonal variation in arisings, 39% of garden waste collections are seasonal in nature, operating for only 7-9 months of the year. A number of others are collected every 4 weeks rather than fortnightly over the winter months. This is verified when looking at the yields of year-round compared to seasonal collections, with 12 month collections averaging 2.84 kg/hh/wk and 7-9 months averaging 2.76. This represents only a 3% higher yield, perhaps indicating the move to seasonal collections being cost-saving without losing significant tonnages. Several authorities have recently moved from year-round to seasonal collections from 2005/6 to 2006/7, with 39% of collections now on a seasonal basis compared to 33% in 2005/6. Local authorities such as West Lothian have moved to a more cost-efficient seasonal garden waste collection allowing them to increase the frequency of the blue bin from every 4 weeks to fortnightly.

However, if local authorities do considering adding food waste to their garden waste collections, there will need to be a rethink around seasonal collection.

Figure 6: Organic Waste Collection Variables

Method of Containment	% Schemes	Collection Frequency	% Schemes	Seasonality	% Schemes
240 litre bin	89%	weekly	7%	12 months	61%
190 litre bin	4%	fortnightly	71%	7-9 months	39%
no container provided	7%	every 4 weeks	21%		

4.1.3 Yield

Overall 189,427 tonnes of garden waste (and food) waste were collected from 1,721,228 households. This represents an increase of 12% from the 2005/6 figures. The yield varies from 0.70 to 4.82kg/hh/wk, although for those authorities providing a container for garden waste collection the lowest yield is 1.78 kg/hh/wk (see Figure 7). The average yield is 2.81 kg/hh/wk, which varies only marginally between family groups with mixed authorities collecting an average of 2.88, rural 2.86 and urban 2.67 kg/hh/wk (see Figure 8). Fortnightly collection produce higher yields than those collected only every 4 weeks, with yields of 3.10 kg/hh/wk and 2.20 respectively. The average for a weekly collection is only 1.71 kg/hh/wk; however this is may be distorted as only 2 authorities have a weekly collection, one of which is an on-demand where no container is provided, meaning that while householders can potentially have their garden waste collected weekly, they have to request this on each occasion, which is likely to significantly reduce participation.

Figure 7: Garden Waste Yield by Council

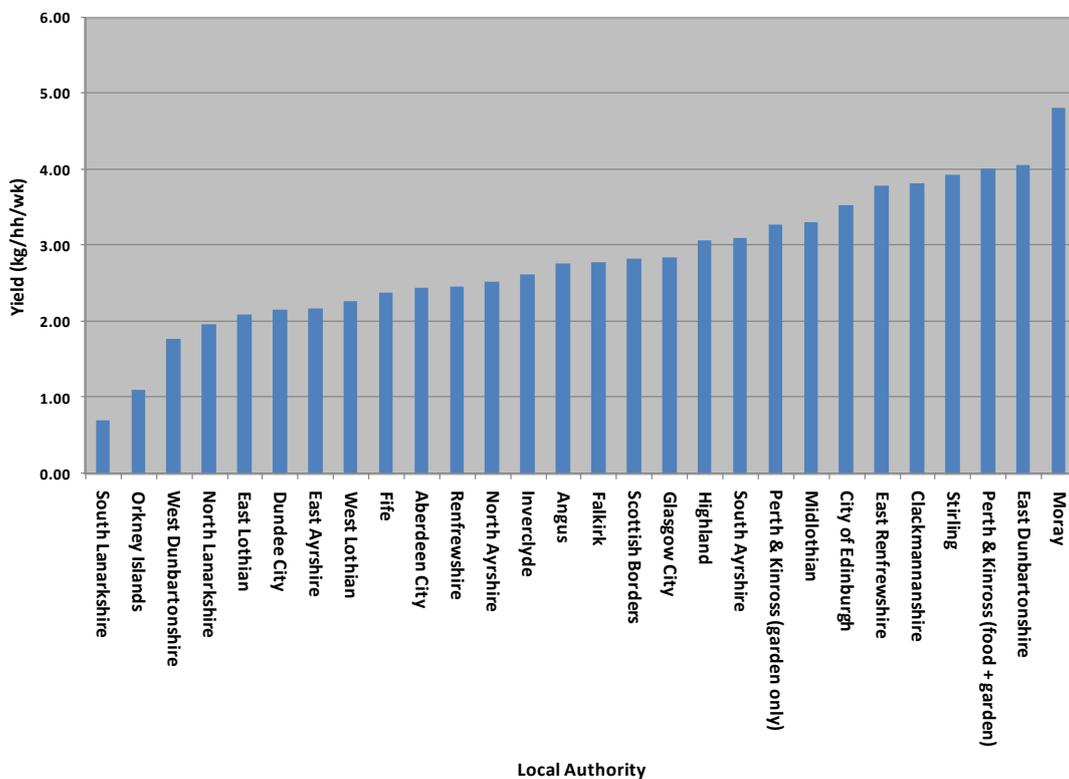
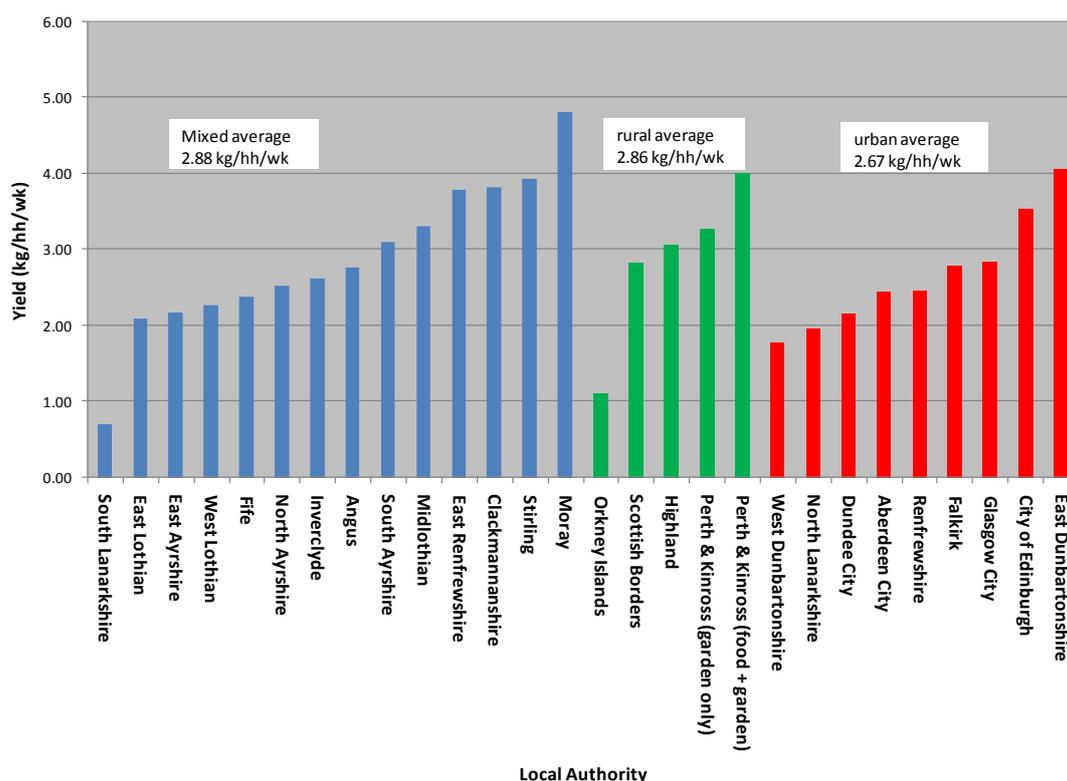
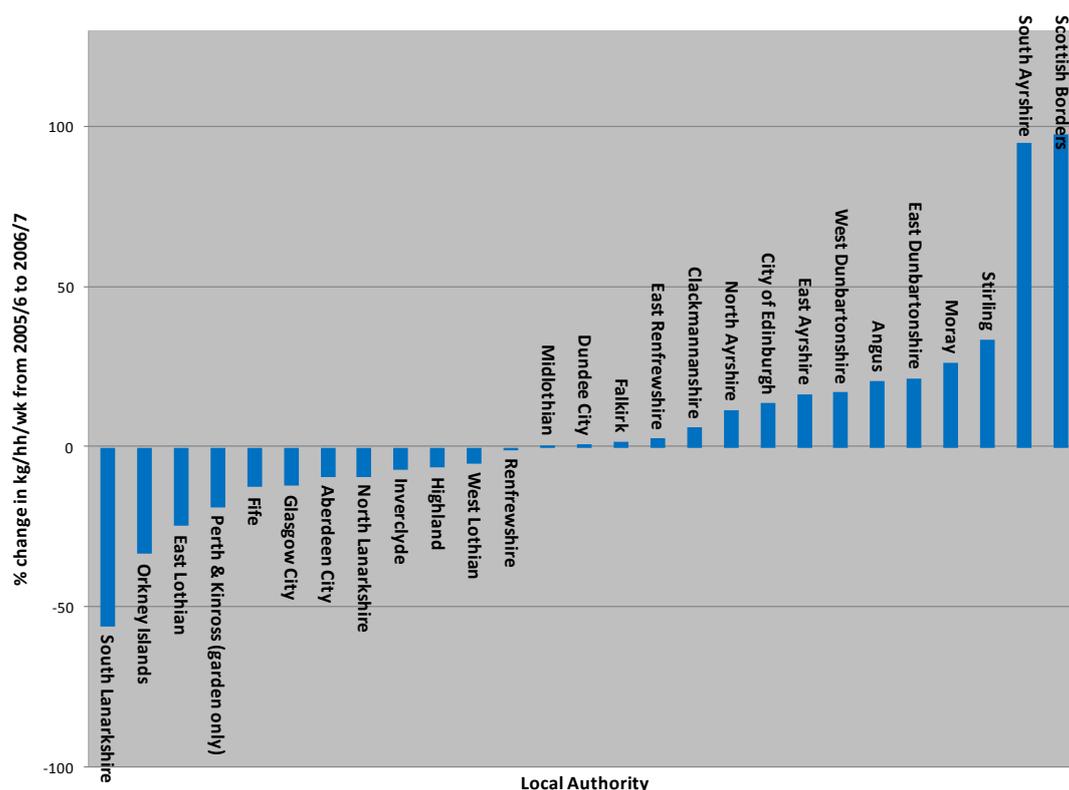


Figure 8: Garden Waste Yield by Family Group



The average yield from garden waste collections has increased from 2.59 in 2005/6 to 2.81 in 2006/7, which represents an 8.5% increase. The change in yield per authority varies from a decrease of 55% to an increase of 98%, with an average increase of 6% (see Figure 9). 12 of the garden waste schemes showed a decrease in yield for 2005/6 to 2006/7. Neither of the 2 schemes with the largest decreases provides containers for garden waste collection, which may discourage continued participation. Other reasons for slight decreases may include a change from year round to seasonal collection. A further potential explanation may be the increase in home composting, driven by an increase in the number of home compost bins being given free or sold at a reduced price to householders, alongside waste prevention campaigns encouraging householders to compost at home.

Figure 9: Change in Garden Waste Yield from 2005/6 to 2006/7



4.2. Dry Recyclate Collection

The collection of dry recyclate material from householders contributes significantly to achieving recycling targets. A total of 224,741 tonnes of dry recyclate were collected from the kerbside in 2006/7, an increase of 34% from 2005/6. All local authorities offer the kerbside collection of at least one dry recyclate material to a proportion of their households. 43 different schemes were reported by the 28 local authorities surveyed for 2006/07. The majority of authorities have one principal scheme, with the remainder being a mixture of trial schemes and those covering difficult to access households such as flatted properties.

4.2.1 Scheme Coverage

On average 84% of households were offered a kerbside collection of at least one dry recyclate in 2006/7 (see Figure 10), with the figure ranging from 34% to 100% of households. For mixed authorities the figure was 90%, while urban and rural authorities averaged 78 and 79% respectively (see Figure 11). The disparity in coverage is clearly a reflection of the difficulties and cost involved in providing a doorstep collection to high density urban populations and remote, low density rural populations.

Figure 10: Dry Recyclate Scheme Coverage by Council

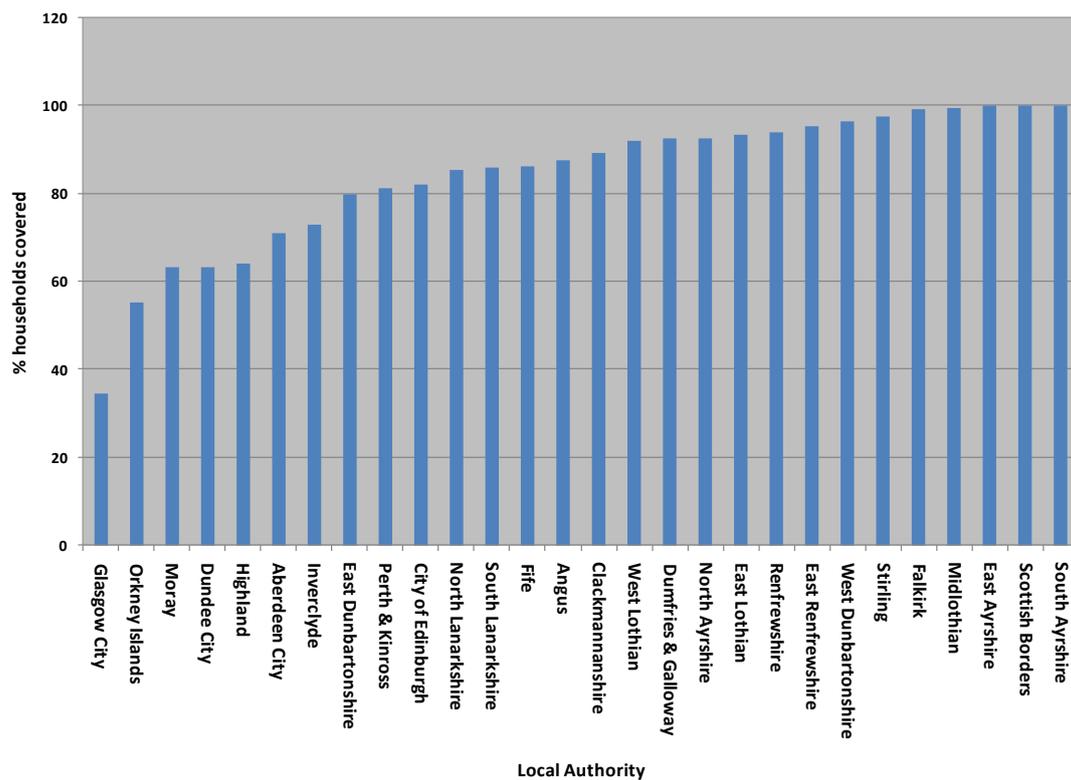
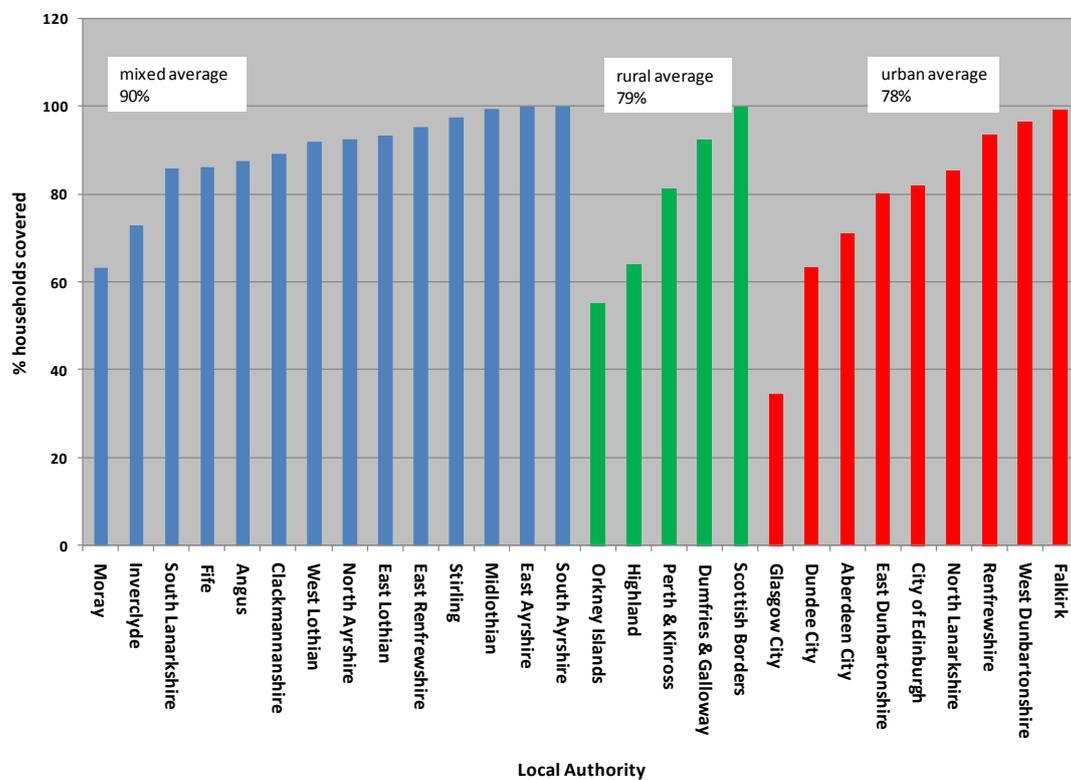


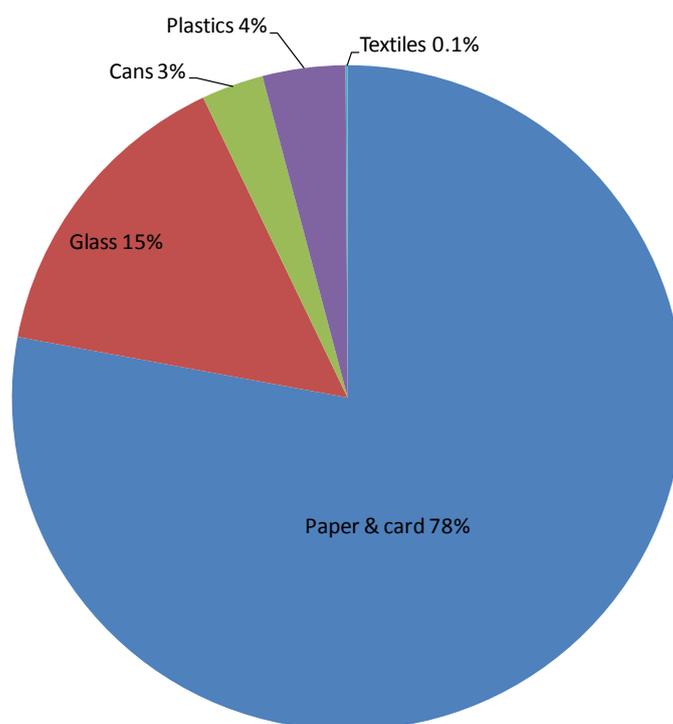
Figure 11: Dry Recyclate Scheme Coverage by Family Group



4.2.2 Yield

A total of 224,741 tonnes of dry recyclate were collected from the kerbside in 2006/7, of which 78% by weight comprised paper & card, 15% glass, 4% plastics, 3% cans (see Figure 12). The combined tonnage of the other materials collected, such as textiles and batteries, contributed less than 1% of the total.

Figure 12: Materials Recovered by Dry Recyclate Collections



Recovery rates in 2006/07 from dry recyclate collections ranged from 0.34 kg/hh/wk in the Edinburgh tenement scheme to 5.92 kg/hh/wk in Moray (see Figure 13). The weighted average for dry recyclate kerbside schemes is 2.36 kg/hh/wk, an increase of 15% from the 2005/6 figure of 2.06. The weighted average takes into account the number of households with access to a scheme in addition to the yield, meaning that small scale trials and flatted property schemes don't skew the overall figure. The average on an overall authority basis is 2.66 kg/hh/wk (see Figure 14), which looks at the overall tonnage from all households with access to a kerbside scheme in that authority, rather than each individual scheme (many authorities have more than one scheme), while the average for principal schemes (i.e. the main scheme in each authority rather than including additional schemes such as tenemental/flatted schemes) is 2.75kg/hh/wk. Principal schemes tend to cover the majority of households with access to kerbside collection in the authority, and all collect paper, which is the highest yielding material. Additional schemes tend to either target harder to reach households, which by their very nature produce lower yields, or include additional materials, such as North Lanarkshire's glass bin, which again produce lower yields as a result of lower availability of materials in the household waste-stream.

Figure 13: Dry Recyclate Yields for all Schemes

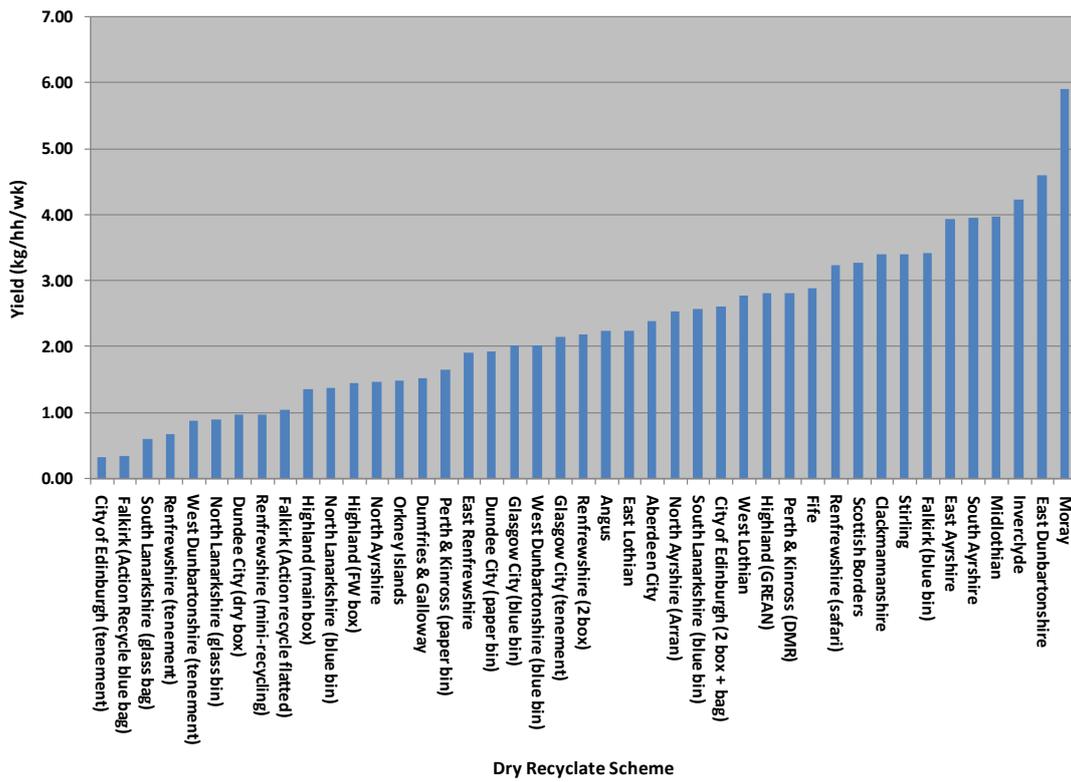
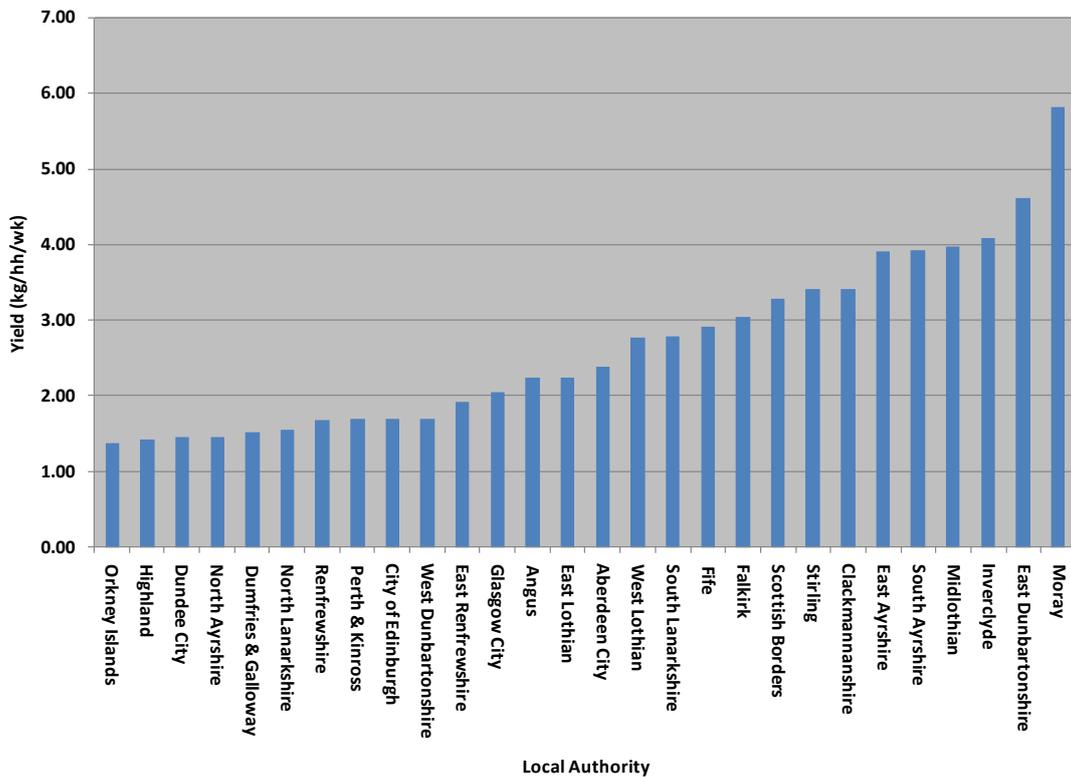
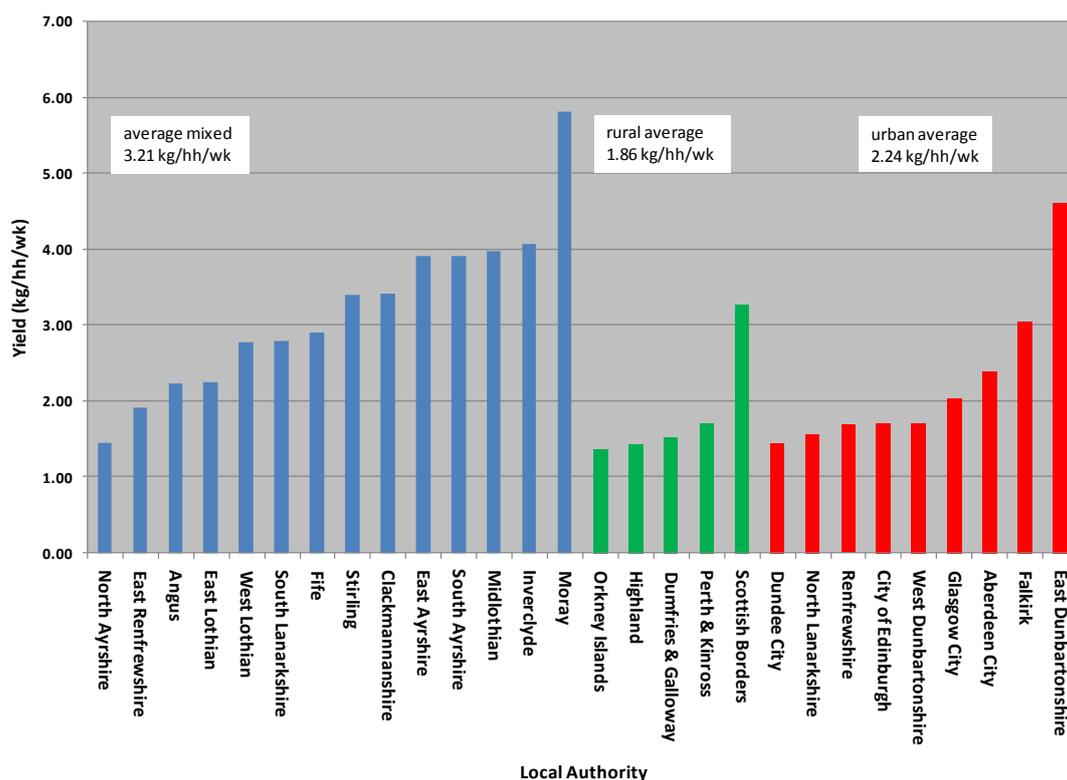


Figure 14: Dry Recyclate Yield by Council



In terms of family group in 2005/06, mixed local authorities produced the higher recovery rates, with an average of 3.21 kg/hh/wk compared to 2.24 kg/hh/wk for urban authorities and 1.86 kg/hh/wk for rural authorities (see Figure 15). The lower figures for rural and urban authorities are likely to be a consequence of the particular problems they face, namely low population densities and difficult housing types. The difficulties of achieving high recycling rates in high density urban areas is demonstrated by the average yield for schemes covering tenements and flats being 1.02 kg/hh/wk.

Figure 15: Dry Recyclate Yield by Family Group



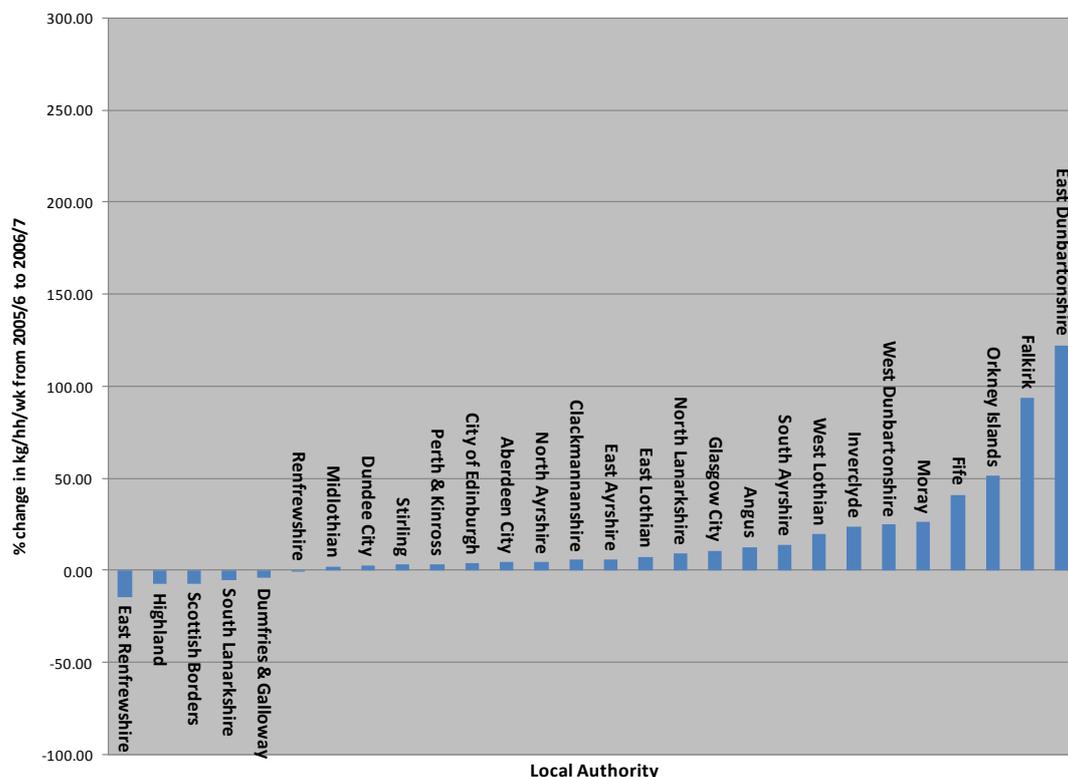
A further point to note in terms of dry recyclate is that several authorities send household waste either to an energy-from-waste plant or to a mechanical-biological treatment (MBT) plant. This has implications for the amount and type of recyclate material which can be removed from the waste-stream for recycling while still for example, maintaining a high calorific value necessary for incineration.

4.2.3 Change from 2005/6 to 2006/7

The yield of dry recyclate from kerbside collections has increased by an average of 15%, ranging from a 78% reduction (14% reduction for principal schemes) to a 123% increase (see Figure 16). In terms of principal schemes only 5 local authorities show a reduction in yield per household with access to kerbside collection, which may be the result of rolling out schemes to a wider range of households, which may include areas characterised by lower participation rates. However, the overall dry recyclate tonnage collected from the kerbside has increased in all of these schemes. The remaining 23 local authorities show an improvement in yield per household, with the

two schemes demonstrating the most significant increases in performance having both changed key factors influencing dry recyclate diversion rates between the 2005/6 and 2006/7 surveys, in one case a change from weekly to fortnightly residual, in the other a change in blue bin collection frequency from every 4 weeks to fortnightly.

Figure 16: Change in Dry Recyclate Yield from 2005/6 to 2006/7



4.2.4 Method of Segregation

Three methods of segregation were reported in the survey; single-stream, kerbside sort and co-mingled collection for sorting at an MRF. There is an even split between kerbside sort and co-mingled systems, each accounting for 35% of all schemes, while source-segregated schemes are slightly less common at 30%.

Single-Stream Collections

Single-stream collections have the advantage of not requiring further sorting, thus saving segregation costs at the kerbside or MRF, and generally providing income from the sale of the collected material. An additional advantage is that single-stream collections are the least likely to suffer from contamination. The downside is that the average yield of 1.95 kg/hh/wk (see Figure 17) is significantly lower than for kerbside sort or MRF destined collections, a clear result of less potential material for recycling being available in the waste-stream. The main single-stream collections focus on paper/card, which appears to have an upper limit of approximately 4.5 kg/hh/wk.

Kerbside Sort Collections

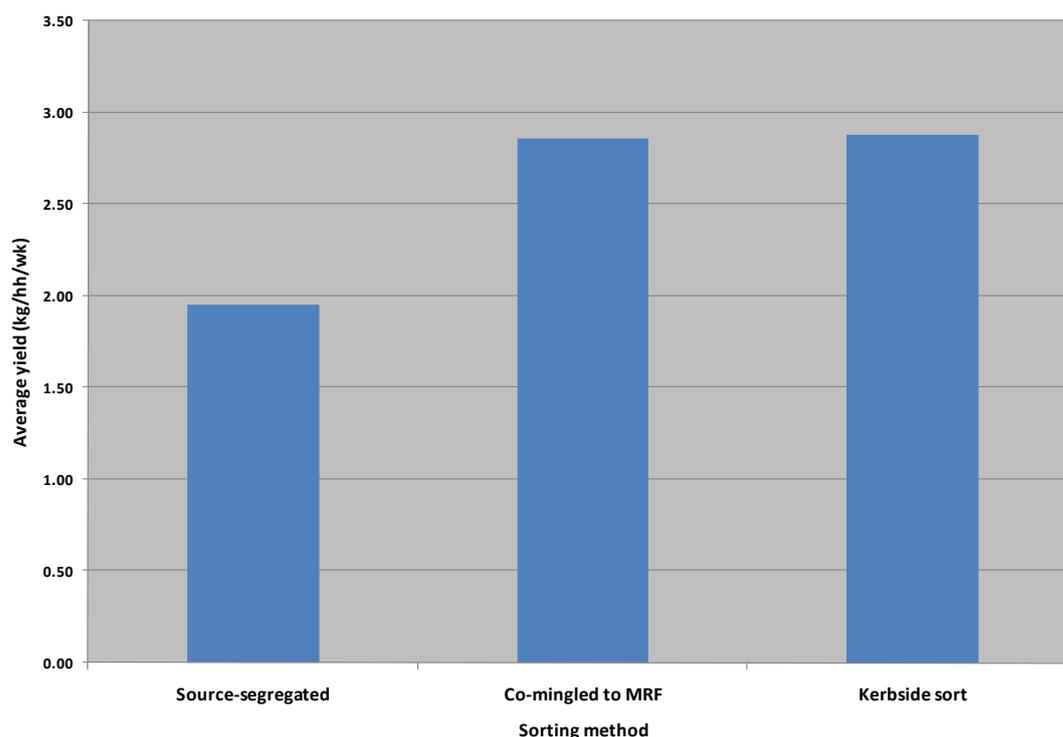
Kerbside sort is where materials are collected co-mingled in a container(s) and subsequently sorted at the kerbside into different compartments of a specially adapted vehicle. This allows a range of materials to be collected and often avoids the need to pay a gate fee for sorting at an MRF. Contamination rates are also low, typically less than 0.5%. However the collection itself is more time and cost intensive.

Co-Mingled Collections

Co-mingled collections are where a range of materials are collected together and subsequently sorted at an MRF. This has the advantage of allowing a range of materials to be collected quickly and economically, particularly where collection vehicles are shared with residual waste collection on an alternate weekly cycle. The disadvantages are that a gate fee has to be paid for sorting at an MRF, and that contamination levels tend to be relatively high compared to other methods of collection. The average MRF rejection rate is in the region of 4-11%, although in some occasions this has been known to be as high as 30%. The quality of material collected also has implications for reprocessors, with for example some paper mills raising concerns over the quality of paper recovered from MRFs.

Dry recycle collections using kerbside sort and co-mingled collections in fact produce very similar yields, with 2.59 and 2.60 kg/hh/wk respectively for all schemes, and 2.88 and 2.86 kg/hh/wk respectively for main schemes. Both systems can therefore provide high dry recycle yields, and the choice between them is likely to be the result of local circumstances, including the geography and population density of local authority areas. A co-mingled collection, for example, may be more appropriate in high density urban areas, where traffic volume may preclude kerbside sort.

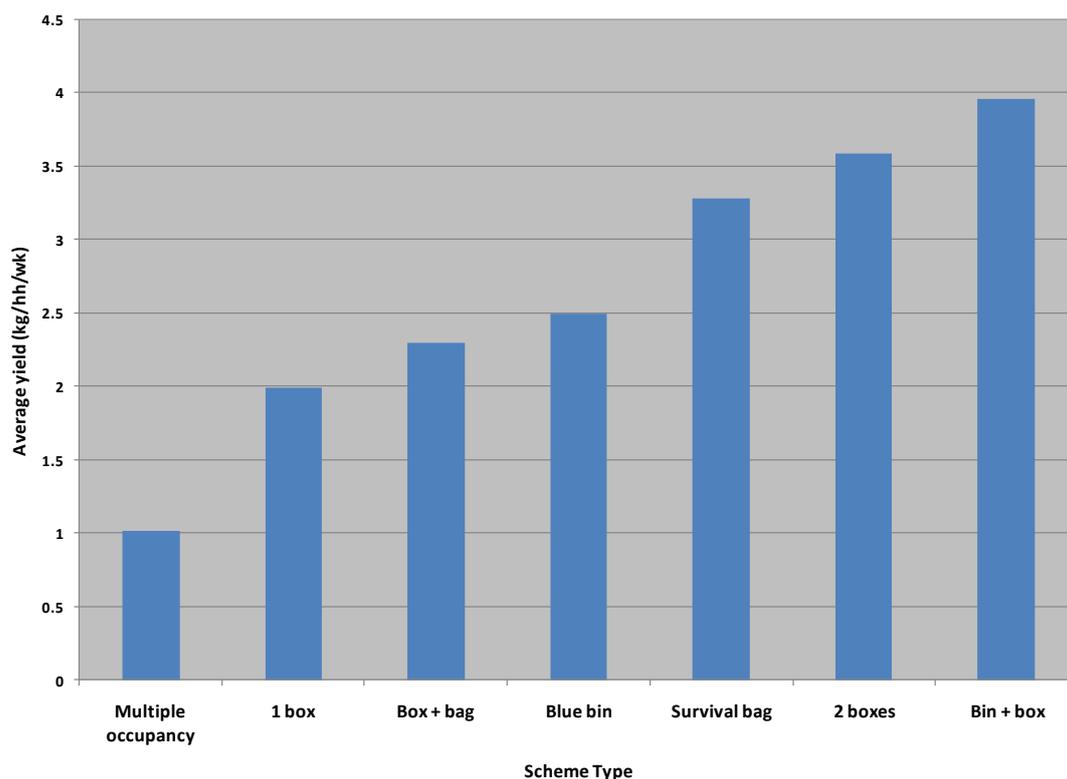
Figure 17: Dry Recyclate Yield by Method of Segregation



4.2.5 Dry Recyclate Scheme Type

A wide spectrum of dry recyclate collection schemes exist in Scotland, with 43 different schemes recorded by the 28 authorities completing the survey. It proved difficult to find schemes directly comparable in terms of factors such as method of containment, collection capacity, frequency of collection, number of materials collected and method of segregation. For the purposes of this survey, a number of broad classifications have been used to compare schemes (see Figure 18). The blue bin plus box combination produced the highest average yield at 3.96 kg/hh/wk, closely followed by 2 boxes at 3.59. As a general rule schemes with more than one receptacle appear to have higher recovery rates, the probable result of a greater range of materials being collected and a higher collection capacity being offered. As may be expected, schemes serving multiple-occupancy properties had the lowest recovery rate at 1.02 kg/hh/wk. Outside the multi-occupancy schemes the poorest performing scheme type is a single box. This is likely to be the result of a number of factors such as fewer materials being collected and insufficient collection capacity. However, Stirling Council produces a yield of 3.41 kg/hh/wk, demonstrating that with the correct collection frequency and supporting factors such as education, high yields can be produced from any of the different scheme types. The factors surrounding and supporting the scheme are likely to be more important than the type of scheme in place.

Figure 18: Dry Recyclate Yield by Scheme Type



“Blue Bin” Schemes

The average yield for the blue bin collections recorded is 2.53 kg/hh/wk. Of the 13 blue bin collections recorded, 8 are co-mingled and 5 source-segregated (all collecting paper/card), with an average yield of 2.79 and 2.11 kg/hh/wk respectively (see Figure 19). The collection frequencies of both the blue bin itself and the residual bin have significant influence on the yield (see Figure 20), with an alternating blue bin and residual collection (i.e. both fortnightly) demonstrating the highest average yield at 3.11 kg/hh/wk, while a monthly blue bin collection combined with a weekly residual collection produces an average yield of only 1.81 kg/hh/wk. Blue bin collections accepting co-mingled dry recyclate produce on average 32% more dry recyclate than single-stream (paper/card) collections (see Figure 21).

Figure 19: Dry Recyclate Yield from Blue Bin Schemes

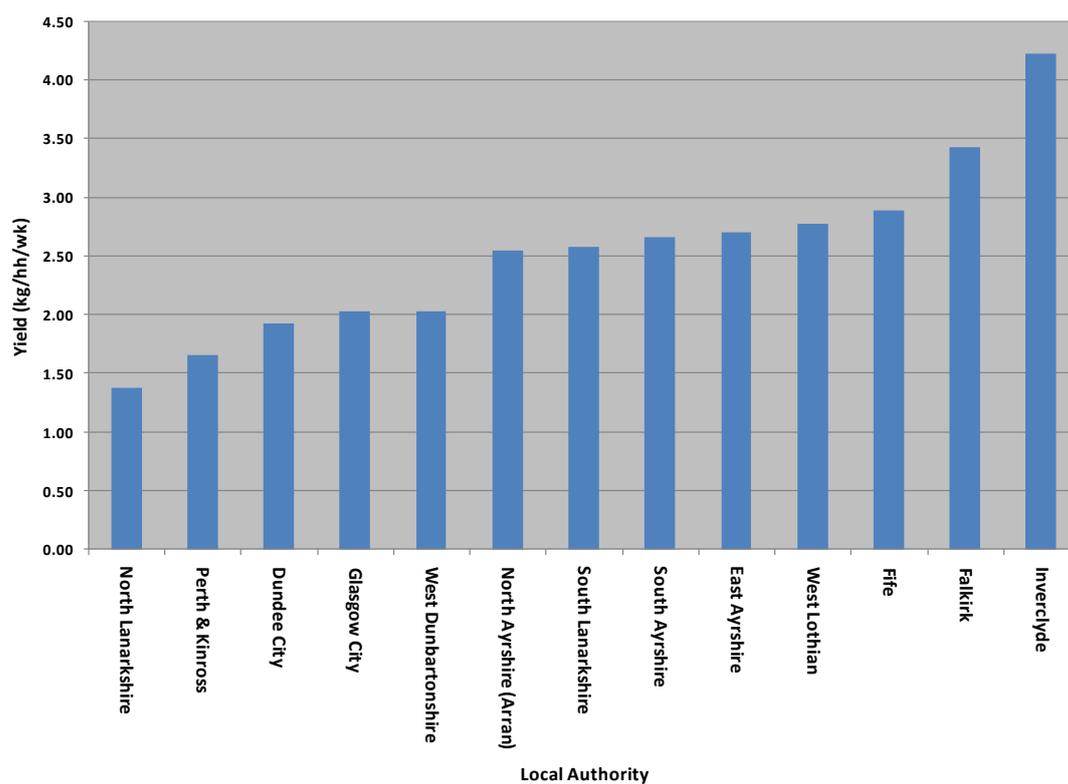
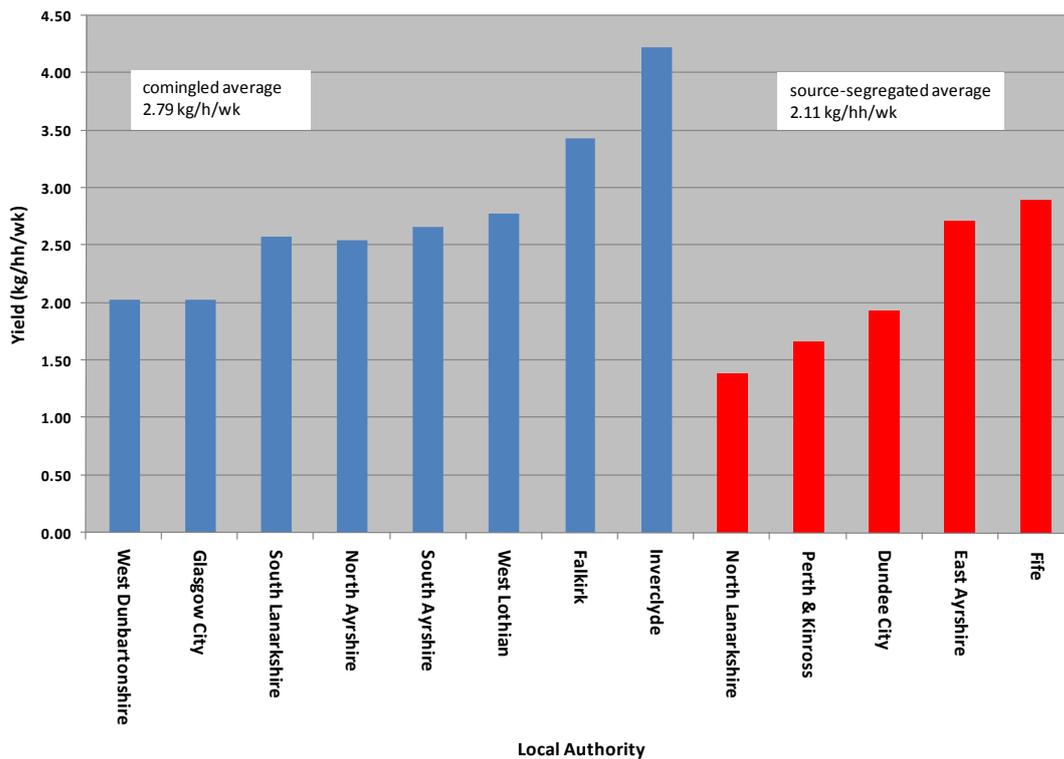


Figure 20: Factors affecting Blue Bin Yield

Average Yield (kg/hh/wk)	Dry Recyclate Frequency	Residual Frequency
3.11	fortnightly	fortnightly
2.89	fortnightly	weekly
2.69	every 4 weeks	fortnightly
1.81	every 4 weeks	weekly

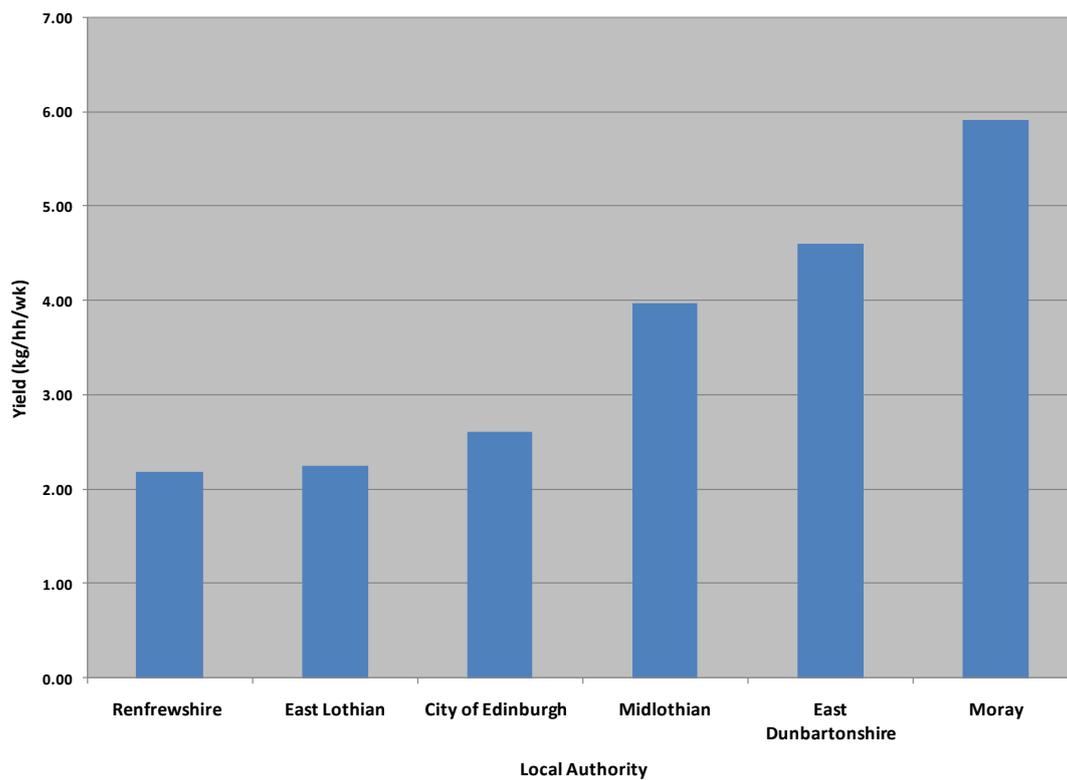
Figure 21: Comparison of Yields from Co-mingled and Single-Stream Blue Bins



Two Box Schemes

The average yield for a 2 box scheme is 3.59 kg/hh/wk, with 6 authorities using this method of dry recyclate collection, which is generally associated with the kerbside sort method of segregation (see Figure 22). 2 box schemes with a weekly recyclate collection frequency collect an average of 4.95 kg/hh/wk, compared to an average of 2.92 for fortnightly collection, i.e. a 70% higher yield. The collection frequency of residual waste also influences yields, with schemes integrated with a fortnightly residual collection producing an average of 4.84 kg/hh/wk dry recyclate, 106% higher than the average yield of 2.35 for schemes associated with weekly residual collections.

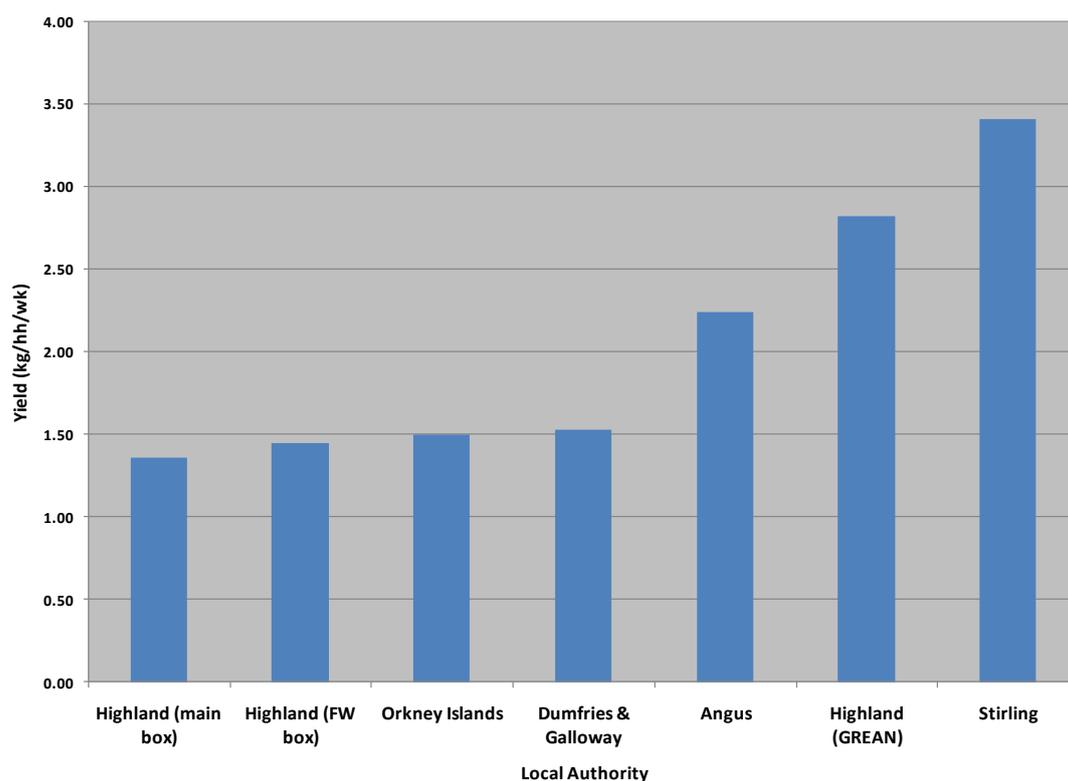
Figure 22: Dry Recyclate Yield from 2 Box Schemes



Single Box Schemes

The average yield for a single box collection is 2.16 kg/hh/wk, with 5 local authorities using this method of collection, one of which, Highland, uses 3 separate box schemes in different areas (see Figure 23). Box schemes collected weekly recover an average of 2.82 kg/hh/wk, 93% higher than the average of 1.46 kg/hh/wk for those collected fortnightly. Box schemes integrated with a fortnightly residual collection produce an average of 64% more dry recyclate than those retaining a weekly residual collection.

Figure 23: Dry Recyclate Yield from Single Box Schemes



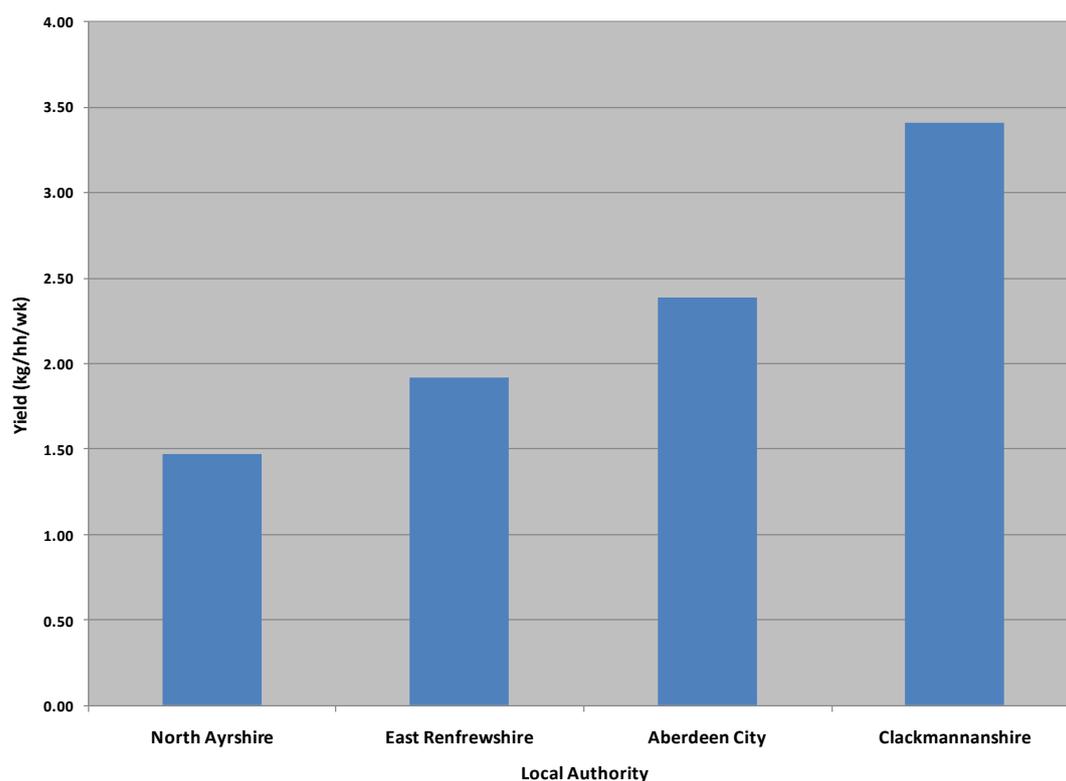
Bin and Box Schemes

Two local authorities collect dry recyclate using a bin and box, recording an average yield of 3.96 kg/hh/wk. Both schemes use a blue bin collected every 4 weeks complemented by a box collected fortnightly. In one case the blue bin is single stream, with the box collecting glass and cans, while the other uses a co-mingled combined with glass only box. The two schemes collect very similar yields overall.

Box and Bag Schemes

Four local authorities collect dry recyclate using a box and bag, recording an average yield of 2.30 kg/hh/wk (see Figure 24). The one scheme with a weekly recyclate collection and fortnightly residual collection produces 3.41 kg/hh/wk, 77% higher than the 1.93 kg/hh/wk average for the 3 local authorities who collect recyclate fortnightly and residual weekly.

Figure 24: Dry Recyclate Yield from Box and Bag Schemes



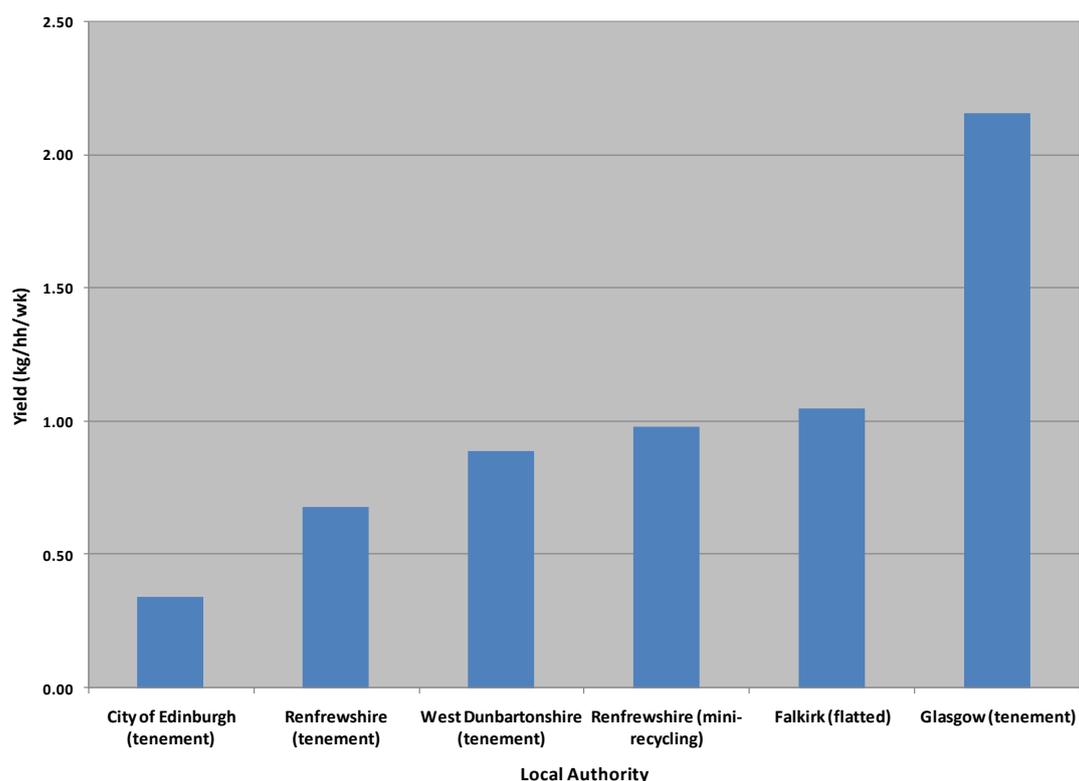
Survival bag Schemes

Only one Scottish local authority uses a survival bag system to collect dry recyclate. This produces a relatively high yield of 3.28 kg/hh/wk.

Multi-Occupancy Schemes

6 local authorities recorded schemes covering tenements and flats, with an average yield of 1.02 kg/hh/wk (see Figure 25). Difficult to reach properties such as flats and tenements generally produce lower tonnages of dry recyclate than easier to access properties such as detached and semi-detached houses. Difficulties arise in finding space to place containers, while door-to-door collection is often problematic due to many fire-wardens categorising containers placed along corridors as a fire risk. Shared containers as opposed to individual containers can also remove a sense of responsibility and ownership, leading to lower participation rates. A further problem is containers filling up quickly and being a distance away from properties, resulting in recycling being perceived as higher effort than it perhaps is for other types of housing stock. Storage space for collecting recyclables may also be limited in flats.

Figure 25: Dry Recyclate Yield from Multi-Occupancy Schemes



4.2.6 Material Recovery Rates

Paper/card is by a substantial margin the highest contributor to kerbside dry recyclate collection schemes, with an average yield of 1.81 kg/hh/wk (see Figure 26). Of the remaining materials glass dominates with an average recovery rate of 0.85 kg/hh/wk, followed by plastic bottles (HDPE & PET) and cans (aluminium and steel) with average yields of 0.16 and 0.11 kg/hh/wk respectively. Other materials collected included foil trays, textiles and other types of plastic. However, these materials contribute minimally to the overall tonnages collected. Within individual materials there is also a significant variation in recovery rates, for example paper/card varies from 0.24 kg/hh/wk to 4.37 (see Figure 27a-d), indicating the potential to improve capture rates in many case. The differences in yield are most significant for paper/card, which may be explained by the variation in the range of paper/card types collected, for example, Moray, who has the highest yield also collects the widest range of materials, with all types of paper and cardboard, including envelopes with windows, and tetrapak products, while other authorities only collect news and pams, which limits the amount of material available for recycling.

Figure 26: Average Dry Recyclate Material Yields

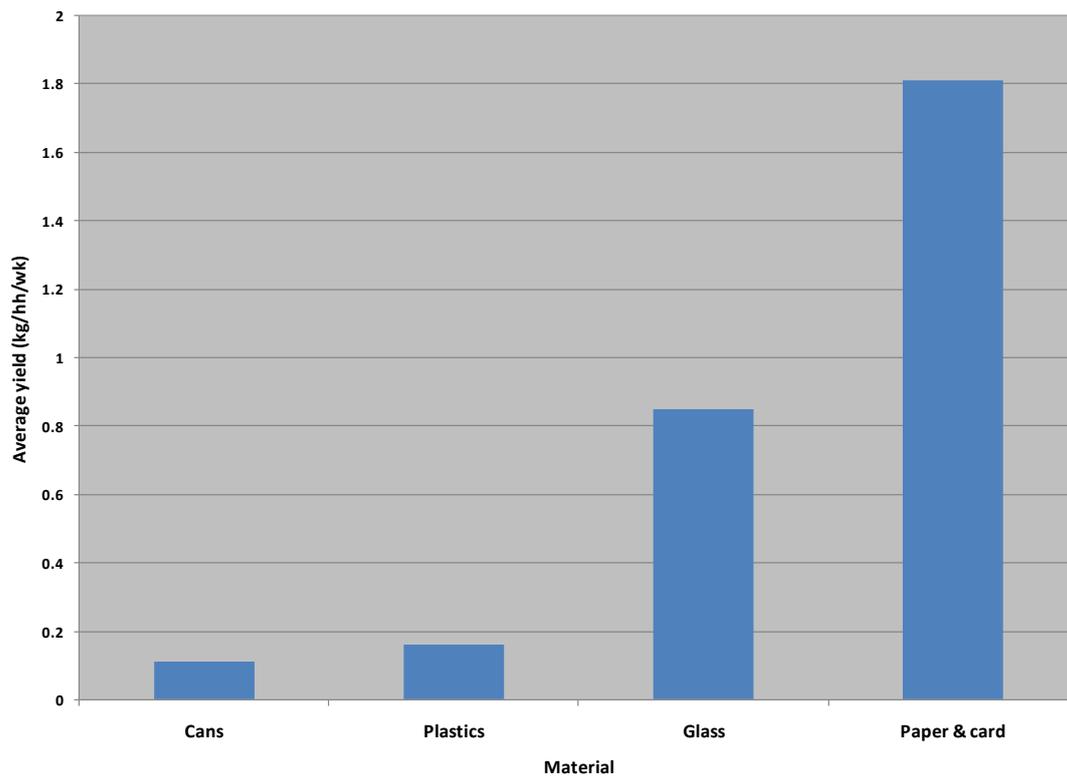


Figure 27a: Paper Yield by Council

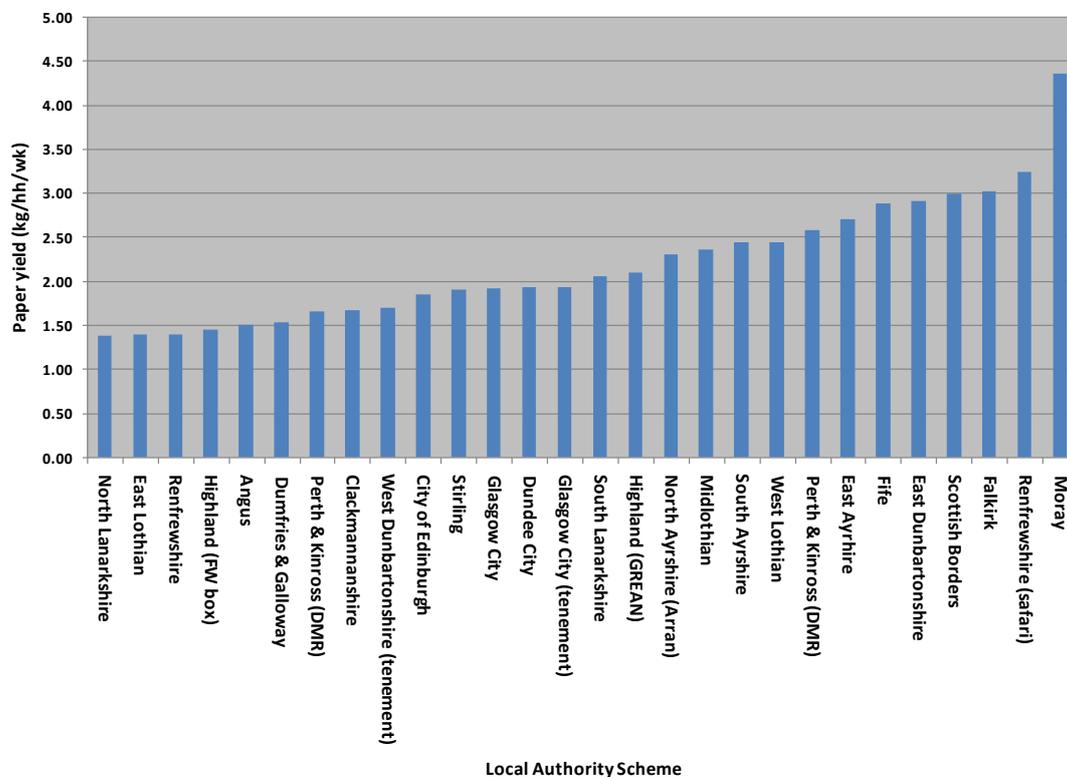


Figure 27b: Glass Yield by Council

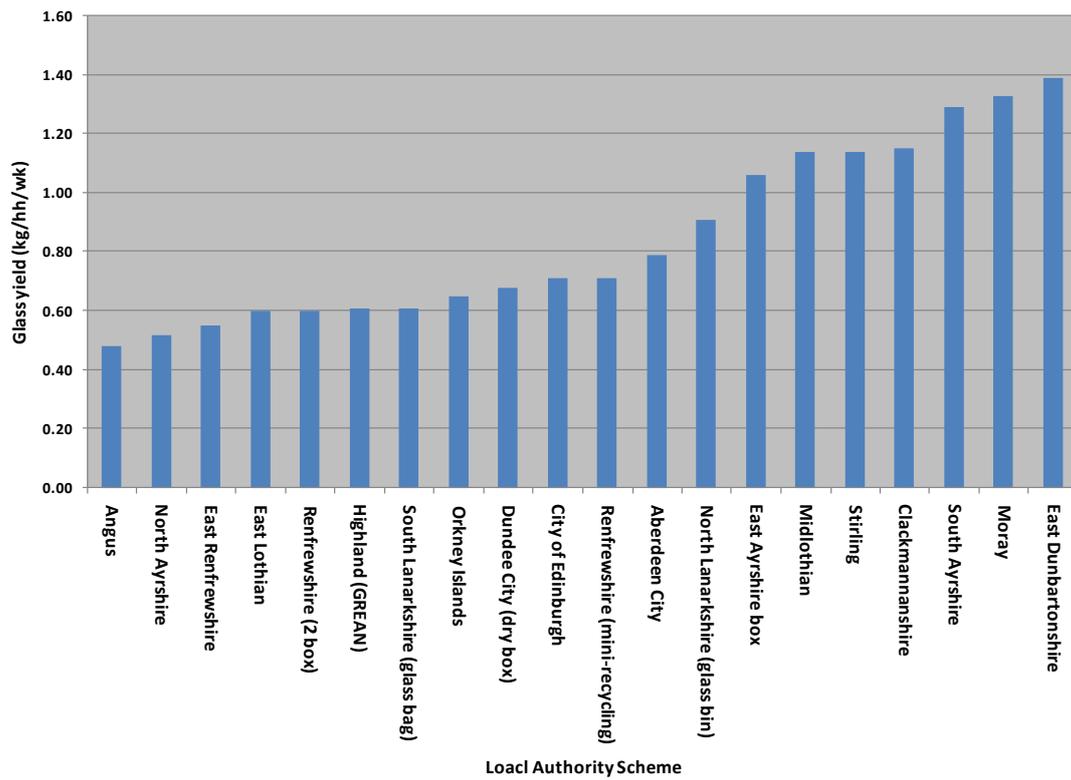


Figure 27c: Plastics Yield by Council

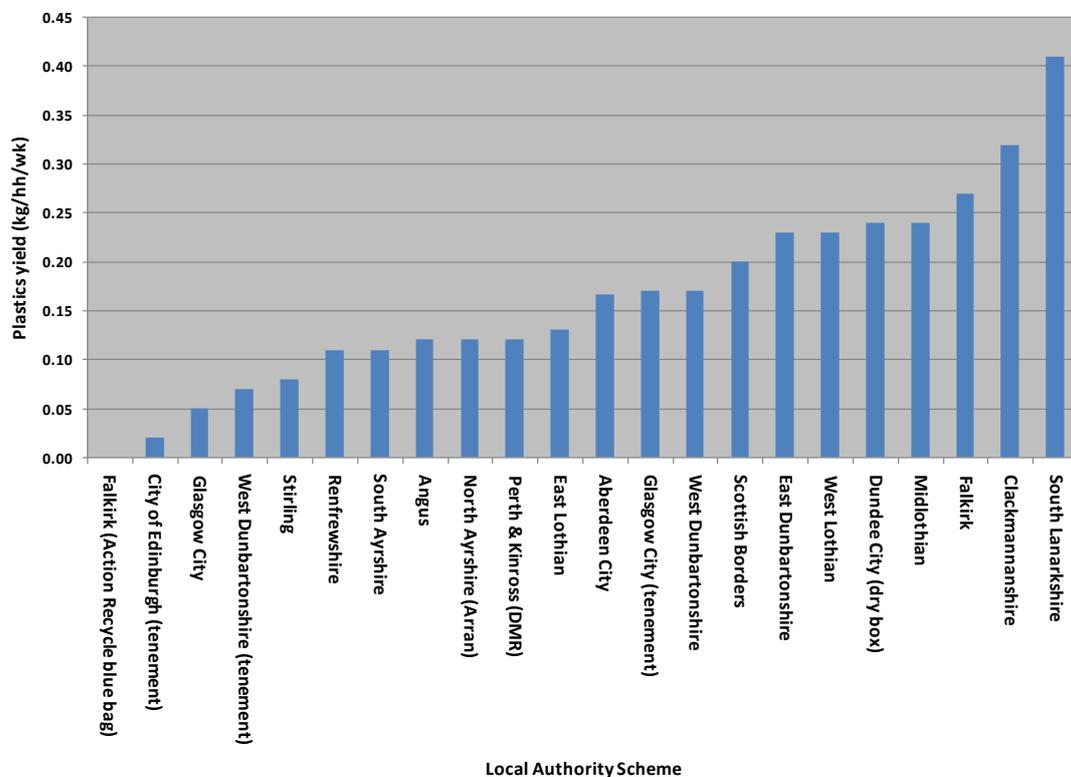
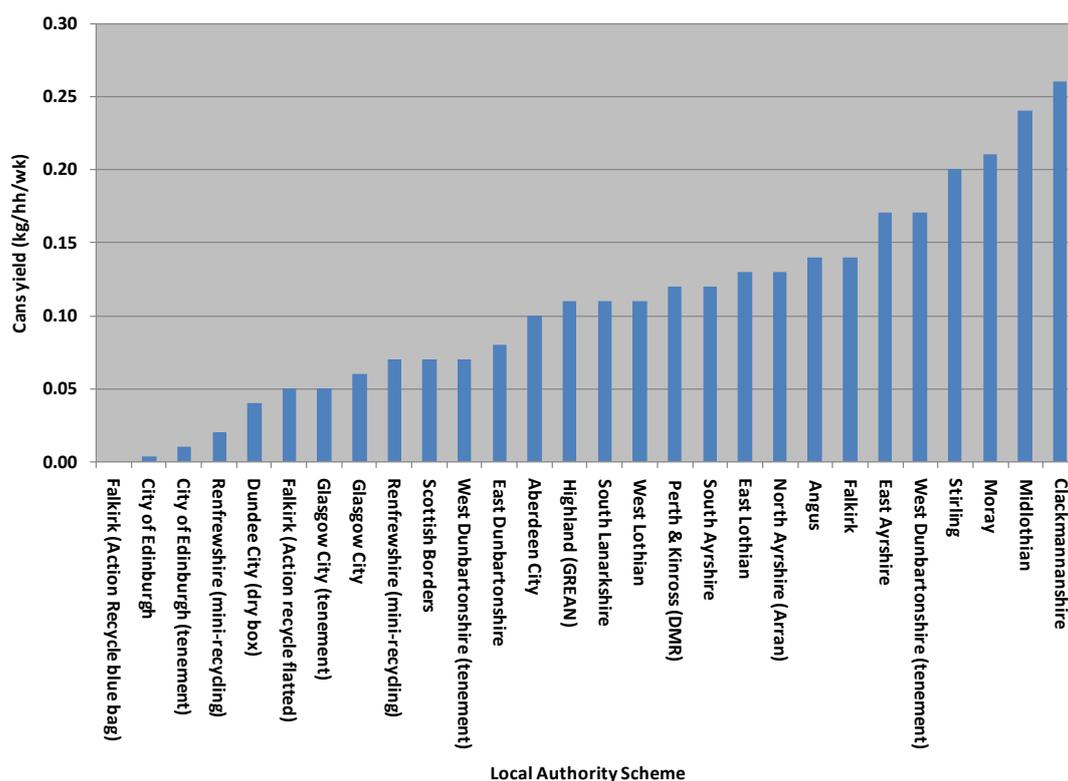


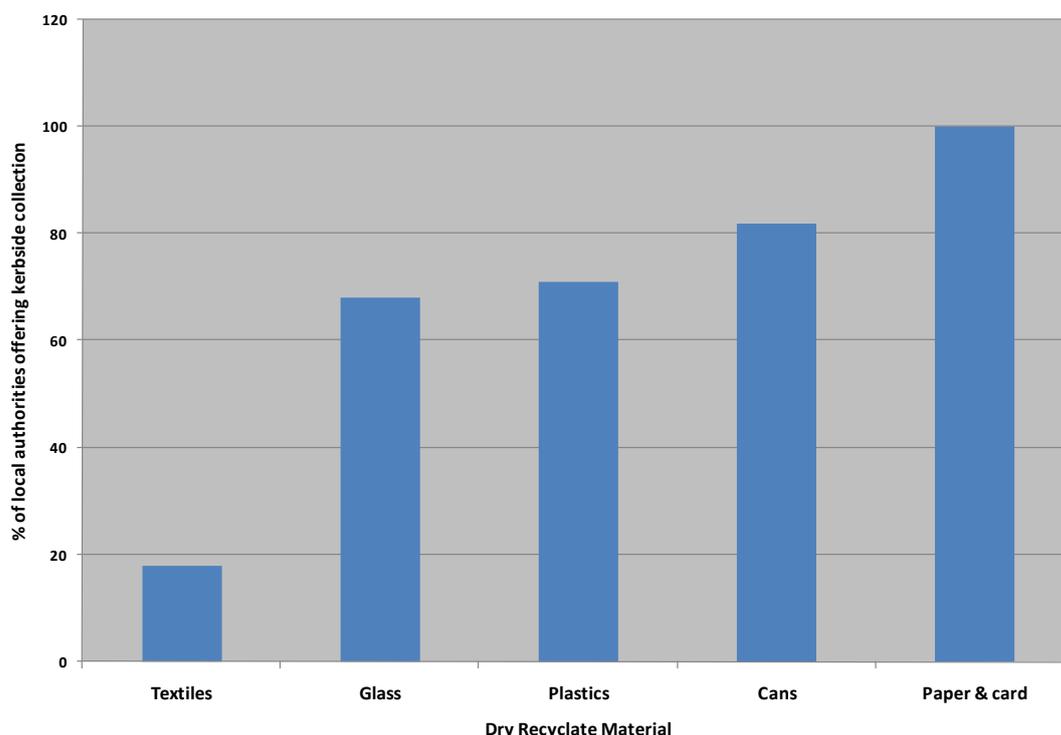
Figure 27d: Cans Yield by Council



The range of materials varies between authorities, with all authorities collecting paper/card, 82 % collecting cans, 71% plastic bottles and 68% glass (see Figure 28). There is potential for considerably more glass to be collected at the kerbside, and with weight-based recycling targets favouring “heavy” materials such as glass, increased collections could contribute significantly to higher recycling rates. However, particularly for schemes relying on co-mingled collections requiring sorting at MRFs, glass can be difficult to integrate into existing kerbside schemes due to health and safety constraints, while there is an obvious economic cost associated with the provision of a separate container and vehicle to collect glass.

71% of local authorities collect plastic bottles (HDPE and PET), with a minority such as Eilean Siar also collecting other types of plastic. Public demand certainly exists to collect a wider range of plastics; however economics and limited reprocessing facilities have resulted in the majority of authorities limiting their collections to plastic bottles, although North Lanarkshire’s revised blue bin collections have recently (June 2008) started collecting mixed plastics, which are sorted at a local facility. A problem with the collection of plastics is considered to be its low density, which results in a relatively low contribution to weight-based target, illustrated by the fact that the authority recording the highest dry recyclate yield per household doesn’t collect plastics. There has been considerable debate about the cost-effectiveness of collecting plastic at kerbside due to its high volume and low weight. However, public demand for plastics recycling is high and the inclusion of plastics has been shown to increase the yield of other dry recyclate materials when added to a kerbside collection.

Figure 28: Percentage of Local Authorities Collecting Individual Materials at Kerbside



5. Factors Affecting Dry Recyclate Yield

In the 2005/6 survey a number of factors significantly influencing the yield of dry recyclate kerbside schemes were identified. These were the collection capacity, the range of materials captured and the frequency of both the dry recyclate and residual waste collection. The data from this year's survey confirms these factors as being crucial to the success of kerbside schemes. Changes to one or more of these factors must be considered alongside their operational implications and interactions with each other. For example, collection capacity and collection frequency are intrinsically linked together, and where insufficient capacity is a limiting factor on diversion rates, the solution is more likely to be an increase in collection frequency rather than providing larger containers. As can be seen in Figure 29 the effect of the dry recyclate factors is not as pronounced as in the previous year. This is likely to be a consequence of a number of authorities already having acted to change the factors, such as by increasing collection frequency, leaving fewer with relatively low yields. The effect of fortnightly residual collections on dry recyclate recovery rates is however, more pronounced than in 2005/6, in part due to East Dunbartonshire changing from weekly to fortnightly residual and showing a subsequent increase in yield.

Figure 29: Changes in Influence of Factors from 2005/6 to 2006/7

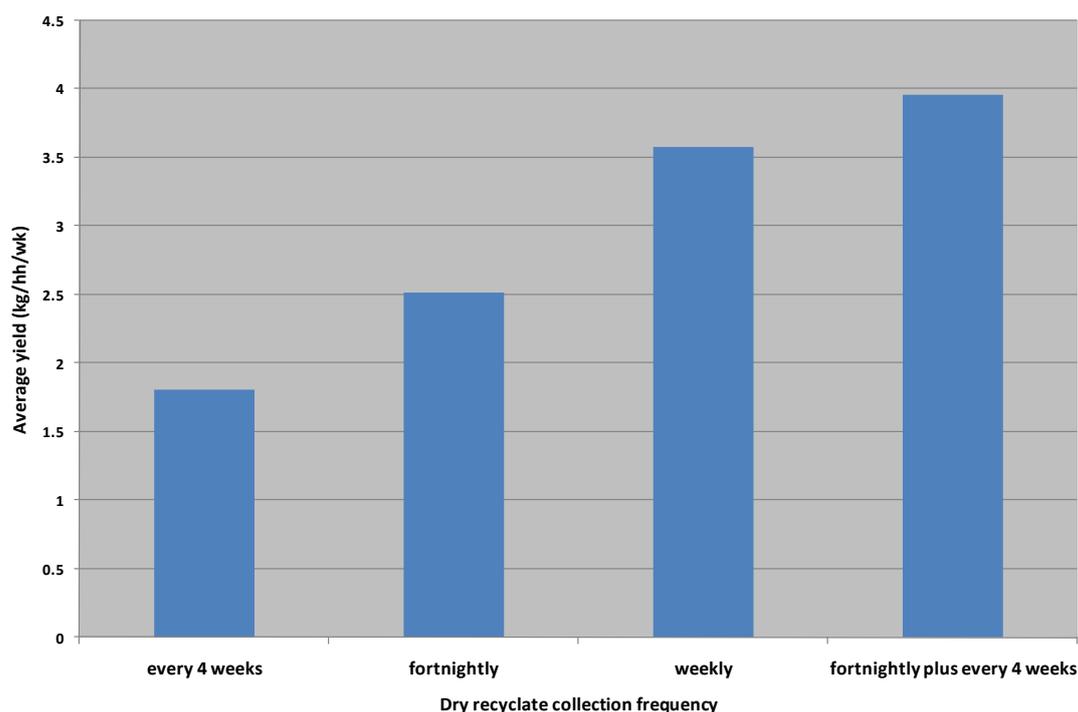
Factor	Effect 2005/06	Effect 2006/07
High Recyclate Collection Frequency	Weekly collections produce 78% higher recovery rates than fortnightly, 94% higher than every 4 weeks	Weekly collections produce 42% higher recovery rates than fortnightly, 94% higher than every 4 weeks
High Collection Capacity	Weekly capacity >100 litres produced 60% higher yields than 51-100 litres, 137% higher than <50 litres	Weekly capacity >100 litres produced 71% higher yields than those < 50 litres
N^o of Materials Recycled	Multi material schemes collecting 4 or more materials produced an average yield 139% higher than single stream collections	Multi material schemes collecting 4 or more materials produced an average yield 60% more than single stream collections
Residual Waste Collection Frequency	Schemes integrated with fortnightly residual collections recover 60% more dry recyclate than those with weekly collections	Schemes integrated with fortnightly residual collections recover 83% more dry recyclate than those with weekly collections

5.1. Dry Recyclate Collection Frequency

The frequency of collection has a significant influence on the tonnage of dry recyclate material collected at the kerbside, as shown in figure. Weekly collections produce a 94% higher yield than those which only collect material every 4 weeks, and 42% higher than fortnightly collections (see Figure 30). The highest average yield is recorded by schemes with a combination of a blue bin collection every 4 weeks and a box collected fortnightly. This is likely to be a consequence of adding the collection of glass to traditional blue bin collections, which generally exclude glass for safety reasons.

In terms of optimising dry recyclate yields, blue bins demonstrate higher performance when collected fortnightly when compared to every 4 weeks, while box/bag collections should ideally be collected weekly instead of fortnightly. The average yield for blue bins collected every 4 weeks is 2.06 kg/hh/wk, while the average for those collected fortnightly is 3.08, which represents an almost 50% higher yield for fortnightly collections. Similarly with 2 box systems, the average yield for those collected fortnightly is 2.92 kg/hh/wk, while for weekly the figure rises to 4.95, an increase of almost 70%.

Figure 30: Effect of Recyclate Collection Frequency on Dry Recyclate Yield



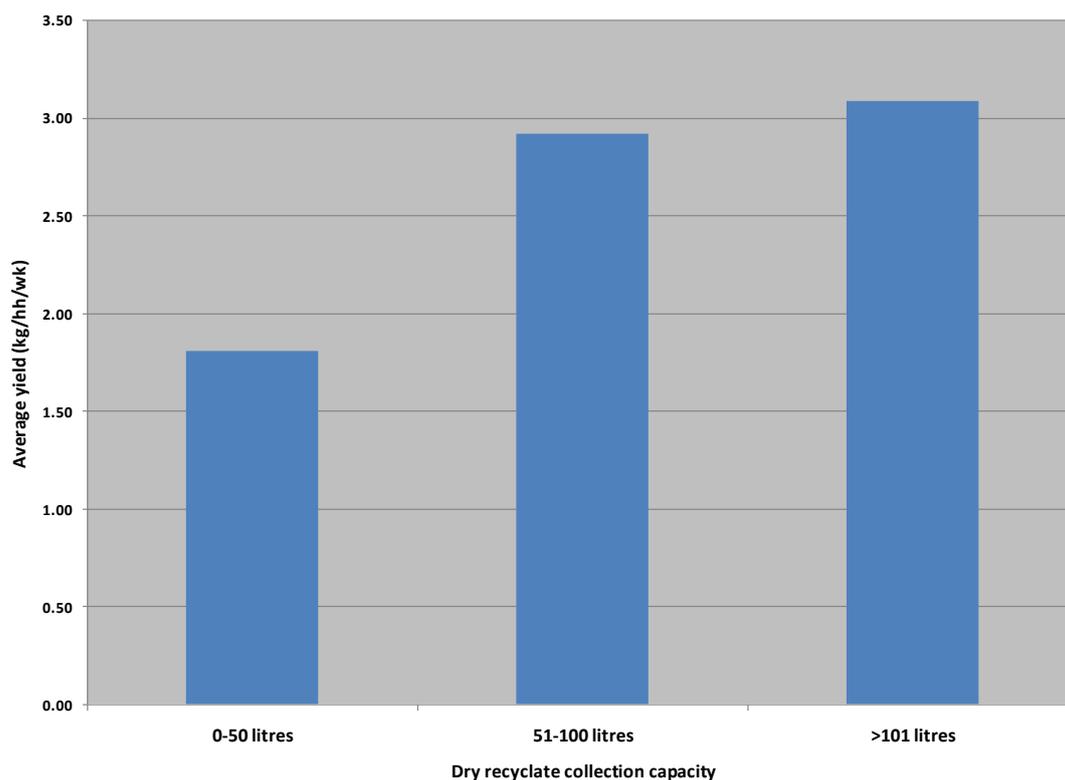
5.2. Collection Capacity

Collection capacity was again shown to be a significant determining factor in the yield of dry recyclate schemes. The weekly collection capacity for each scheme was calculated (i.e. 60 litres for a 240 litre wheeled bin collected every 4 weeks) and correlated with the dry recyclate yield. Collections providing the equivalent of over 100 litres capacity every week produced on average 71% higher yields than those collecting 50 litres or less, and 6% higher than those providing 51-100 litres capacity, suggesting that a weekly capacity of 50 litres or less is a significant constraint in collecting dry recyclate from the household waste stream (see Figure 31). A weekly collection capacity of 70 litres or over appears to be the level above which high diversion rates can be achieved, with schemes providing over 70 litres collecting an average of 3.50 kg/hh/wk, compared to 2.09 for those with less than 70 litres. This is particularly the case where high volume but low weight materials such as plastic bottles are included in a collection. While many authorities do offer free additional containers in the cases of boxes or bags, or 360 litre bins instead of the more standard 240 litre bins, knowledge and uptake of this is likely to vary.

For schemes providing a weekly capacity of 70 litres or less, an increase in collection capacity, whether through a larger container or more frequent collection, is likely to produce an increase in dry recyclate tonnages. Increasing the collection frequency provides extra capacity for households to recycle targeted materials and therefore reduces the likelihood of potential recyclate being placed in the residual waste container due to a lack of recycling capacity. A number of local authorities have already increased collection capacities by means of increasing collection frequencies, for example both Falkirk and West Lothian Councils have increased their blue bin

collection from every 4 weeks to fortnightly, with both recording increased tonnages of dry recyclate as a result. Similarly, North Lanarkshire is currently increasing the frequency of their blue bin from every 4 weeks to fortnightly. Integral to this restructuring is a move from weekly to fortnightly residual waste collection, together with a change from single-stream to co-mingled collection. It hoped that by changing a number of the factors influencing dry recyclate yield significant progress will be made in working towards higher recycling targets.

Figure 31: Effect of Collection Capacity on Dry Recyclate Yield

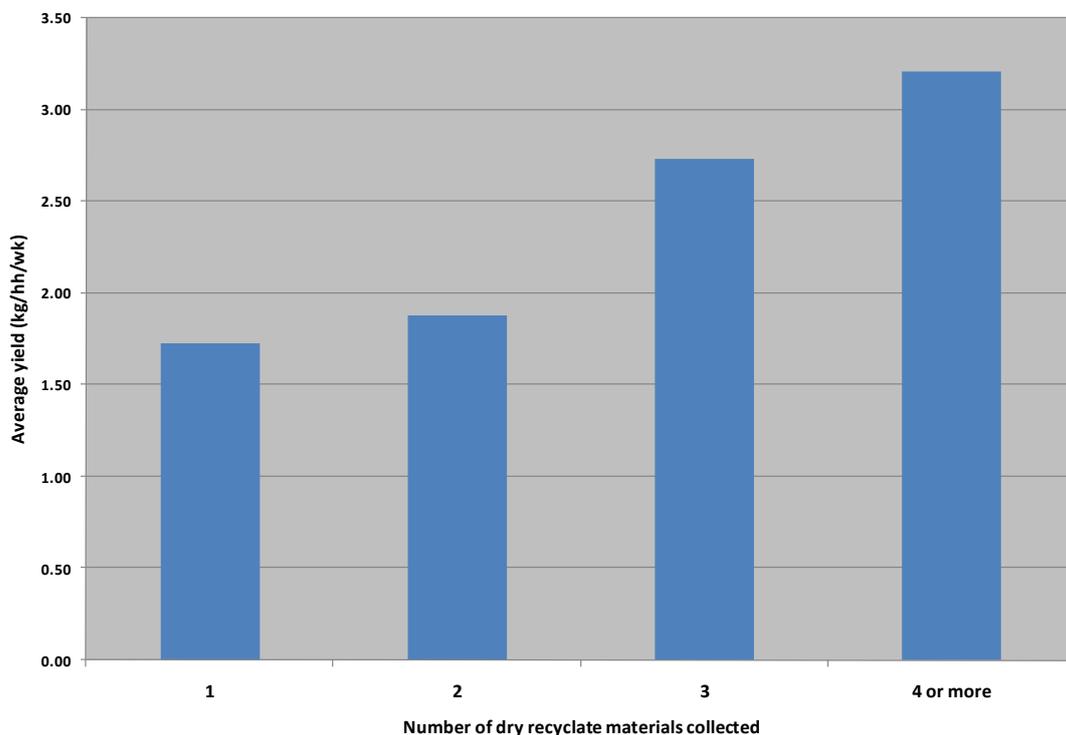


5.3. Range of Materials Collected

The number of materials collected by a scheme has a significant influence on the recovery rate for that scheme. Single material schemes average only 1.73 kg/hh/wk compared to 3.21 kg/hh/wk for those collecting 4 or more materials. Schemes collecting 4 or more dry recyclate materials produce on average 86% higher yields than single stream collections, 71% more than schemes collecting 2 materials and 18% more than those with 3 materials (see Figure 32). Single material collections have less target material available in the household waste-stream and therefore, even with high participation and capture rates, cannot match the tonnage per household for schemes collecting a range of materials. However, this is offset to a certain extent by the fact that the majority of single-stream collections are for paper/card, the material with the highest individual tonnage per household, and which can provide an economic advantage for the local authority, producing an income stream in contrast to a gate fee payment for MRF destined collections. Single-stream collections collecting a material other than paper/card typically demonstrate low recovery rates, for example an average of 0.94 kg/hh/wk for glass

only collections, reflecting the lower tonnage available in the waste-stream. The greater the number of materials collected, the higher the potential tonnage available in the household waste-stream. However, after the 4 principal materials of paper/card, glass, plastics and cans, adding additional materials appears to produce only relatively small increases in yield. However, it has been recognised that adding specific materials to a collection can increase the capture rate of the other materials collected or even increase participation levels. Additional materials can usually be added to existing containers at minimal additional cost, assuming sufficient capacity exists both in the recycling container and collection vehicle. For example, West Lothian has recently added both textiles and Tetrapak to the materials collected by its blue bin scheme, and hope to see an associated increase in tonnage collected. However, it must be recognised that, particularly in kerbside sort systems, the number of compartments in a collection vehicle can limit the number of materials which can be collected. The capacity of both the recycling container and collection vehicle is also a determining factor, particularly when adding high-volume materials such as plastics to a collection, which may necessitate an increase in collection frequency to accommodate the new material (s). Similarly, the range of materials that can be sorted or reprocessed locally is a potential constraint when considering the possibility of adding new materials to an existing scheme.

Figure 32: Effect of Number of Materials Collected on Dry Recyclate Yield



5.4. Effect of Residual Waste Collection Frequency

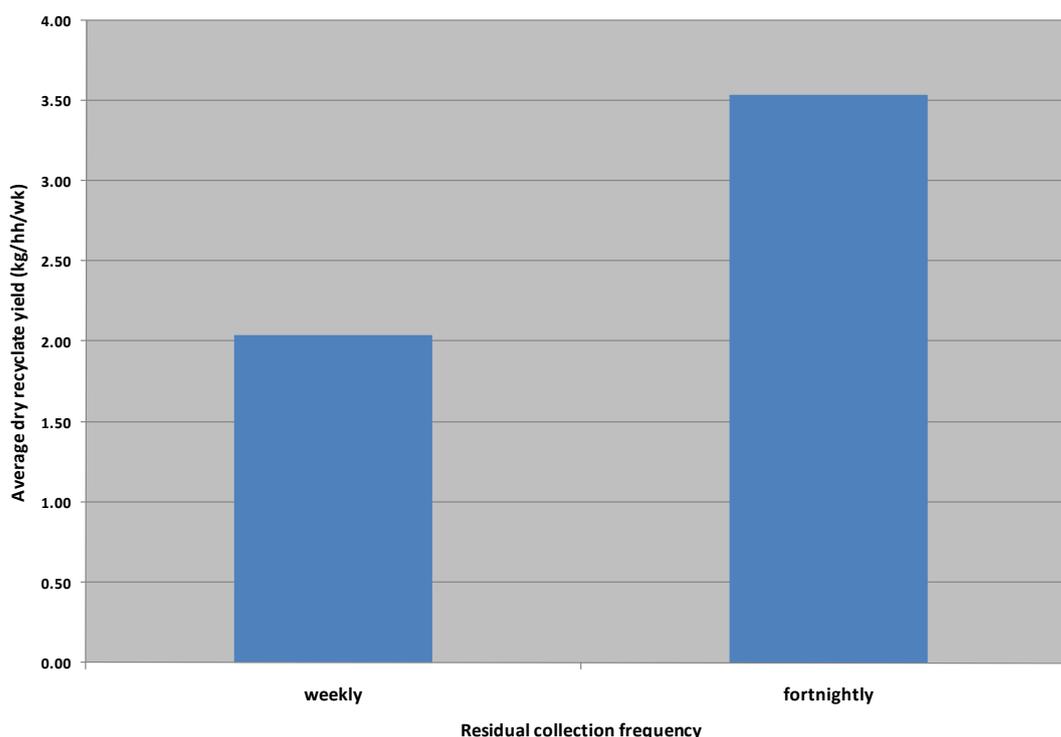
A number of local authorities throughout Scotland have changed from weekly to fortnightly residual collections, also known as alternate weekly collections in schemes where residual waste and recyclate are collected on alternating weeks.

Fortnightly residual collections may have been implemented as an integral part of the introduction of an integrated kerbside recycling service, or alongside an established recycling system, in an attempt to increase recycling rates. Fortnightly residual collections are thought to increase recycling rates by “forcing” householders to recycle due to decreased residual capacity. They can also have the advantage of reducing operational costs. A total of 12 local authorities collected residual material fortnightly in 2006/7, with 16 maintaining a weekly collection. Of those retaining a weekly collection, 3 have schemes covering varying percentages of their households which have a fortnightly residual collection, all of which are out-performing the weekly residual in their areas in terms of dry recyclate yield. Of the 4 authorities not providing data for the survey, only Aberdeenshire collects residual waste fortnightly, taking the total to 13 out of 32 (41%) collecting residual waste fortnightly.

The data collected for local authorities in 2006/7 provides evidence that fortnightly residual collections have a positive impact on dry recyclate diversion rates (see Figure 33). Dry recyclate yields are 83% higher in principal schemes (the main scheme a local authority operates) with fortnightly residual collection as opposed to weekly. Taking into account all schemes including trials and tenement/flatted property schemes, the figure rises to 101% higher dry recyclate yields with fortnightly compared to weekly residual collection. Further support for the effectiveness of fortnightly residual waste collection in increasing recycling is shown by the fact that the top 8 local authorities in terms of recycling rates for 2006/7 all collect residual waste fortnightly.

Fortnightly collections of residual waste have been the subject of considerable media attention as a consequence of the perceived health risks and reduction in service. The focus of this debate has largely been south of the border, however one Scottish local authority, East Dunbartonshire, has recently changed back from fortnightly residual collection to weekly as a result of negative publicity and political campaigning. Initial indications are that the re-introduction of weekly residual collections has led to a resultant decrease in the dry recyclate diversion rate. However, data over a longer time period is required to confirm this trend.

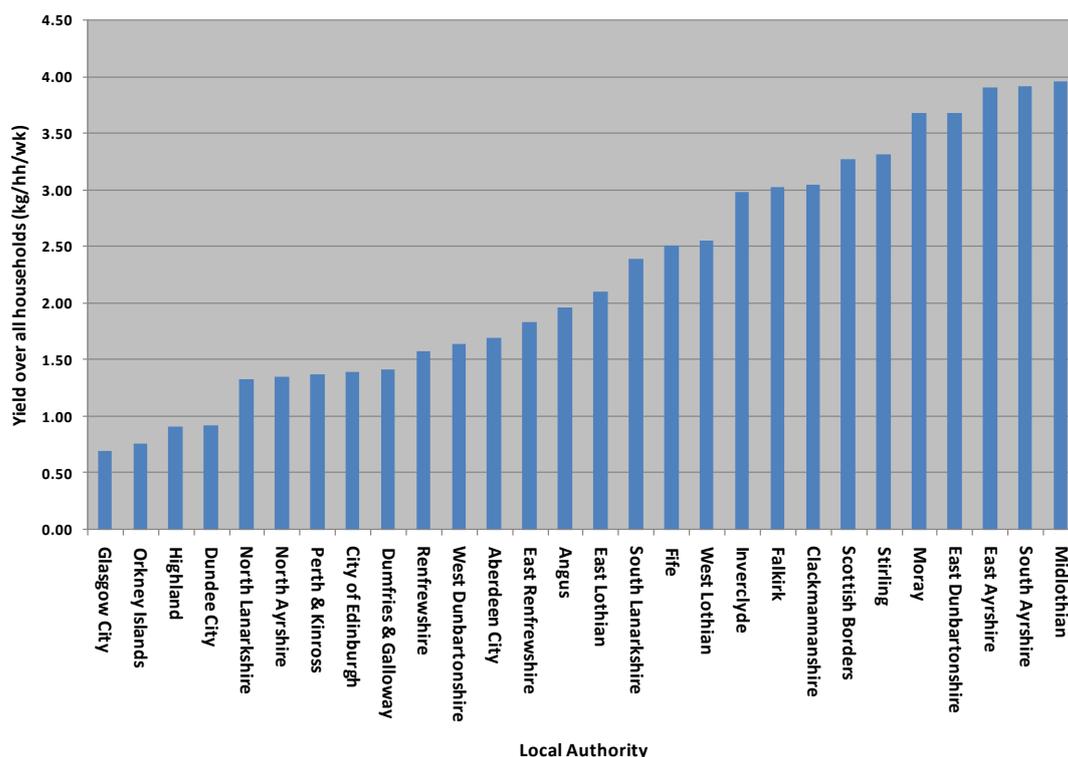
Figure 33: Effect of Residual Collection Frequency on Dry Recyclate Yield



5.5. Percentage of Households with Access to Kerbside Collection

The percentage of households being offered a kerbside collection of dry recyclate materials can also influence recovery rates. Local authorities which have limited coverage of households may have focused on areas likely to experience higher participation and capture rates, and thus higher recovery rates, as a consequence of factors such as property type and socio-economic status, whereas as other authorities offer a kerbside service to a much higher percentage of their households, including “harder to reach” housing types such as flats and tenements, which are typically characterised by lower recovery rates than detached/semi-detached properties. This may be demonstrated when looking at the percentage of households covered by an authority in comparison with the average for the appropriate family group. For example Moray Council has the highest dry recyclate yield at 5.92 kg/hh/wk, but only covers 63% of households, the lowest of all mixed authorities, and significantly below the average for mixed authorities of 90% of households. Therefore when looking at dry recyclate yield over all households in an authority (rather than restricting it to those households with access to kerbside recycling), Moray is found to have only the 5th highest rate as opposed to highest (see Figure 34).

Figure 34: Dry Recyclate Yield over all Households by Council



6. Material Capture from Recycling Centres and Points

A total of 335,767.535 tonnes were collected from recycling centres/points by the 32 Scottish local authorities, of which 76% originated from recycling centres and 24% from recycling points. The survey requested data for recycling centres and points (formerly civic amenity sites and bring sites) on an individual recycling centre and combined recycling points basis. Unfortunately due to the way data is gathered in many local authorities, only a minority of authorities were able to split the information in this way. This is a result of the same vehicle servicing a number of recycling centres and points, resulting in the corresponding tonnages from each site being aggregated. It was therefore decided to look at aggregated tonnage data from recycling centres and points, and determine the split between kerbside and recycling centres/points. Data from wastedataflow was used to supplement the information provided by local authorities and to allow all 32 to be included.

As may be expected, rural authorities collect a higher proportion of their recyclate tonnage from recycling centres and points than urban or mixed authorities. On average 47% of recyclate is collected from recycling centres and points in rural authorities with 53% collected from the kerbside. This compares to 38 and 39% respectively for recycling centres and points in urban and mixed authorities (62 and 61% from kerbside). This is a consequence of rural authorities providing more recycling points in remoter areas where kerbside collection may not be cost effective as a result of low population densities and long distances to reprocessing sites/bulking sites. The four authorities with the highest kg/hh/wk from recycling

points are all rural (Aberdeenshire, Eilean Siar, Orkney and Highland), all with over 1kg/hh/wk, compared to the national average of 0.57. This is also demonstrated when looking at the number of recycling points provided in relation to the number of households, with rural authorities averaging one recycling point per 587 households, compared to one for every 1293 households in mixed authorities and one per 1804 households in urban authorities.

In terms of individual materials (see Figure 35) it is evident that glass is the only material where a higher tonnage is collected at recycling centres and points than kerbside, with 52% of overall glass originating from recycling centres/points. Glass has a long history of being collected at recycling points in particular, for example at supermarket banks. Of the materials compared in figure 27, it is also the one that fewest kerbside schemes collect. Significant amounts of garden waste are also collected at recycling centres and points, with a 28% contribution to the overall garden waste tonnage. The tonnage collected for the other 3 materials, cans, plastics and paper/card, at recycling centres and points contribute 11-15% of their respective overall tonnages.

Figure 35: Relative Contributions of Recycling centres/Points & Kerbside Collections to Overall Tonnage

Material	Overall Tonnage	Tonnage from recycling centres/points	Relative contribution	Tonnage from kerbside collection	Relative contribution
Paper/card	205,014	29,740	15%	1,752,744	85%
Glass	69,026	35,915	52%	33,111	48%
Plastics	10,515	1,307	12%	9,208	88%
Cans	7,714	848	11%	6,866	89%
Garden (+ food)	264,741	75,318	28%	189,423	72%

The effect of kerbside collection schemes on overall tonnages was also analysed for glass, plastics and cans. (see Figure 36). This wasn't relevant for paper/card as all local authorities collect this material at the kerbside, and for organic waste Dumfries & Galloway was the only authority out of the 28 who don't offer an organic waste collection. They didn't collect any organic material at recycling centres or points either, presumably as a consequence of material being taken to the MBT plant.

Figure 36: Effect of Availability of Kerbside Service on Overall Tonnages Collected

Material	Average Overall Yield (kg/hh/yr)	Effect on Recovery Rate
Glass (no kerbside)	22.75	
Glass (with kerbside)	44.84	97% higher with kerbside
Plastics (no kerbside)	1.04	
Plastics (with kerbside)	7.82	652% higher with kerbside
Cans (no kerbside)	0.60	
Cans (with kerbside)	5.50	817% higher with kerbside

The addition of a kerbside collection significantly increased the overall recovery rate for all 3 materials, ranging from an average 97% increase with glass to 817% with cans. This demonstrates that householders are far more likely to recycle material when it is collected from the kerbside where little effort is involved, than to take materials to the nearest recycling centre or point. In the case of glass and cans, local authorities without a kerbside collection demonstrate a higher recovery rate at recycling centres and points than those who do, for example those authorities not offering a glass kerbside collection collect an average of 22.75 kg/hh/yr glass at recycling centres and points compared to 13.24 for those who collect glass at kerbside. However, this increased recovery at recycling centres and points in no way compensates for the lack of a kerbside collection, with authorities collecting glass at kerbside exhibiting on average 97% higher recovery rates than those who don't. The figure was more confused with plastics, as 50% of local authorities who collect plastics at kerbside don't offer plastics recycling at recycling centres or points, and several authorities such as Moray don't collect plastics at all. More detailed information on each of the materials discussed can be found in Figure 37 (a-e), which shows the overall tonnages of each material and the relative contributions from kerbside collections and recycling centres/points.

Figure 37a: Collection of Paper/Card by Local Authority

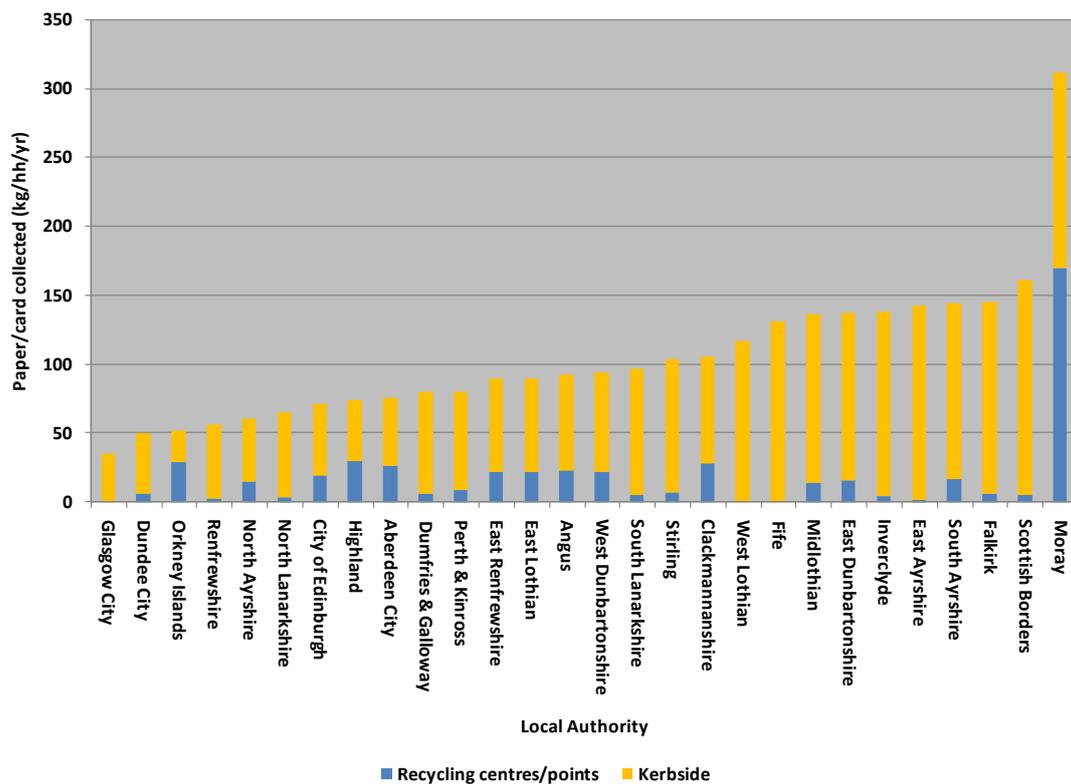


Figure 37b: Collection of Glass by Local Authority

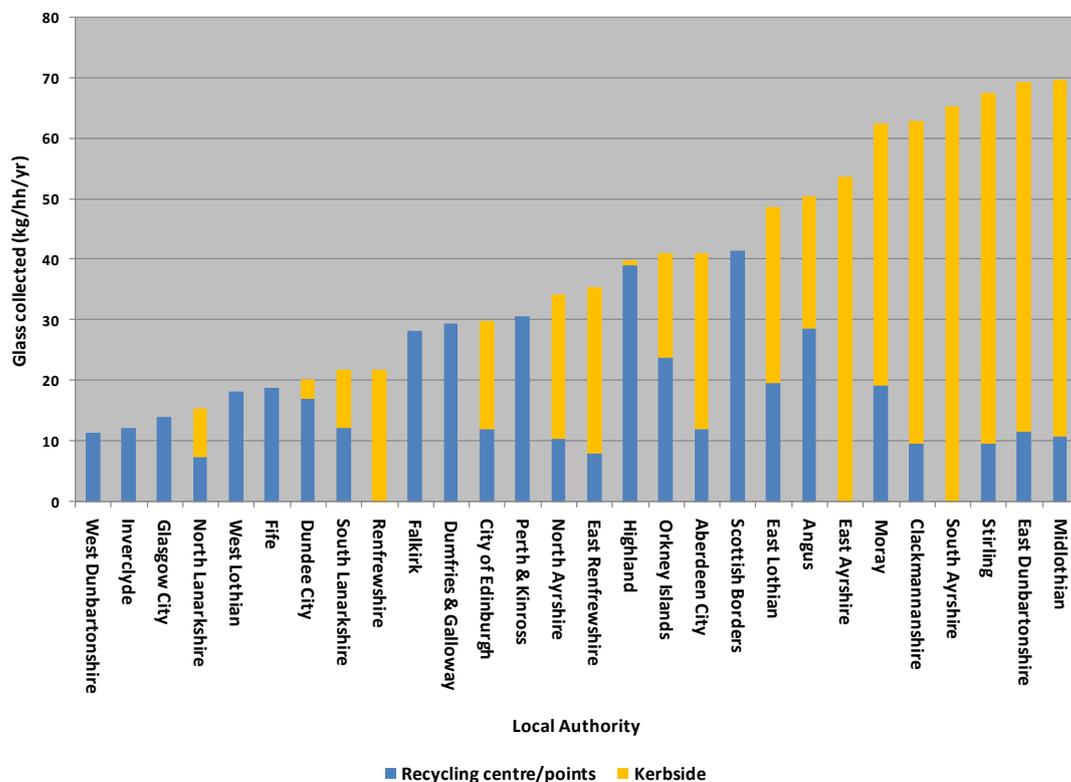


Figure 37c: Collection of Plastics by Local Authority

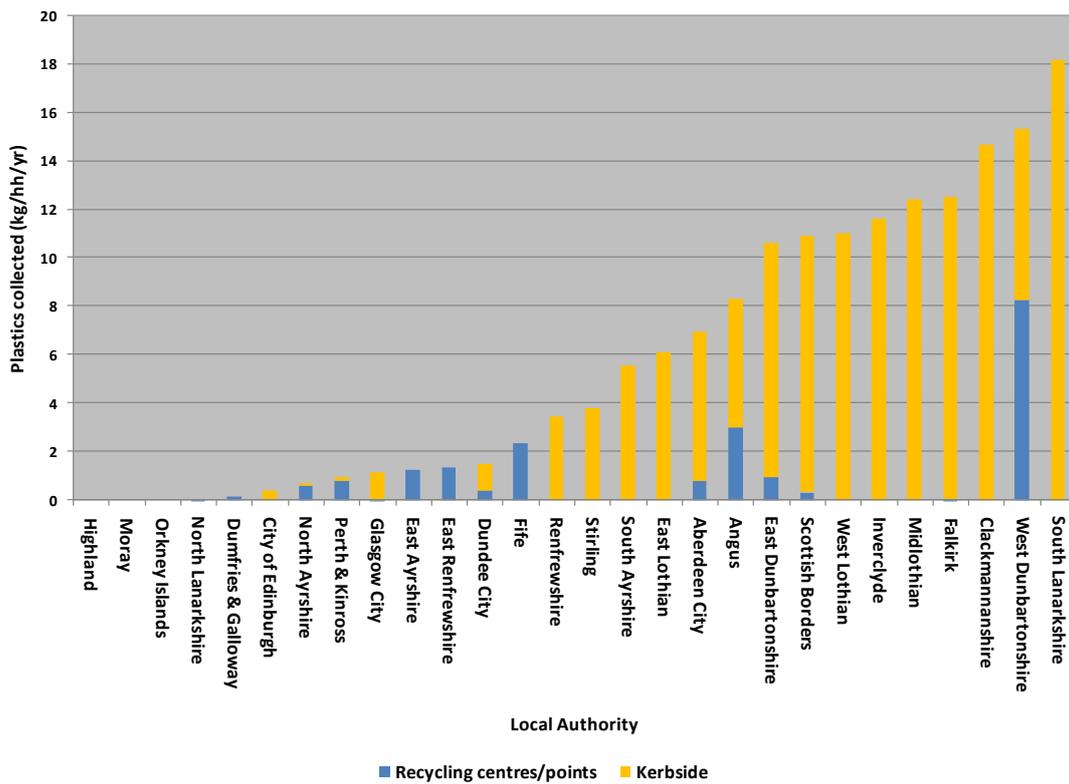


Figure 37d: Collection of Cans by Local Authority

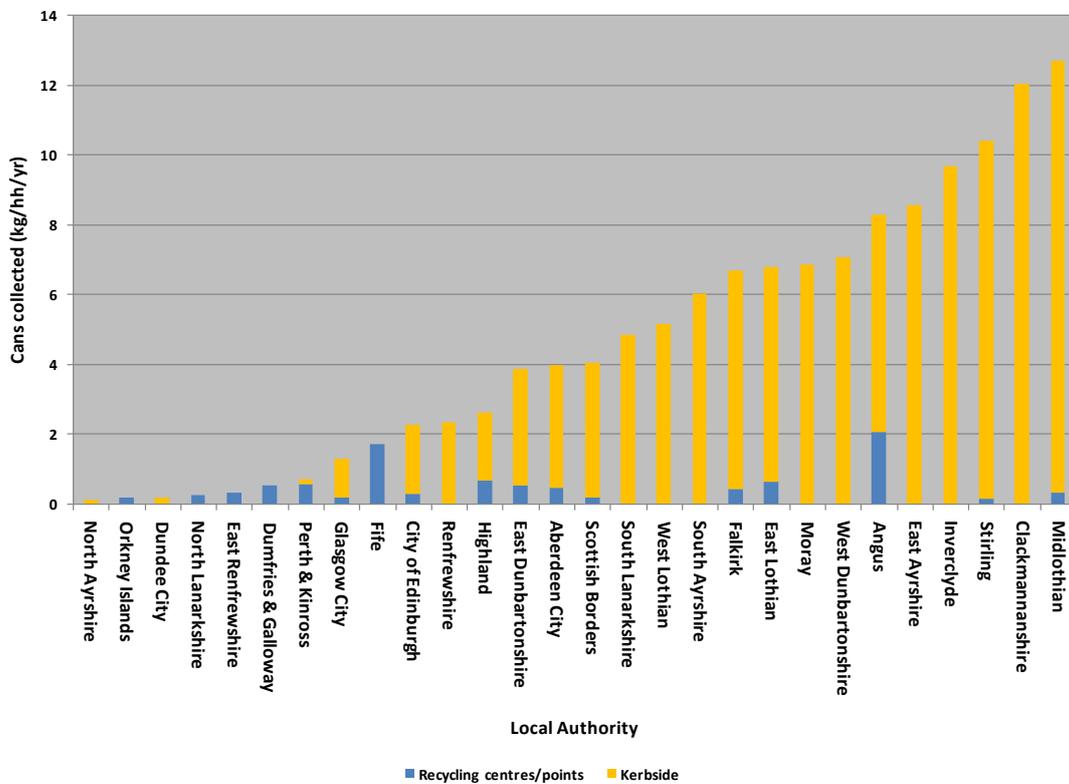
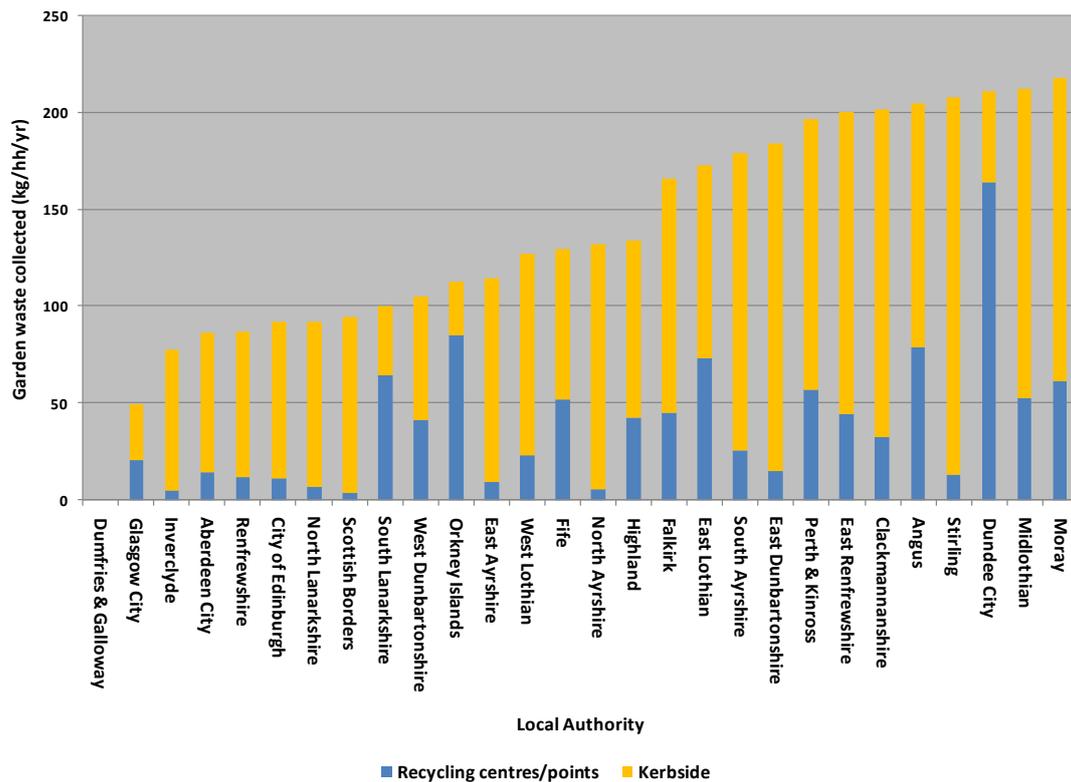


Figure 37e: Collection of Garden (and Food) Waste by Local Authority



The amount of recyclate collected from recycling centres and points varies according to the family group, as shown in Figure 38a-e. Rural authorities collect in particular a very high proportion of glass at recycling centres and points. Many rural authorities concentrate kerbside collections on single-stream paper/card, and collect other materials at recycling points. They also offer fewer plastics collections, both at recycling centres/points and at the kerbside. This is likely to be a result of the costs of transporting high volume, low weight plastics over the long distances typical in rural areas.

Figure 38a: Paper/Card Collection at Recycling Centres & Points by Family Group

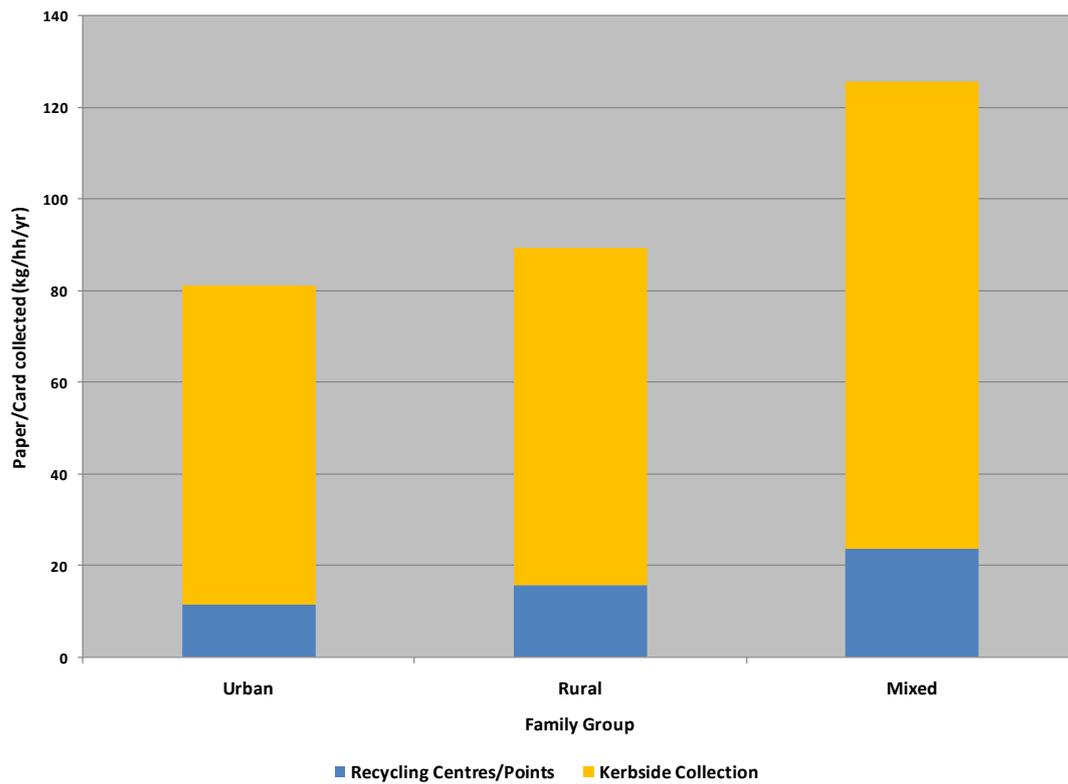


Figure 38b: Glass Collection at Recycling Centres & Points by Family Group

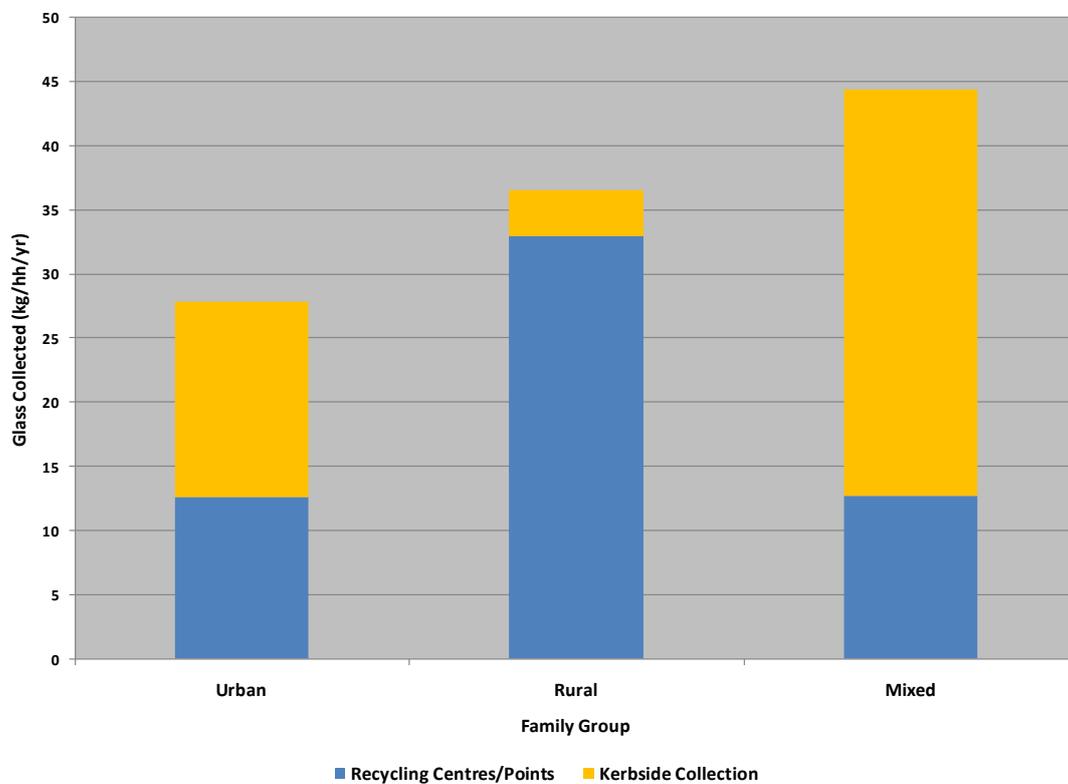


Figure 38c: Plastics Collection at Recycling Centres & Points by Family Group

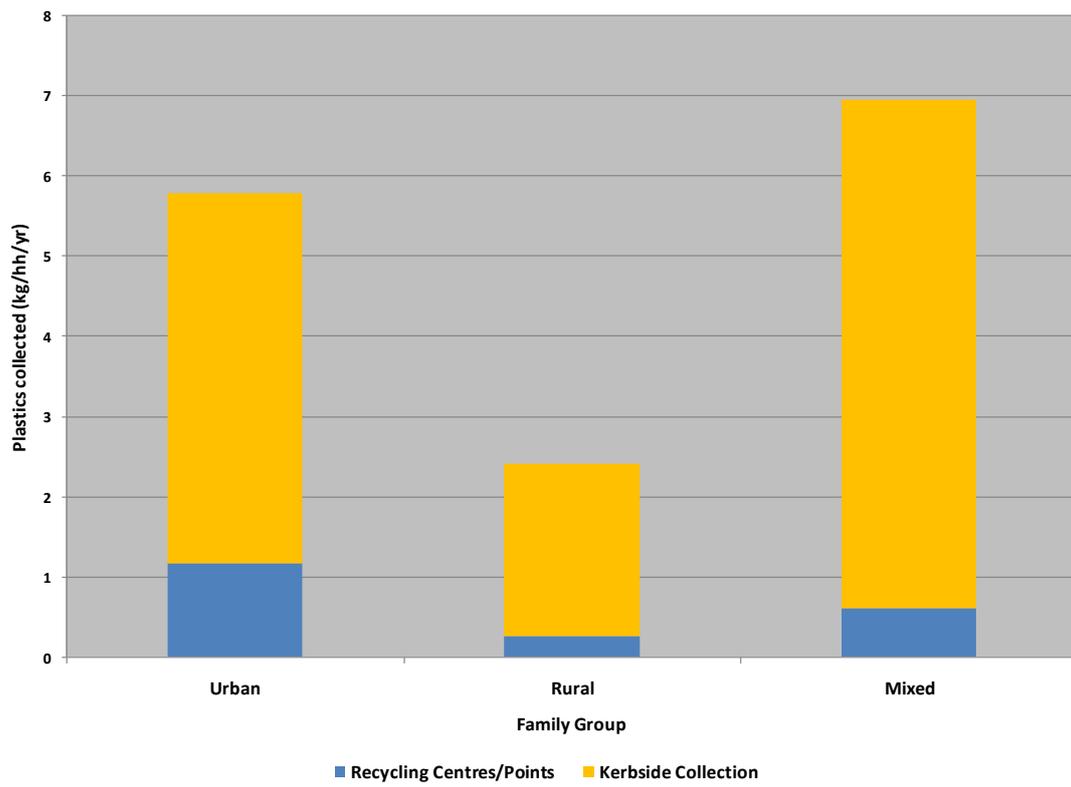


Figure 38d: Cans Collection at Recycling Centres & Points by Family Group

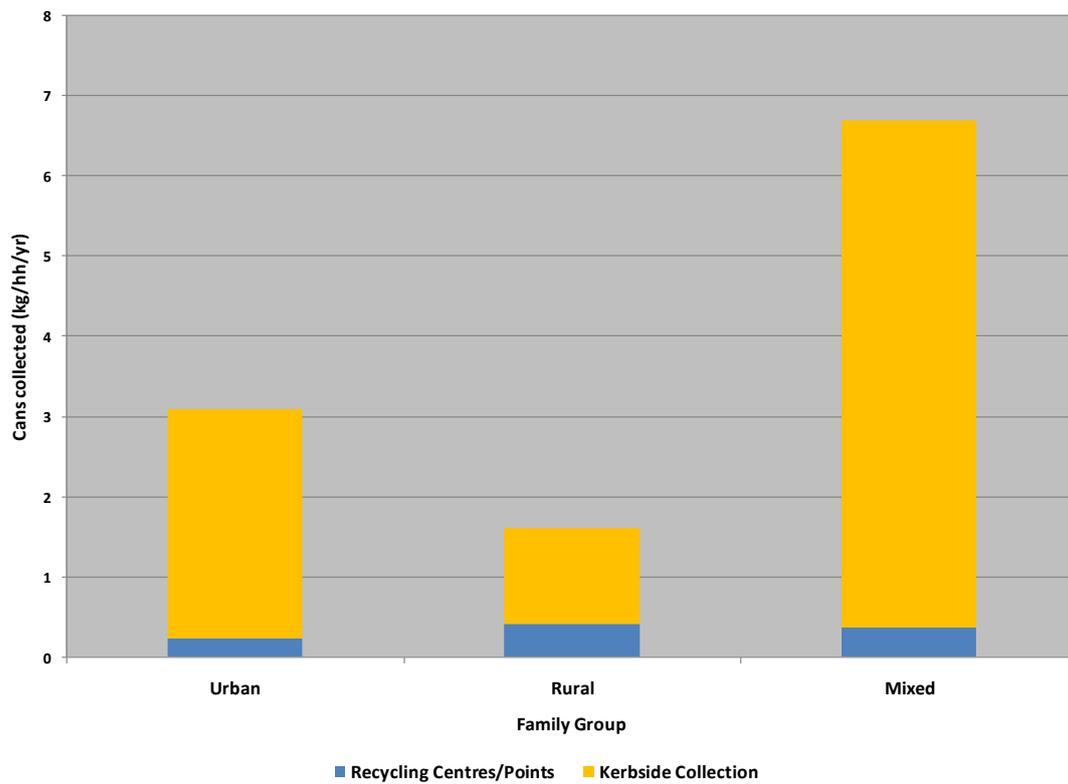
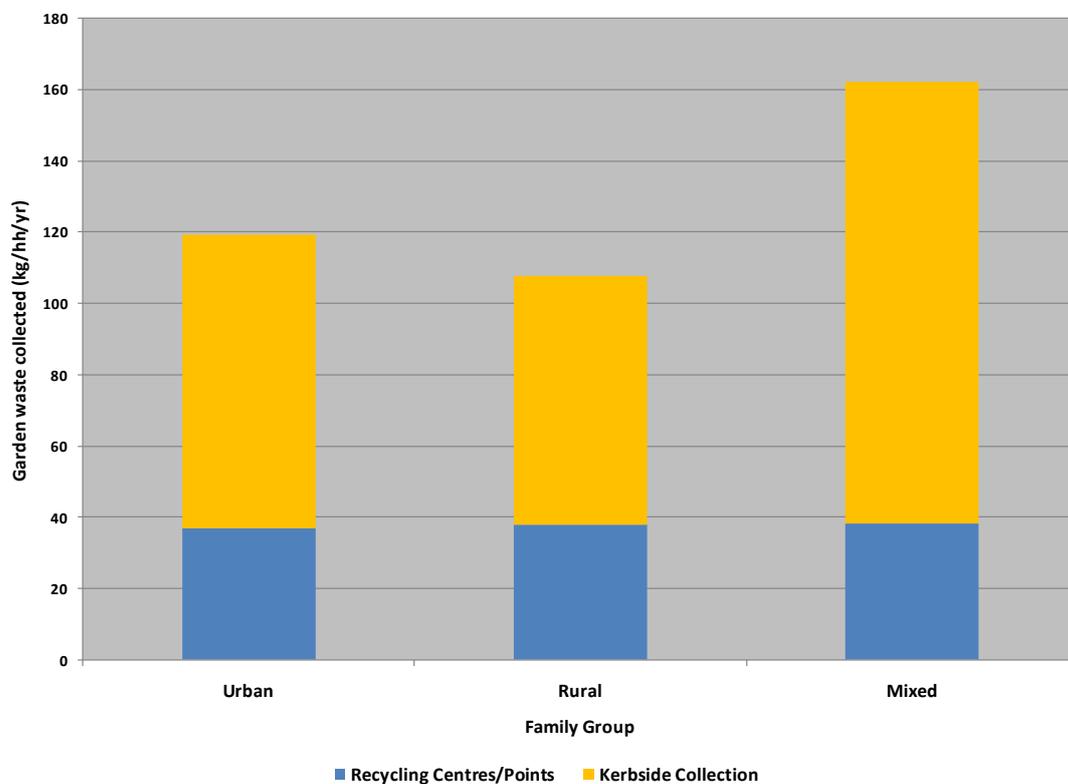


Figure 38e: Garden Waste Collection at Recycling Centres & Points by Family Group



7. Discussion

7.1. Recycling Performance Optimisation

From the results of the 2006/7 Survey it is evident that opportunities still exist to improve recycling rates from kerbside collection schemes, by means of providing kerbside services to a higher proportion of households, and by optimising existing schemes.

7.1.1 Expansion of Schemes

A number of authorities have scope to significantly increase the number of households being offered kerbside collections of dry recyclate. An example here is Glasgow City, who plan to roll-out collections to additional properties in their blue bin, brown bin and tenemental schemes, taking the number of households covered from 34% to 73%.

7.1.2 Introduction and Expansion of Schemes Covering Difficult to Reach Areas

Local authorities, particularly in urban areas are making progress in introducing schemes to cover difficult to reach areas such as flatted properties, properties in areas with narrow lanes, etc. However, there is potential for significant increases in the number of households in these types of properties gaining access to kerbside collection.

7.1.3 Optimisation of Existing Kerbside Services.

Local authorities attempting to increase recovery rates from dry recyclate kerbside collection schemes are advised to consider the following factors, all of which were shown to have a significant on tonnages collected:

- Ensure sufficient recycling capacity is available – either through increased frequency of collection with existing containers, or by providing larger or additional containers
- Expand the range of materials collected by means of existing collections or the additions of new containers/vehicles e.g. the addition of tetrapak, plastics, glass and/or food waste
- Policies to limit residual waste such as fortnightly residual waste collection and a no excess waste policy.

7.1.4 Action to Tackle Variations in Performance within Individual Schemes

The diversion rate achieved by the kerbside collection of recyclables varies not only between schemes, but also within individual schemes. In a study undertaken on behalf of Renfrewshire Council areas of underperformance and high performance were identified, in which the dry recyclate yield ranged from 1.16 to 4.3 kg/hh/wk, compared to an average for the overall scheme of 2.19 kg/hh/wk. The average yield per participating household was perhaps surprisingly found to be similar between low and high performing routes, at 5.33 and 5.68 kg/hh/wk respectively. This suggests that for all households who participate in the recycling scheme, the average

amount they recycle is comparable, whether in a low or high performing area. Variation in set-out rate was highlighted as the main factor accounting for the variation in route performance, with a 31% set-out rate in the lowest performing day routes compared to 65% for the highest. This variation within a scheme may be linked to socio-economic factors and housing types. Low performing routes were found to contain higher numbers of terraced and 4-in-a-block properties whereas high performing ones consisted of more semi-detached and detached properties.

Areas of underperformance should be identified and specifically targeted in an attempt to increase yields from these areas. Over 50% of local authorities employ recycling advisors, who can provide intervention in areas of below average recycling performance within a local authority, with the aim of increasing participation and capture rates, and decreasing contamination rates in these specific areas. The Scottish Government has awarded funding to 12 comparatively under-resourced local authorities for additional waste awareness activity, a significant proportion of which has been spent on the employment and training of recycling advisors. The influence of recycling advisor intervention is being measured by means of before and after surveys, looking at changes in set-out rates, contamination levels and where possible tonnages. Initial results have been encouraging, for example in the case of South Ayrshire Council where the blue bin set-out rate increased from 62% to 70% following intervention by recycling advisors. A SWAG report with further case studies is due to be published in August 2008.

7.1.5 Education and Awareness

The use of targeted education and awareness campaigns can contribute towards optimising the amount of dry recyclate collected by a scheme in the following ways:

- Improved participation and capture rates, i.e. to increase number of households participating and improve capture of different materials
- Minimisation of contamination
- Increased awareness of scheme and improved recognition of materials which can be accepted
- Intervention by recycling advisors to target underperforming areas.

7.2. Non-Kerbside Activities

Further opportunities to improve recycling rates includes the addition or upgrading of recycling centres and points, improved recycling from special uplift services and trade waste recycling schemes.

7.3. Reprocessing Capacity

With local authorities increasing the tonnage of recyclate being captured, it is essential to ensure that adequate reprocessing capacity is available to process this additional material. In terms of individual dry recyclate materials such as paper/card, cans and glass, reprocessing capacity does exist, although often in other

parts of the UK or overseas, particularly in the Far-East. The limited reprocessing capacity in Scotland may increasingly become a problem, particularly with spiralling fuel costs, which has economic implications for long road haulage to reprocessing facilities south of the border.

Reprocessors have expressed concerns about co-mingled collections, in the case of paper as a result of contamination levels, and with glass due to the collection of mixed glass as opposed to colour-segregated collection. This leads to the recycled material being used as aggregate instead of going to higher-value markets.

The recycling of plastics is more problematic, with no post-consumer reprocessing capacity available in Scotland. Plastic bottle reprocessing capacity is available in other parts of the UK, but facilities accepting other forms of plastic are extremely limited, placing constraints on their collection.

Composting capacity for segregated green garden waste exists and but potential problems are likely to arise with the introduction of food waste collections, for which in-vessel composting facilities are required. An estimated 100,000 tonnes of in-vessel capacity exists in Scotland. Although additional capacity is planned, potential delays in accreditation may result in a lack of capacity for local authorities planning to add food waste collections, either as single-stream or co-mingled with existing garden waste collections. This problem needs to be resolved before food waste collection on a wider scale is introduced.

7.4. Contribution of Kerbside Collection Optimisation towards Achieving Recycling Rates Targets

An exercise was undertaken to assess the effects of optimising the performance of kerbside collection recycling schemes on the ability of local authorities to meet future recycling targets. Three different scenarios were analysed, firstly bringing all the schemes below their family group average to that average, secondly bringing all schemes up to the level of the family group highest performer, and thirdly bringing all schemes up to the highest performer overall for dry and organic. Scenarios 2 and 3 were found to meet the 2010 40% target (see Figure 39).

Figure 39: Recycling Rate Predictions

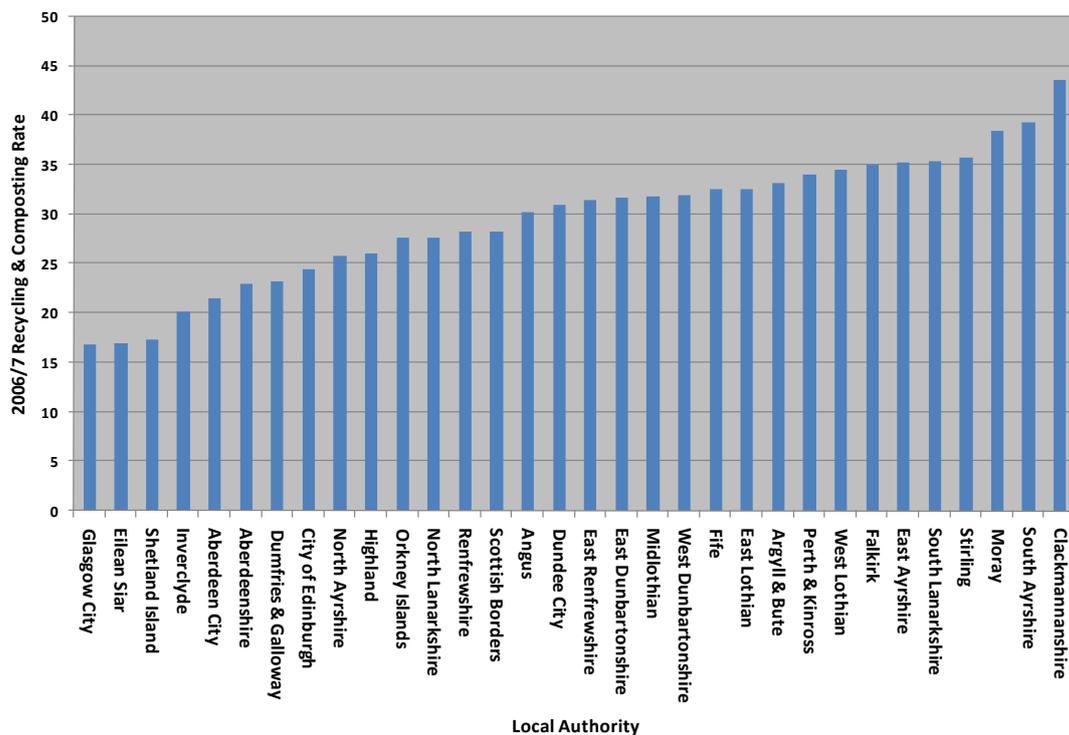
Scenario	Recycling Rate	Add food waste (2 kg/hh/wk)
Bring all dry & garden up to family group average yield	33%	37%
Bring all dry & garden up to family group maximum yield	43%	47%
Bring all dry & garden up to overall maximum yield	46%	51%

Adding food waste collection at an assumed yield of 2 kg/hh/wk to all existing garden waste collections, and bringing all schemes up to the current highest performing yield was the only scenario meeting the 50% target. This illustrates how difficult it will be for local authorities to achieve the 50% target and beyond. This is compounded by the current shortage of reprocessing facilities, for example which for are licensed to compost food waste. Alternative treatment methods are likely to be required to meet future recycling rate and Landfill Directive targets.

7.5. Overall Recycling Rates

In addition to the kerbside collections analysed in this survey, recyclate collected from other sources such as recycling centres and points (civic amenity sites and bring sites) and special uplift services contribute to the overall recycling rate achieved by a local authority. A number of local authorities achieve high recycling rates, despite average kerbside recovery rates, due to relatively high contributions from recycling centres and points. An example is Perth & Kinross, as can be seen in Figure 40. Many rural authorities with low population densities in remote areas, where kerbside collections can be uneconomic, have focused substantial effort and investment in recycling centres and points and reaped the benefits in terms of recycling rate improvements.

Figure 40: Recycling Rates 2006/7 (from LAS data, SEPA)



7.6. Waste Reduction

Recycling and landfill diversion targets are weight based, which encourages the collection of recyclate as opposed to placing emphasis on waste reduction, which is higher up the waste hierarchy. However, with the Scottish Government’s new Zero

Waste Policy, waste prevention and reduction are likely to become key policy drivers. A number of local authorities have already introduced waste reduction measures such as home composting campaigns and real nappy campaigns, and several have dedicated waste minimisation officers. SWAG is also working in partnership with some authorities on waste prevention campaigns, in addition to the Love Food Hate Waste campaign which attempts to reduce the amount of food waste created by householders.

Overall waste MSW arisings increased from 3,415,594 to 3,437,046 tonnes from 2005/6 to 2006/7, an increase of 0.6%. Waste production per household in 2006/7 ranged from 1.17 to 1.69 tonnes per annum; with an average of 1.47 (see Figure 41). This is almost identical to the 2005/6 average of 1.46 tonnes, indicating that on average local authorities have been successful in overcoming growth in waste arisings. 12 authorities report a decrease in waste arisings, providing an indication of the success of waste reduction measures already in place in some local authorities. However, 20 authorities still reported an increase in waste arisings, demonstrating that work is still required in this area. The change in overall MSW arisings varies from an increase of 6.7% in South Ayrshire to a decrease of 11.2% in East Ayrshire, the average being a 0.4% increase (see figure 39). After stabilising waste growth, the next focus will be to reduce waste arisings, a challenge which a number of authorities have already made progress on.

Figure 40: Waste Production per Household by Council 2006/7

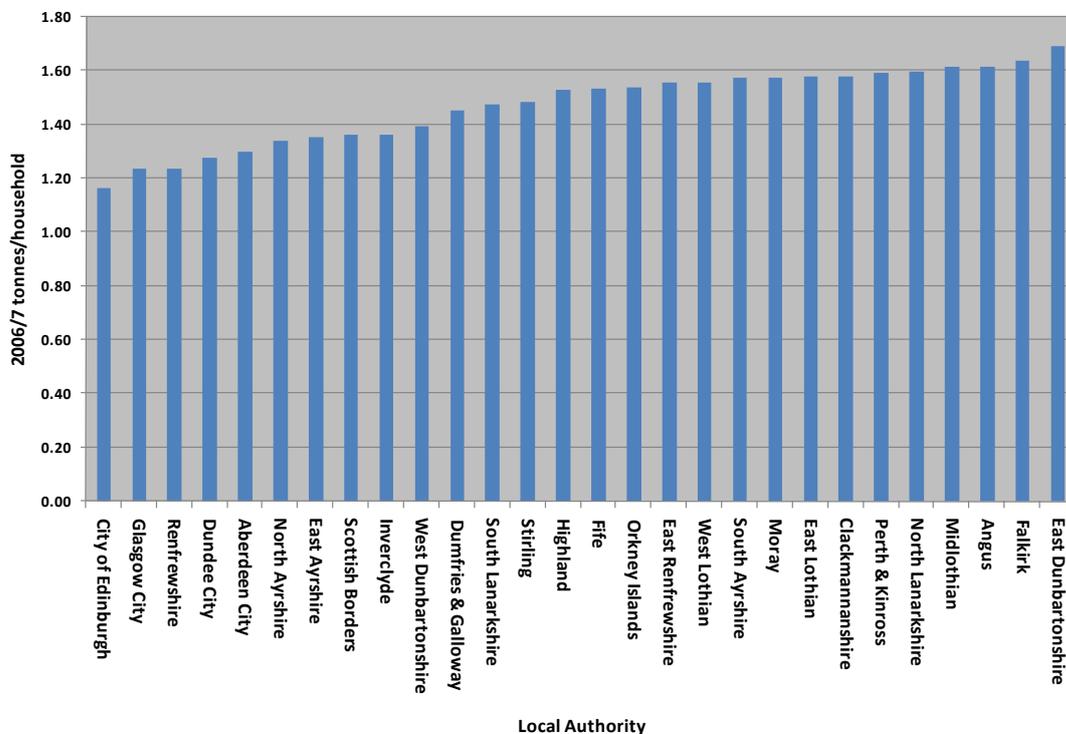
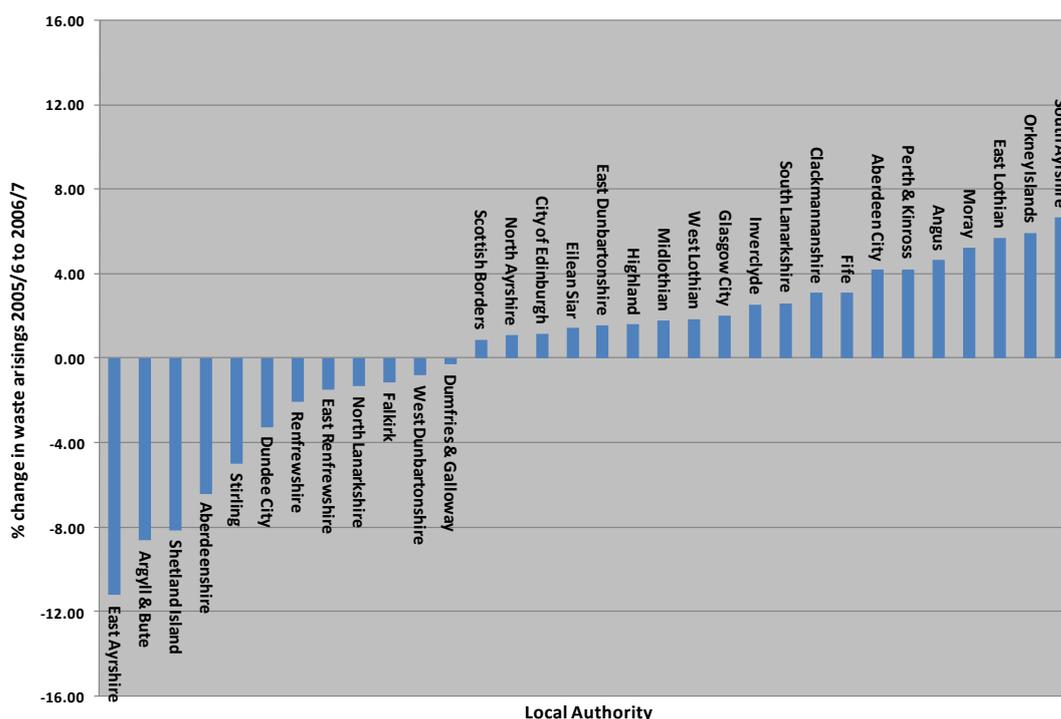


Figure 41: Change in MSW Arisings from 2005/6 to 2006/7



7.7. Reliability of Data

The data provided by local authorities in this survey must be treated with a certain level of caution. The figures given didn't always concur with data from other sources and several changes were made in consultation with the local authorities involved.

On some occasions estimates have been used for the material split in co-mingled collections, where only aggregate tonnage information is provided by the MRF/reprocessor rather than individual material tonnages. A further problem with data is a lack of clarity over whether recycled tonnages provided includes material later rejected due to contamination, or whether this has been subtracted.

In addition to kerbside collection, the survey also requested information on recycling centres and points. However, this data proved to be difficult to analyse due to data gaps, and the difficulties experienced by many local authorities in attributing tonnages between recycling centres and points.

8. Conclusions & Recommendations

32 Scottish local authorities were surveyed, with complete data sets being collected for 28. These 28 local authorities collected a total of 414,164 tonnes of recyclate at the kerbside in 2006/7, with dry recyclate (224,741 tonnes) and garden waste (189,423 tonnes) contributing 54% and 46% respectively.

27 out of 28 local authorities offered a garden waste collection at kerbside, with 76% of households being covered. Lower percentages of households were covered in

urban areas due to the nature of the housing stock, and in rural areas, perhaps a reflection on higher home composting rates in rural areas. Garden waste collection was shown to be seasonal in nature, reflected by the fact that almost 40% of schemes are seasonal in nature, with collection ceasing or reducing in frequency over the winter months. The average recovery rate for garden waste is 2.81 kg/hh/wk.

All 28 local authorities offered a dry recyclate collection, with 84% of households having access to a kerbside collection of at least one material. Paper/card contributed the highest recovery rate within dry recyclate materials, with all authorities offering the collection of paper. The average recovery rate for dry recyclate is 2.30 kg/hh/wk. The principal factors associated with high recovery rates for dry recyclate collection were found to be high frequency of collection, high collection capacity, a wide range of materials collected, and fortnightly collection of residual waste.

Considerable progress has been made by Scottish local authorities from the 2005/6 to 2006/7 survey. Increases in provision of kerbside collections to households along with higher performance of these schemes has helped achieve an increase in the recycling rate of to above 30% for the first time. Optimising kerbside recycling collection can play a significant role in working towards the 2010 and 2013 recycling targets set by the Scottish Government at the beginning of 2008, particularly when combined with the introduction of food waste collections. However, in order to achieve later recycling and landfill diversion targets alternative waste treatment technologies will be required.

This study indicates that a number of factors influence the performance of kerbside recycling schemes. Making changes to schemes in recognition of these factors, where deemed necessary, can significantly increase tonnages collected and contribute to the achievement of early recycling targets. Concentrating on dry recyclate schemes, the following measures are recommended:

- Blue bins should be collected fortnightly
- Boxes and bags should be collected weekly
- Sufficient collection capacity should be provided, generally an equivalent weekly capacity of 70 litres or over maximises yield
- Maximise the range of materials collected
- Collect residual waste fortnightly
- Expand schemes and/or introduce tailored schemes for difficult to reach areas to cover a higher percentage of the population.