

A Recyclate Market Review for Scotland

Report to

The Scottish Government

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1. Introduction

The aim of the Recyclate Market Review for Scotland report is to assess the current recyclate arisings in Scotland and to assess the implications on the markets for each of the key materials for 2007/08. The key aspects to be addressed in this report are:

- Market size – recovery of materials in both the municipal and commercial waste management sectors.
- Market analysis – what is the installed capacity for managing these recovered recyclates, what is the structure of the market?
- Local market issues – what local issues are arising over price, quality etc.?
- Key issues arising – what issues need to be taken into consideration in any further planning or policy setting activities?

2. Findings

The key findings of the review highlighted a commonality among most materials in terms of the key market issues. These are summarised below by material.

| Material | Quality | Prices | Capacity | Competition | Markets |
|----------|---------|--------|----------|-------------|---------|
| Paper | ✓ | ✓ | | ✓ | |
| Plastic | ✓ | ✓ | ✓ | | ✓ |
| Glass | ✓ | ✓ | | ✓ | |
| Metal | | ✓ | | ✓ | |
| Wood | ✓ | | ✓ | ✓ | ✓ |
| Textiles | ✓ | ✓ | ✓ | | ✓ |
| Tyres | | | ✓ | ✓ | |
| Organics | | ✓ | ✓ | ✓ | ✓ |

This commonality between key market issues for materials will act as a guide for future Remade Scotland work – highlighting the five key areas of concern in all market development activity: quality, price, capacity, competition and markets.

3. Suggested Actions

In order to meet the challenges of reaching Scotland's 70% recycling and composting targets by 2025 a number of actions have been developed to overcome any perceived barriers related to the key issues highlighted by our analysis. These suggested actions are summarised below.

| | |
|--------------------|---|
| Quality | There is a requirement for a consistent quality development programme for recovered materials supplied by Scottish local authorities. |
| Prices | More research is required to ascertain the core reasons behind price disparity to ensure that local authorities are receiving comparable prices from the market. |
| Capacity | Further information is required on market capacity. Market capacity will be examined in closer detail for a range of materials in the Remade 2008 programme. A report on <i>Treatment Capacity Requirements</i> will be completed in December 2008. |
| Competition | There is a need to acquire a greater understanding of service provision at a regional level and understand the competition for recovered materials in greater detail. The Remade programme for 2008 will address this issue in the <i>Material Flows</i> project. |
| Markets | Markets for certain materials are still being developed. For core materials market development is based on economic analysis: for materials such as organics and textiles more research on diversification will be required. |

4. Data

The base year for this report is 2005/06 and the following key data sources have been utilised:

- Local Authority Waste Arisings Survey (LAWAS) (2005/06);
- WasteDataFlow (2006);
- Local Authority Surveys and Interviews (2005/06);
- Licensed Site Returns (2006).

In order to provide as complete a picture as possible, on commercial waste and market conditions, data from other sources have been included where applicable. Therefore, in some cases data from other years (including 2007) is quoted. Key data sources of this type were material reprocessor surveys and interviews, as well as material specific reports produced by the Waste Resources Action Programme and Remade Scotland. Prices presented in this report are strictly ex works.

5. The Recovered Paper Market in Scotland: Market Size

5.1. Municipal Waste Stream

Approximately 114,040 tonnes of paper were recovered from the municipal waste stream in 2005/06 with a further 57,936 tonnes arising as a mixed paper and card stream giving a total of 171,976 tonnes.

Kerbside collections from households accounted for 53% (or 91,099 tonnes), with 34% (or 58,083 tonnes) arising from sorting operations at MRFs and a further 13% (or 22,794 tonnes) arising at bring sites.

5.2. Scottish Recovered Paper Market

Data for the recycling of paper in Scottish waste management facilities are collected as a combined paper and card fraction. For the purposes of establishing a market size this data has been included and the figures presented are for paper and card materials sent on for reprocessing and recycling from Scottish waste management facilities. They are inclusive of municipal tonnage figures.

The total recovered paper and card arisings sent for reprocessing in 2006 were 196,709 tonnes with 83,078 tonnes arising as paper and card from the mechanical treatment of waste (European Waste Code (EWC) 19 12 01), 93,130 tonnes arising as municipal and similar wastes (EWC 20 01 01) and 20,441 tonnes arising as paper and card packaging (EWC 15 01 01).

5.3. UK Recovered Paper Market

In 2006 8.2 million tonnes of paper were collected for recovery in the UK. UK recovery has increased 36.8% since 2000 bringing an additional 3.2 million tonnes of recovered paper to the market.

UK mill usage of recovered paper has decreased 19.5% during the same period, with UK paper mills using 800,000 tonnes less per year. This decrease is accounted for by an increase in the export of recovered paper.

6. The Recovered Paper Market in Scotland: Market Analysis

6.1. Reprocessing Capacity

In 2006 the UK consumed 2,686,090 tonnes of newsprint. 61% of demand was met with imports. Currently three mills in the UK produce recycled newsprint:

- Abitibi Consolidated has 220,000 tonnes of annual capacity;
- UPM Kymmene has 500,000 tonnes of annual capacity; and
- Aylesford Newsprint has 400,000 tonnes of annual capacity.

The total combined capacity for the reprocessing of News and PAMS to newsprint in the UK is therefore approximately 1,120,000 tonnes per annum. However, due to imports the total capacity is not currently utilised.

At present there is no direct reprocessing capacity in Scotland for recovered paper. Following the loss of capacity at BPB Paperboard and Smith Anderson, Scotland is now entirely reliant on supply routes either via merchants, exporters or direct to UK mills.

6.2. UK Capacity Growth

The large volumes of newsprint imported into the UK combined with an increasing domestic supply of raw material are creating an obvious incentive to establish more newsprint manufacturing capacity within the UK. Reportedly, those incentives are materialising in proposals for new newsprint manufacturing capacity.

In May 2007, the German-owned Palm Group announced plans to invest £330 million in a newsprint mill in Kings Lynn, Norfolk. If it receives planning permission the site will be able to produce 400,000 tonnes of recycled newsprint per year. The firm hopes the mill will be operating by summer 2009.

Aylesford, meanwhile, is considering whether to invest in a new line for its Kent site. If it goes ahead, the machine could increase production by 200,000 tonnes a year. It is not clear whether this increase would include the closure of the older of its two existing lines, which has an annual capacity of 90,000 tonnes.

Ecco Newsprint announced plans in 2007 to build a new recycled newsprint mill at Wilton on Teesside with an annual capacity of more than 400,000 tonnes. The company already has planning permission for the plant, which is expected to come on stream in the first quarter of 2009.

Together these projects could increase the UK newsprint recycling capacity by circa 1,000,000 tonnes. It is not certain however, how much of this capacity will be constructed in the present economic climate.

6.3. Scottish Private Market Segmentation and Structure

The recovered paper market has four main segments, collection and supply of materials, mills, merchants and exporters with a single entity occasionally operating in a number of functions.

Collection and Supply in Scotland

In terms of collection and supply of paper and card the market has been analysed in terms of collection and/or supply of paper and card from packaging sources, mechanical treatment, and municipal and similar materials.

- For paper and card materials arising from packaging sources Lowmac Alloys (21%) and William Tracey (39%) have a significant market share.

- For paper and card materials arising from the mechanical treatment of waste Biffa (68%) and William Tracy (18%) has a significant market share.
- For paper and card materials arising from municipal and similar sources Viridor Enviroscot (18%) and Lowmac Alloys (7.5%) have a significant market share.
- The market leaders in collection and supply of waste paper and card to merchants and mills (outwith Local Authorities) are Biffa, William Tracey, Viridor Enviroscot and Lowmac Alloys.

Mills

The paper reprocessing market is dominated by News and PAMS and therefore by the three large newsprint mills: Aylesford, UPM Kymmene (Shotton) and Abitibi Consolidated (Bridgewater). In terms of access to the Scottish market, geography dictates that there is an oligopoly with only UPM and Abitibi within acceptable haulage distance.

Merchants

There are a number of paper merchants operating in the UK. There are fewer paper merchants operating in Scotland with only Biffa Waste Services and Stirling Fibre operating as independent merchants, whilst Smurfit Kappa and Severnside both act as integrated “merchant to reprocessing” operations.

In terms of recovered paper Stirling Fibre is the clear market leader with supply relationships to both major mills and the export market through its co-ownership of Fibre Brokers International.

Exporters

Exports occur from the mainland to Europe, United States or more commonly to the Far East. In order to export directly to China the exporter must be registered with the General Administration of Quality Supervision, Inspection and Quarantine of China (AQSIQ). In order to fulfil the requirements of the AQSIQ Regulations overseas suppliers, such as those in the UK are required to submit documentation along with an application form, prior to approval. This includes information on the organisation, promises to obey technical regulations, proof of categorisation and environmental quality of the materials exported, quality and environmental management systems, obligations to the cargo’s environmental quality control etc.

After AQSIQ issues the "Receipt Notice of Overseas Suppliers of Waste Materials Import Registration Application", auditors evaluate the supplier including a document evaluation and on-site evaluation. In addition, the capability of the exporter to ensure that materials conform to Chinese environmental protection control standards and regulations will also be measured and evaluated.

At present there is only one exporter in Scotland registered with AQSIQ – Fibre Brokers International.

6.4. Recovered Paper Exports

In 2007 exports to China grew from 46% to 49%, consolidating its role as the main source of demand for recovered paper in global markets. European demand remains stable despite mill closures in Europe removing 2.5 million tonnes of capacity. Although some countries have increased their market share (i.e. The Netherlands displayed a 13% increase in demand) the overall tonnage exported to Europe is similar to 2006.

Export market prices remain buoyant with recovered paper prices rising due to this increased demand from emerging economies, especially China. Nevertheless trade has been marginally affected by the increase in freight transport costs. The Far Eastern Freight Conference (FEFC), an organisation grouping 16 of the biggest shipping lines, recently agreed an increase on tariffs. This price increase applies to shipping lines trading with the Far East, the main destination of UK paper exports. The FEFC has stated that the introduction of higher surcharges is mainly due to the level of congestion in Britain's ports and a shortage of containers. This recent price increase also comes on top of other surcharges.

WRAP estimates that "the price of ocean freight has increased by more than 50 per cent since the beginning of the year. This is equivalent to an increase of about £6 per tonne, of which the tariff increase accounts for about £2.50"

7. The Recovered Paper Market in Scotland: Local Market Issues

7.1. Prices

For Scotland's Local Authorities to negotiate any improvements to the price they receive for recovered paper, they would require one of two scenarios to occur.

Either:

- Recovery of a quantity of recyclates that would allow a price shift in the marketplace through contraction and extension of supply;
- Higher revenue is realised through achievement and surpassing of quality determinants.

It is an unfortunate by-product of Scotland's demography and geography - that in terms of recycling economics - we are a "price taker" as opposed to a "price maker" in the marketplace. The output of paper into the marketplace is comparatively small so that any changes in supply are unlikely to have any effect on the market equilibrium price.

UK market prices have, for the most part, been stable for the last five - seven year period with minimal fluctuations emphasising both the ongoing maturity of the market, and a consistently buoyant price for virgin pulp. Average prices at June 2007 ranged from £40 to £60 for mixed paper and from £60 to £70 for News and PAMS (WRAP, 2007).

Analysis of a recent survey undertaken by Remade Scotland however, shows that the range of prices attained by Scottish Local Authorities was between £15 to £28 for News and PAMS, £4 to £39 for mixed paper, and £15 to £30 for mixed paper and card.

As such, whilst it would appear that prices in the paper market at a UK level are stable, relative pricing among Scottish Local Authorities is still subject to great variability, between authorities and between grades, and still appears to be lower than the UK average.

7.2. Quality

Whether it is for the purposes of achieving best possible price to ensure financial returns or to enhance material acceptability and stimulate increased utilisation – the benefits of “quality management” of recovered materials have been recognised since the introduction of our National Waste Plan. As the importance of quality has moved further up the recycling agenda, the key issue has been what constitutes “quality” for each recovered material, what the specifications are, and how are they tested, met and managed.

To date the principal approach to quality of recovered materials has been the development of new publicly available specifications (PAS), delivered by WRAP and BSI, in partnership with relevant stakeholders.

In a recent Remade Scotland survey respondents were asked whether they are required to meet any particular quality specification for their recovered paper. Notably there was no response from any participant in relation to this question.

Quality of recovered paper continues to be a significant issue for a number of reasons:

- There still appears to be little relationship between achieving a quality specification and price obtained;
- There is still no solid data to affirm the difference in quality between source segregated and mechanically sorted paper;
- There is still no affirmation of an “industry standard” for recovered paper adopted by Confederation of Paper Industries (CPI) or any of its members.

To date, the only mill in the UK that has made its required quality specification publicly available is Aylesford in Kent. This specification makes it clear to all suppliers of the maximum level of tolerances for specific contaminants. Details are given in the table below.

Development of these publicly available quality specifications from mills to suppliers is crucial for ensuring that supplies continue to meet the needs of the end users – particularly where a growing base of supply is enforced by legislation rather than hard economics.

| Material | Tolerance Limit | Reason |
|---------------------------|-----------------|--|
| Food | 0% | Have the same effect as moisture plus the addition of fats and proteins which stain the fibres. We do not do anything chemically strong enough to lift the stains |
| Burnt Materials | 0% | This contaminates the water in the pulpers and stains fibres. Fragments of black can also find their way on to our finished product |
| Glass | 0% | Has the same effect as non-paper items with the addition that it is hard to filter out and has an extremely abrasive effect as it goes through our systems |
| Brown Paper/Card | 1% | We manufacture white paper. We do not do anything chemically strong enough to turn brown fibres white |
| Paper older than 3 months | 1% | After 3 months it becomes more difficult to lift ink from newspaper which can result in a reduction in the brightness of our product |
| Treated Paper | 1% | These either prevent us from being able to pulp up the paper or introduce disproportional amounts of contamination compared to the useable fibre received |
| Non Paper Items | 1% | They reduce the value we get from the load of material we receive and we then have to dispose of them |
| Wet Paper | 10% - 25% | Moisture is heavy and reduces the value we get from the load. It also causes fibres to rot, reducing their strength and adversely affects the chemistry in the recycling plant |
| General | <1% | The sum of all contamination exceeding 1% could lead to a load being rejected |

8. Key Issues Arising in the Recovered Paper Market

8.1. Prices

There continues to be some disparity between the prices obtained for similar grades between Local Authorities – in the case of News and PAMS this is as much as 46% and for mixed papers as much as 90% difference for the same “grade” being supplied. It is clear that there may be issues of quality, service costing, or rebate provision that can skew these figures.

More research is required to ascertain the core reasons behind this disparity to ensure that local authorities are receiving comparable prices from the market.

8.2. Quality

There is still no consistent programme of quality management of paper and card recycle in the Scottish public sector. Given Scotland's position in the market, and the UK's position as a marginal supplier in the global market, this continues to be of concern. In order to maintain confidence and demand for paper supplies either price or quality must be the dominant variant. As Local Authorities require strong revenues to maintain collection systems – Scotland's position as a supplier must be based on achieving high quality specifications to ensure demand.

If it is unlikely those mills in the UK are willing to adopt a single specification then it is likely that the most positive step that can be taken to ensure a consistent supply of "mill ready" material is to adopt a supply led specification.

It is therefore suggested that there is a requirement for a consistent quality development programme for recovered paper supplied by Scottish Local Authorities.

8.3. Market

The marketplace in Scotland does appear to be small in comparison with the rest of the UK, with fewer players, less infrastructure and a greater propensity towards regionalised monopolies. It is unknown at present what effect this is having on new entrants into the marketplace, or the development of greater regional competition for services.

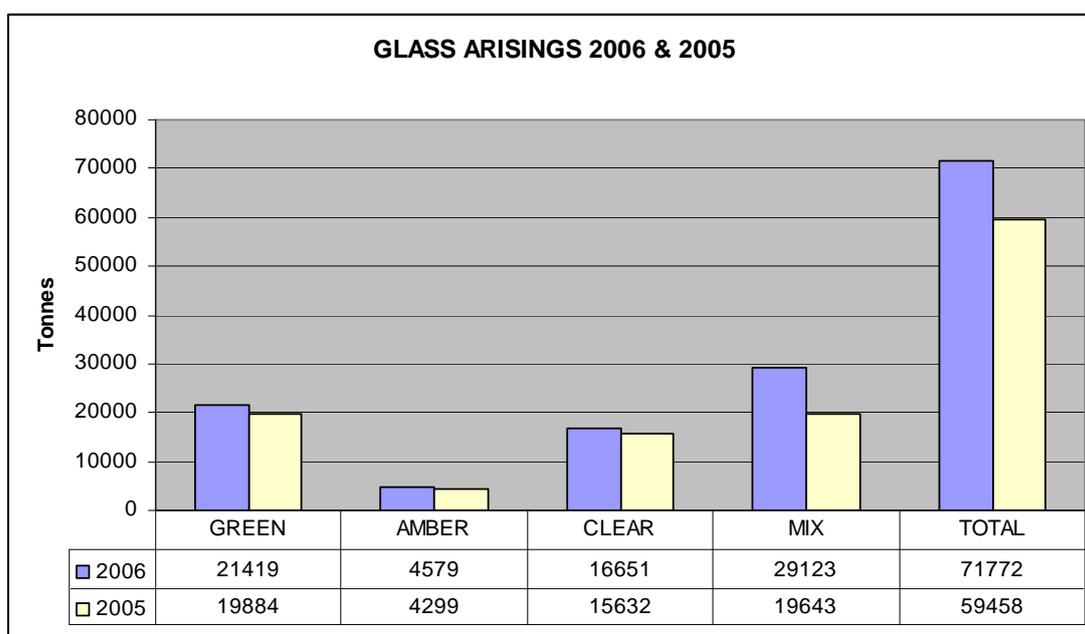
It is suggested that there is a need to acquire a greater understanding of service provision at a regional level and understand the market flows for recovered paper in greater detail.

9. The Recovered Glass Market in Scotland: Market Size

9.1. Municipal Waste Stream

71,772 tonnes of glass were collected by Scottish Local Authorities in 2005/06. This was a 17.2% increase from 2004/05. The breakdown by glass type is given in the figure below. The data was obtained from LAWAS and manipulated using the following assumptions:

- Source segregated glass: 49% green glass, 40% clear glass and 11% amber;
- Source segregated glass includes 100% of Local Authority bring sites and source segregated Local Authority kerbside schemes;
- Mixed glass includes 100% of Local Authority commercial glass collection and 100% of Local Authority co-mingled glass collections.



In 2005/06 green glass collection rose by 7.2%, and amber and clear by 6.2%. On average collection of colour segregated glass grew by 6.5% whereas mixed glass collection increased by 32.6%.

This shift from source segregation to mixed collections is helping Local Authorities to keep increasing the capture rate of glass. However, the market price and security of outlet for mixed glass is lower than for colour segregated glass.

Scotland is increasing its collection rate faster than the rest of UK. In 2005/06 overall collection in Scotland was 17.2% higher than the previous year, whereas the rest of UK increased collection by 4.6%. Scotland's greater level of improvement over the rest of the UK during this period is partly due to an increase in kerbside schemes introduced by Local Authorities supported by funding from the Scottish Government. More new kerbside schemes were introduced in Scotland than in England during 2005/06.

9.2. Scottish and UK Recovered Glass Market

Overall 71,772 tonnes were collected in Scotland by Local Authorities with an additional 148,054 tonnes handled by packaging waste accredited reprocessors, bringing the potential total collected in Scotland to 219,826 tonnes. In the UK 1,320,000 million tonnes of cullet were collected for recycling in 2006 with Scottish collection therefore accounting for circa 17%.

10. The Recovered Glass Market: Market Analysis

10.1. Reprocessing Capacity

In 2006 UK glass container production was circa 2.1 million tonnes, with a further 1.2 million tonnes used in flat glass, glass wool and other product manufacture applications.

Around 1.31 million tonnes of glass was recycled in 2006, with circa 750,000 tonnes utilised in the glass container remelt industry. The table below shows the breakdown of recovered cullet use.

| | Green (tonnes) | Amber (tonnes) | Clear (tonnes) | TOTAL |
|-------------------------------|----------------|----------------|----------------|-----------|
| UK Glass container production | 408,814 | 374,943 | 1,313,422 | 2,097,179 |
| UK cullet recycled | 337,748 | 80,026 | 334,072 | 751,846 |

In the UK, demand for source separated cullet outstrips supply. Spare recycling capacity is outlined in the table below. Closed loop recycling achieving maximum recycling content would use an additional 460,268 tonnes of recycled glass in the UK per annum.

| Cullet | Potential Spare Recycling Capacity (tonnes) |
|--------------|---|
| Green | 30,184 |
| Amber | 107,445 |
| Clear | 322,639 |
| Total | 460,268 |

The British Glass Manufacturers' Confederation (BGMC) reported that annual growth of closed loop glass recycling slowed from 10% in 2005 to 1.8% in 2006. The organisation indicates that the reduced growth rate is, in part, a result of a reduction in the quality of materials being returned to the industry. This also explains 65,000 tonnes of cullet imports to the UK, as glass remelters struggle to source high quality cullet from the UK market.

Mixed glass can not be used for closed loop recycling so alternative, open loop markets have to be identified for this material. It is important to ensure that supply of mixed glass from Local Authorities' collection does not outpace demand from emerging applications. A number of companies commercialising alternative applications of glass have been identified in Scotland (Remade, 2006). These companies and applications are outlined in the table below.

| Company | Product | Description |
|------------------------|-------------|--|
| Brand & Rae, Fife | Block | Brand and Rae are a building products manufacturer. The company has utilised funds made available by the WRAP programme to increase the amount of recovered glass in its ready made concrete blocks to around 30%. The process, which can utilise mixed cullet, has the capacity to utilise up to 17,000 tonnes of cullet to make around 1.2 million blocks per annum. |
| Superglass, Stirling | Glass Wool | Manufacturer and supplier of glass wool insulation. The processes can utilise either post consumer container cullet, or flat glass – although at present it is predominantly clear cullet. The processing facility has made investments to ensure that it can supply products with up to 80% recycled glass content. Superglass uses around 40,000 tonnes of recovered cullet every year. |
| Allglass, Renfrewshire | Glass Beads | Allglass is the brand name for the glass reprocessing business operated by William Tracey Limited. The business provides three main products; quality clear cullet is processed into glass beads for the purposes of road workings and plastics fillers – and glass grains for water filtration. The glass beads provide the highest value to the company, albeit this is linked to a high specification for manufacture. Mixed cullet is utilised for supply into the concrete industry. |
| Dryden Aqua, Edinburgh | Filtration | Produce a product called Advanced Filtration Media (AFM), which is highly processed green and amber glass. Clear glass cannot be used due to the way it breaks down when processed. Trials are being undertaken with Scottish Water comparing their conventional filtration media to the AFM. Scottish Water hope that if the trials go well then by using AFM it will help reduce their dependency on coagulants / flocculants such as aluminium sulphate, which is one of their main costs. Dryden Aqua have now received funding from Scottish Water, the Waste and Resources Action Programme (WRAP), the Shanks First Fund, Viridor Credits and Midlothian Council to help develop the market and gain accreditation from the Drinking Water Inspectorate in order to use this media in potable water applications. |

It has not been possible to obtain accurate data about glass cullet tonnages currently used on each application by each company. However, estimates of market size are given in the table below.

| Alternative Markets (green and mixed colour) | Potential Market Tonnage |
|--|--------------------------|
| Fibre Glass | 12,000 |
| Abrasives | 3,000 |
| Filtration | 9,000 |
| Bricks | 17,000 |
| Sports Turf | 4,000 |
| Aggregates - Concrete | 5,000 |
| Aggregates - Other | 20,000 |
| TOTAL | 70,000 |

10.2. Scottish Private Market Segmentation and Growth

The increase in mixed glass collection requires further attention to be focused on alternative markets. There is potential for promoting these markets through sustainable procurement policies, especially in construction. There is now a requirement by Scottish Government that public sector construction projects over £1 million should include at least 10 per cent recycled or re-used material. The Scottish Government in particular could further boost demand for recycled products by extending this target.

In addition, bulky and heavy construction materials (for instance bricks and aggregates) are generally only transported short distances to prevent prohibitive transport costs. Therefore, a requirement for construction materials with recycled content within procurement contracts will help boost local Scottish manufacturers.

It is expected that demand for alternative applications will evolve differently. For instance, WRAP estimates that cullet used in the manufacturing of fibreglass will double by 2015.

Security of outlet may be a rising risk as more recycled glass material becomes available. This especially applies to mixed glass as this material does not have established markets.

10.3. Recovered Glass Exports

Due to different patterns of consumption and production in the UK, discussed in the section below, there is a trend to export a clear cullet glass in the largest quantities and import green cullet glass. The import and export market reflects these patterns of demand. The export market is a rising outlet for segregated recycled glass with a 130% increase since 2003; these exports were mostly green cullet.

However, while expanding, this is still a small outlet with a market share of 11%, just over 200,000 tonnes in 2006. In addition, exports are partly offset by imports of segregated cullet, mostly of clear glass, of 65,000 tonnes in 2006.

11. The Recovered Glass Market in Scotland: Local Market Issues

11.1. Material Mass Balance

The increase in mixed glass recycling is having an effect on annual growth in closed loop (bottle to bottle) glass recycling, which slowed from a 10% increase in 2005 to 1.8% in 2006. Technically, the UK remelt market can still absorb a further 460,268 tonnes of cullet, as long as it has the required quality.

The different patterns of consumption and production in the UK creates a colour split in the waste stream that is not in balance with the colour split demanded by the glass manufacturing industry. The table below illustrates the differences.

| Glass Type | Glass Collected in the UK | Glass Produced in the UK |
|------------|---------------------------|--------------------------|
| Green | 45% | 19% |
| Amber | 11% | 18% |
| Clear | 44% | 63% |

The colour imbalance is largely a result of spirits (mostly whisky) being the main UK manufacturing product. Therefore, there is a strong demand for clear cullet in the UK. On the other hand, consumption of wines is high in the UK so green cullet is the most prevalent in the waste stream. As most bottled wines are imported from abroad the associated green bottles are usually also manufactured outside the UK. This imbalance between supply and demand has an effect on prices (as demand for clear and amber cullet outstrips supply) but also on the achievable recycling content of manufactured bottles for each colour.

However, recycling content is most influenced by the fact that green glass manufacture has a greater tolerance for colour impurity than either amber or clear glass. In principle, green bottles can contain up to 90% cullet, whilst clear and amber containers can have up to 50% (WRAP, 2007). Glass furnaces actively seek to incorporate recycled glass due to benefits including reduced energy use, fewer emissions and longer lifespan of furnaces (British Glass, 2007). Therefore, the fact that recycled content is not reaching these levels is mainly due to availability of recycled cullet of the appropriate quality (British Glass, 2006).

12. Key Issues Arising in the Recovered Glass Market

12.1. Quality

Closed loop recycling is preferable and there is currently a greater demand than supply for the use of colour segregated glass cullet in glass manufacture. In addition,

this is a secure market that brings clear environmental benefits. However, the trend towards greater mixed glass collection means there is a decrease in the availability of colour segregated glass cullet of suitable quality. Local authorities should consider these market implications when introducing new collection schemes.

12.2. Market

Mixed glass recycling is increasing as Local Authorities seek to increase capture rates for glass. However while the markets available for mixed glass cullet are developing they are less secure than for colour segregated glass in closed loop recycling. Since the majority of alternative applications for glass are construction based, the focus should be on promoting the use of these materials through sustainable procurement practices.

13. The Recovered Plastics Market in Scotland: Market Size

13.1. Municipal Waste Stream

Approximately 8,201 tonnes of plastic were recovered from the municipal waste stream in 2005/06.

Plastic film accounted for 0.3% (or 25 tonnes), dense plastics 19.2% (or 1,575 tonnes) whilst mixed plastics, presumed to be largely mixed bottle plastics, provided the vast majority of recovered plastics 80.5% (or 6,602 tonnes).

The vast majority of recovered plastics (68.9%) were recovered from MRF operations; with 19.7% recovered from kerbside collections and 11.4% from bring sites.

13.2. Scottish Recovered Plastics Market

Data for the recycling of plastic in Scottish waste management facilities is collected under eight main EWC categories, these are:

- Waste Plastics from Agriculture, Horticulture etc. (02 01 04);
- Waste Plastics from manufacture, formulation, supply and use (MFSU) (07 02 13);
- Plastic Shavings (12 01 05);
- Plastic Packaging (15 01 02);
- ELV Plastics (16 01 19);
- Construction Plastics (17 02 03);
- Plastics from Mechanical Treatment of Waste (19 12 04); and
- Municipal and Similar Commercial/Industrial Plastics (20 01 39).

Overall in 2006 segregated consignments of plastics entering waste management facilities was 26,246 tonnes. The vast majority of plastics were delivered as municipal or similar (47.1%), with 24.2% delivered as plastic packaging and 20% of plastic waste being MFSU production waste, largely emulsions and wastes destined for landfill.

It is notable that a significant proportion of this tonnage managed in Scottish waste management facilities (14,734 tonnes) is plastic wastes from industrial processes – a combination of plastic by product sludges, emulsions and solid off cuts. As such the level of post consumer plastics wastes recycling is lower than first estimated.

13.3. UK Recovered Plastics Market

The UK market size for recovered plastics can be broken down into various segments. Municipal recovered plastics in the UK which consist of mostly mixed plastic bottle were circa 110,000 tonnes for 2005/06. England accounted for circa 77% of this tonnage with Scotland, Northern Ireland and Wales accounting for 7-8% each. As such England dominates the municipal recovery of plastics.

Recovery of ELV plastics was circa 35,000 tonnes, with around 75,000 tonnes of WEEE plastics also recovered at UK level. UK recovery of plastic packaging accounted for through the PRN/PERN system was circa 456,000 tonnes according to data from the National Packaging Waste Database for 2006 of which only 36% was reprocessed in the UK.

14. The Recovered Plastics Market in Scotland: Market Analysis

14.1. Reprocessing Capacity

UK Reprocessing Capacity

There is a reported 500,000 tonnes of post consumer plastic reprocessing capacity in the UK. The most significant development recently, however, is the development of food grade production facilities in the UK.

The largest development planned for 2008 will be the Alternative Waste Solutions facility in Lincolnshire, increasing capacity from 20,000 tonnes per annum to circa 100,000 tonnes per annum for mixed post consumer bottles. The facility will be able to produce food grade HDPE and PET pellets to the food grade market and PET flake to the thermoforming market.

The first food grade project to come on stream however is Closed Loop London. The facility will have a capacity of circa 35,000 tonnes per annum for mixed plastic bottles and will produce HDPE and PET pellet to the food grade market.

Baylis Recycling has doubled capacity to 30,000 tonnes of sorting capacity following the development of two new sorting facilities in Norfolk and Northampton. A similar sized facility operated by Intercontinental Recycling opened in October last year and can process 30,000 tonnes per annum of mixed bottle plastics. The facility will initially create a PET flake and an HDPE pellet for the plastic sheeting and piping markets before focussing in the long term on the food grade market.

These developments alone are likely to add at least circa 160,000 tonnes of new reprocessing capacity to the UK – with at least 115,000 tonnes of this new capacity focussing on food grade product. It is also anticipated that there will be further developments as market leaders such as Linpac respond to further market demand.

It is clear from these developments that there is a perception of increased demand for food grade PET (rPET) and HDPE – indeed both Innocent Drinks and GlaxoSmithKline have both highlighted shortfalls in UK supplies of rPET as they seek to move to a 100% recycled product.

Scottish Reprocessing Capacity

There is little reprocessing capacity available in Scotland for the full reprocessing of waste plastics, and specifically no capacity for the full product recycling of post consumer municipal waste plastics.

There is existing capacity for reprocessing at British Polythene Industries but this is predominantly for a PE film material stream that is not presently collected from the municipal waste stream. Similarly there is excellent capacity for niche material such as farm plastics with Solway Recycling.

There is reprocessing capacity of circa 15,000 tonnes per annum at Plastics Technology Services in Dumfries, but this is for plastic industry wastes, and cannot process post consumer wastes due to the lack of any hot wash and sanitisation facilities.

As such there is a distinct lack of reprocessing facilities available to Scottish waste managers and Local Authorities, requiring haulage and transfer to facilities in England or the export of materials to the EU and Asia.

14.2. Scottish Private Market Segmentation and Structure

The UK recovered plastics market has four main segments, collection and supply of materials, merchants, reprocessors and exporters with a single entity occasionally operating in a number of functions.

Collection and Supply

In terms of collection and supply of plastic wastes, Scottish supplies are dominated by the collection activities of Local Authorities – supplying in excess of 8,000 tonnes to the marketplace in 2006 and over 12,000 tonnes in 2007.

Nevertheless, there are a number of companies who both participate in this process, and also supplement these supplies with their own commercial activities. From licensed site return statistics the Scottish market leaders in the supply of plastic wastes are:

- Oran Waste Services (plastic packaging);
- William Tracey Limited (plastic packaging);
- Lowmac Alloys (municipal and similar plastics);
- Biffa Waste Services (construction plastics);
- Stirling Fibre (municipal and similar plastics).

Reprocessors

There is no market leader for the reprocessing of municipal and similar post consumer wastes in Scotland, as capacity does not exist for this activity. Specifically

Scotland has no hot wash or sanitisation facilities that could process materials to an acceptable industry standard.

In terms of other niche processing activities, this is clearly dominated by Plastic Technology Services in Dumfries, processing industrial plastic wastes – and British Polythene Industries in Port Glasgow, reprocessing the polyethylene waste stream.

14.3. Recovered Plastics Exports

Exporters of plastic wastes are held under two separate databases – the National Packaging Waste Database (NPWD) and the AQSIQ Compliance Register.

Those companies in Scotland who are held under the NPWD are accountable for packaging waste only, and are accredited to issue Packaging Export Recovery Notes (PERN's). These companies may export to the EU, North America and Asia, excluding China unless they have an AQSIQ registration.

The only company presently authorised to issue PERN's in Scotland is Solway Recycling in Dumfries.

AQSIQ registered companies can supply directly to China, and may be able to supply to other destinations also. As at December 2007 Scottish plastic exporters registered with AQSIQ are limited at present to just one entry – Polymers Trading International based in Elgin.

Plastics exports have grown almost nine fold from 2000 – 2006. Exports of plastics in 2006 were reported as circa 450,000 – of this 290,623 tonnes were captured in the PERN packaging reporting system. The majority of plastics exports (80% - 90%) are destined for China, either directly or through the trade gateway of Hong Kong. Specific data for Scotland is not available at present but it is anticipated that recovery of data on exports from Scotland to the EU and Asia will be possible through analysis of the new Annex VII forms that must accompany all Transfrontier Shipments of Waste.

15. The Recovered Plastics Market in Scotland: Local Market Issues

15.1. Prices

Prices in the waste plastics market are essentially driven by the relationship between domestic supply and the demand of the domestic and export markets.

The results of a recent Remade Scotland survey indicated that there was a significant range of revenues generated by Scottish Local Authorities for mixed bottles plastics, between a low of £38 per tonne and a high of £155 per tonne.

The low price is fairly consistent with the average price for mixed plastics (Audit Scotland, 2007) of £38.30, but still some way short of the reported UK average trade figures in journals such as Materials Recycling Weekly (£55 - £70) and Letsrecycle.com (£90 - £140).

To this end it is clear that prices received in Scotland by Local Authorities are, in some cases, still significantly below those achieved elsewhere in the UK market place.

15.2. Quality

Domestic Quality

The quality of recovered plastics supplied to the marketplace will determine the long term security of both prices and consumer demand. To support the recovery of quality polymers WRAP had developed the Publicly Available Specification PAS 103 in 2005.

PAS 103 is a classification and grading system for recycling waste plastics packaging materials which aimed to increase the value of the materials in the market.

The interface for the specification is set between collection and trading operations and the waste plastics processing stages and ancillary processes. The classification system, which is carried out by visual inspection, involves:

- The initial recording of the batches and their source and other details;
- The specification of the quality of the waste and its grading (original application, polymer types, main colour, contaminants);
- The classification of the original or intended application (bottles, bags, films).

PAS 103 also covers test methods and good practice in the collection, storage and delivery of waste plastics packaging. The classification and grading is carried out by a visual assessment of each batch of waste plastics. Initially, details of the batch are recorded, including:

- The source and batch identification;
- The net weight of the batch;
- The form of the batch (e.g. baled, bagged);
- The number of units (e.g. bales or bags) in the batch;
- The form of the waste plastics (e.g. original product, flaked, granulate, shredded, crumbed or reel);
- Whether the waste is pre-consumer or post-consumer;
- The weight, dimensions and density of the bales or bags;
- Whether it is obligated packaging.

The quality of the waste is then specified, and the waste graded, according to the following categories:

- Main original application of the waste;
- Main polymer type(s) present;
- Main colour;
- Contaminants.

In each category the type and percentage by weight is assessed visually and reported. The surface water content and any additional information on the batch of waste may also be provided.

Subsequently, research by WRAP and DEFRA, as part of the Waste Protocols programme of work, on the manufacture of secondary raw materials from waste non packaging plastics highlighted the development of draft European standards for various recovered polymers. These are set out in the table below.

| Code | Description |
|----------------|--|
| prEN 15342 | Plastics – Recycled Plastics – Characterisation of polystyrene (PS) recyclates |
| prEN 15343 | Plastics – Recycled Plastics – recycling traceability and assessment of conformity |
| prEN 15344 | Plastics – Recycled Plastics – Characterisation of Polyethylene (PE) recyclates |
| prEN 15345 | Plastics – Recycled Plastics – Characterisation of polypropylene (PP) recyclates |
| prEN 15346 | Plastics – Recycled Plastics – Characterisation of poly(vinyl chloride) (PVC) recyclates |
| prEN 15347 | Plastics – Recycled Plastics – Characterisation of waste plastics |
| prEN 15348 | Plastics – Recycled Plastics – Characterisation of poly (ethylene terephthalate) (PET) recyclates |
| prCEN/TR 15353 | Plastics – Recycled Plastics – Guidelines for the development of standards relating to recycled plastics |

The Waste Protocols work has two key aims related to quality and market acceptability:

- To produce a Quality Protocol which clearly sets out the steps that must be taken for the waste to become a non-waste product or material that can be either reused by business or industry, or supplied into other markets, enabling recovered products to be used without the need for waste regulation controls;

- To produce a regulatory position statement; which clearly informs the business community of what regulatory obligations they must comply with to use the processed waste material.

The research concluded that a Quality Protocol is drafted for manufacture of secondary raw materials from waste non packaging plastics stating the point at which this waste ceases to be a waste and can be considered as a secondary raw material.

Specifically the technical advisory group (TAG) concluded that the Quality Protocol should state that this waste ceases to be a waste when it can be demonstrated that the material:

- Has been sold to a third party for an identified productive use;
- Has conformed with an appropriate specification agreed between seller and buyer; or
- Has been delivered with a SDS that follows the approach set out in REACH and includes information on appropriate end use applications.

In addition, it was suggested that the Quality Protocol should state that:

- If a pellet is necessary for non-packaging plastic waste to reach the end user specification then it will not cease to be waste until it has been through that additional melt process;
- If the end user can use chip in their end product, then non-packaging plastic waste can cease to be waste at the point where the chip is sold and dispatched to an appropriate end user;
- Supply documentation should be provided to the customer and retained to demonstrate certainty of use;
- Compliance with the Quality Protocol is voluntary, and if the Quality Protocol is not adopted, regulatory controls will still apply to the waste handled, transferred or used;
- Other record keeping recommended within this report is voluntary but processors must be aware that end users may request certificates of conformity or analysis.

Consultations on this Waste Protocols work ended in March 2008, if successful this appears certain to enhance the knowledge base of what quality of material are required by the market. This protocol however, will only apply in England and Wales.

Export Quality

In 2004 a new accreditation scheme for companies exporting recovered waste materials to China was introduced requiring foreign waste material suppliers to register with the General Administration of Quality Supervision, Inspection and Quarantine of China (AQSIQ). Companies looking to export waste to China apply to AQSIQ giving various details of their business, systems, environmental quality standards, suppliers etc. Under Chinese Solid Wastes Law, AQSIQ is free to revoke the import licenses of exporters that have had cargoes shipped back on environmental grounds twice within any twelve month period.

At the time of writing there were only three Scottish companies accredited on the AQSIQ Listings, RM Easdale (mainly copper and other metals), Fibre Brokers International (mainly paper and board) and Polymers Trading International (plastics). It is suggested that any other export activity to China is undertaken by the other 80 AQSIQ accredited exporters in the UK.

Although it has been problematic to source information on the quality requirements to which the AQSIQ Register refers, a WRAP report concluded that the standards for plastics set by the Chinese State Environmental Protection Administration are understood to be that:

- Plastics have to be crushed, washed, colourless and odourless;
- Any residual contents of the waste plastic containers should not exceed 0.01%;
- Any mix of impurities such as woods, metals etc should not exceed 0.1%.

And that for the purposes of importing waste plastics:

- Materials must be recyclable with a high melt temperature and have minimal contamination;
- Mixing new plastic and waste plastic is prohibited;
- Post consumer waste should be processed (cleaned, dried and ground) prior to shipping.

Clearly these are tighter and more restrictive standards for exporting materials than may have first been thought and it is not known whether the guideline specifications are being met for materials leaving the UK. However, as China moves towards ever tightening levels of environmental protection the degree to which export markets are considered secure in the future will depend on our ability to meet such an exacting specification.

16. Key Issues Arising in the Recovered Plastics Market

16.1. Reprocessing Capacity

It is clear that Scotland is in need of some reprocessing capacity for post consumer plastics, and most specifically mixed plastic bottles. Whilst there is significant capacity in England and significant capacity growth expected in the next 48 months, Scotland is still reliant on the movement of wastes outwith the country in order to assure credible recycling.

This is not to suggest that Scotland requires a full integration of recycling to reprocessing to product manufacture – rather it is suggested that the focus should be on ascertaining the relative economic merits of intermediate processing such as hot wash and granulation / flaking of polymers to a recognised industry standard (perhaps utilising the waste protocols work developed by Defra) to assure that we maximize value recovery whilst achieving credible recycling routes.

16.2. Prices

Prices obtained by Scottish Local Authorities for their plastic wastes still continues to be a concern – specifically in relation to the variation in prices between Local Authorities and between Scotland and the figures obtained in the UK. Whilst demand appears to be consistent, and in some cases set to grow with capacity expansions in the UK – there are other factors, such as transportation and quality that can affect prices obtained.

It is suggested that reasons behind these variations is researched and understood more clearly so as to ensure that any price benefits from capacity expansions are felt in Scotland.

16.3. Quality

A key challenge for the development of plastics collection and processing will be the ability to maintain a focus on quality whilst recovering even greater quantities from the waste stream. The lack of any indicative standards presented by the market place has undermined to a great extent the ability of the supply market to maintain this focus.

This is expected to change, at least in England and Wales with the introduction of quality protocols – albeit this will primarily be for non packaging plastics. It is recognised however, that this will have an effect on Scottish suppliers of materials as this is predominantly to the English market.

Similarly the quality restrictions placed on the export trade to China through AQSIQ is likely to have an impact on trade and the ability to get material to the required standards on contamination will bring significant challenges, particularly as the majority of municipal plastics arise from MRF processes.

To this it is suggested that a quality management approach to plastic wastes is developed, with possible localized case studies to examine the cost benefits of different quality management scenarios.

17. The Recovered Metals Market in Scotland: Market Size

17.1. Municipal Waste Stream

In 2005- 2006 Scottish Local Authorities accounted for 43,181 tonnes of recovered metals. The vast majority of this was metal collected at recycling centres and metal recovered at materials recycling facilities. Overall recovery of metals increased by over 37% compared to 2004/05 levels. In addition, in relation to can recycling there is an increased contribution from mixed cans (from 71% to 76% of total cans recovered).

The overall contribution of scrap metals to the total metals recovery has decreased slightly from 89% to 85% against 2004/05 levels, although it must be taken into account that materials previously regarded as scrap such as white goods, may now be classified upon recovery as WEEE, and therefore this trend does not necessarily support a conclusion that scrap recovery is diminishing.

17.2. Scottish Recovered Metals Market

Consignments of Metals

In 2006 approximately 1,047,400 tonnes of metals arose as segregated consignments at waste management facilities.

Consignments of metals were highest in Fife and Glasgow. This is mainly due to the presence of two key metals companies, the metal exporter RM Supplies in Fife and John Adam & Sons in Glasgow.

Recovered from Sorting Operations

Sorting operations at waste management facilities yielded a further 65,700 tonnes of metals. This activity was most prominent in Renfrewshire, Dumfries & Galloway and Perth where significant additional recovery was achieved by scrap metal merchants Christie & Son in Renfrew, J Walker & Son, Annan and Rosefield Salvage, Irongray (both Dumfries) and by WEEE re-processors Shore Recycling in Perth.

18. The Recovered Metals Market in Scotland: Market Analysis

18.1. Reprocessing Capacity

Steel Reprocessing

In 2006 the UK recovered in excess of 11Mt of steel with approximately 67% or 7.4 Mt being exported. Recovered steel to the UK market is absorbed by steel makers (2.7 Mt) and iron foundries (0.9 Mt).

The vast majority is exported to the EU25 (3.0 Mt, of which Spain accounts for 1.6Mt), Turkey (2.4 Mt) and Asia (1Mt, of which Malaysia is the highest consumer).

There is no tangible reprocessing infrastructure for post consumer steel packaging in Scotland in terms of processing through electric arc furnaces (EAF) for engineering

steels or basic oxygen steel (BOS) facilities for carbon steel. Reprocessing capacity for post consumer steel packaging in the UK is largely based in England with Corus's BOS facilities at Port Talbot, Scunthorpe and Teesside and the EAF facility in Rotherham.

The capacity for each of the BOS plants is presently 100,000 tonnes per annum, with the EAF facility able to consume 50,000 tonnes per annum of post consumer packaging steel. As such the existing reprocessing capacity at Corus is circa 350,000 tonnes per annum. At present Corus do not have any plans to extend or upgrade capacity limits.

Corus and CanRoute

Corus processes approximately 90% of all post consumer steel packaging processed in the UK. In order to ensure clarity and confidence in the supply chain, Corus established the CanRoute scheme in 1999. The scheme offers a regional network of recycling centres for materials recovered by Local Authorities, community groups and commercial businesses.

In order to become approved as a supplier of steel packaging to Corus, organisations must first become an "Approved CanRoute Source" – this is undertaken by Corus and ensures that feedstock, supply, plant and equipment and licensing are to the standard required. Upon approval Corus will advise the source which of the CanRoute centres will take their materials. In Scotland John R Adam and Sons is the only CanRoute centre for supply to Corus. At present Corus estimates that circa 5,000 tonnes per annum of post consumer packaging steel is supplied through the CanRoute scheme from Scotland. There are presently no plans to increase the number of CanRoute centres in Scotland, with a lack of high density baling and re-baling equipment on the East Coast of Scotland cited as a particular issue of concern.

Aluminium Reprocessing

In 2006 the UK exported approximately 387,000 tonnes of aluminium. The overwhelming majority of this (72%) was exported to Asia, with China (35%) and India (13%) the main recipients. The EU received around 26% of the UK's aluminium exports in 2006.

Similar to steel, Scotland has no post consumer aluminium reprocessing capacity. This activity is largely the role of Novelis who process the vast majority of UK used beverage cans (UBC) at their Latchford Locks facility in Warrington. The Warrington facility presently processes 130,000 tonnes of UBC, aluminium foil and scraps, with a significant portion of this imported. Although there are no plans to increase capacity, Novelis are intending to add a front end sorting system to manage the levels of plastics contamination from incoming UBC streams. Exports from the plant are presently around 10,000 tonnes.

Novelis and Aggregation Centres

Novelis have a system of supply similar to that of Corus and the CanRoute scheme. Novelis have a series of regional aggregation centres that operate to accept used

beverage cans and some aluminium foil and aerosols from collectors and processors. Aggregation centres will ensure that the quality specifications of Novelis are met, often involving a certain quantity of decontamination and baling activities. In Scotland Alloa Community Enterprise is the only accredited Novelis aggregation centre.

Novelis estimates that approximately 1,800 tonnes of used beverage cans (UBC) were received through the Scottish aggregation centre – with potentially another 200 – 300 tonnes of Scottish material being traded via English agents. There are presently no plans to establish any further aggregation centres in Scotland as tonnage levels dictate that this is not presently required.

18.2. Scottish Private Market Segmentation and Structure

The metals reprocessing market capacity is dominated in Scotland by enterprises that count scrap metal dealing, exporting or re-processing amongst their specialist services. These firms account for over 94% of available reprocessing capacity. Due to diversification of services a number of companies also associated with the Construction & Demolition, ELV and WEEE sectors have been included in the Metals sector data.

Overall Scrap Metals

Of the companies which count scrap metal amongst their specialist services two companies dominate the market: RM Supplies (one of the major exporters of scrap metal in the UK) and John Adam & Son. Between them they account for just under 50% of the market. The top nine companies account for approximately 88% of the segregated metal consignments received by metal merchants/re-processors in 2006. Data are presented on market share in the tables below.

| Metals Into Facilities | Market Share |
|------------------------|--------------|
| RM Supplies | 23.31% |
| John Adam & Son | 22.50% |
| John Lawrie Ltd | 13.73% |
| Rest of market | 40.46% |

| Metals Output from Facilities | Market Share |
|-------------------------------|--------------|
| John Adam & Son | 30.57% |
| Dalton & Sons | 13.26% |
| Christie & Son | 11.29% |
| Rest of market | 44.88% |

Construction & Demolition

In the Construction and Demolition sector there is one clear leader which in 2006 accepted around 81% of segregated metal consignments, Whiteinch Demolition. It

must, however, be taken into account that of the companies who operate within this sector many count scrap metal recycling as one of their specialist services e.g. Dalton Demolitions. These companies will therefore not have been included in this section. In terms of metals transported from C&D enterprises for further reprocessing the market is more spread out - the top three companies account for just over half of the market share. As many C&D companies operate sorting facilities as part of their services this is to be expected. In addition, Whiteinch Demolition is known to grade materials and sell them back to industry from their premises. Data are presented on market share in the tables below.

| C&D Input | Market Share |
|---------------------------------|--------------|
| Whiteinch Demolition, Glasgow | 81.70% |
| Dem-Master Demolition, Bathgate | 8.51% |
| Braidwood & Son, Bonnybridge | 3.98% |
| Rest of market | 5.80% |

| C&D Output | Market Share |
|------------------------------------|--------------|
| Whiteinch Demolition, Glasgow | 23.32% |
| DJ Laing, Petterden | 18.15% |
| Demolition Recoveries Ltd, Glasgow | 12.93% |
| Rest of market | 45.60% |

End of Life Vehicles

Similar to the Construction and Demolition sector many ELV specialists also operate on a wider scale as scrap metals merchants. The specialist ELV sector is dominated by AG Watson Inverkeithing with regards to consignments of segregated metals accepted. Due to the nature of the sector where the segregation and/or stripping of metals from the product (in this case end of life vehicles) actually occurs at the facilities themselves, a better indication of market share can be inferred from the tonnages sent from the facility for further reprocessing. AG Watson still enjoys market dominance but only to the extent of a 60% share. Data are presented on market share in the tables below.

| ELV Input | Market Share |
|----------------------------|--------------|
| AG Watson, Inverkeithing | 97.63% |
| Denis Autos MRF/ELV, Lewis | 2.22% |
| Link Ltd, Kinglassie | 0.13% |
| Rest of market | 0.03% |

| ELV Output | Market Share |
|--------------------------------|--------------|
| AG Watson, Inverkeithing | 59.97% |
| Strutherhill Autos, Larkhall | 14.83% |
| Stewart Melrose (Bathgate) Ltd | 6.27% |
| Rest of market | 18.94% |

Waste Electronic and Electrical Equipment

A number of designated WEEE specialists also operate as ELV enterprises. These companies have not been included in this section. In addition, any metals collected at specific Local Authority WEEE sites have been included in the section 'Other Waste Management'.

Due to the nature of the sector where the segregation and/or stripping of metals from the product (in this case WEEE) actually occurs at the facilities, consignments of segregated materials arriving at facilities were almost non-existent. A better indication of market share can be inferred from the tonnages sent from the facility for further reprocessing. Almost all WEEE output in Scotland is processed through Shore Recycling in Perth. Its nearest rival in 2006 was the Dumbarton community enterprise Lomond Training and Environmental Services which handled only 4% of Scotland's WEEE metals in 2006. Data are presented on market share in the tables below.

| WEEE Metals Output | Market Share |
|--|--------------|
| Shore Recycling | 92.10% |
| Lomond Training and Environmental Services Ltd | 4.25% |
| EnvironCom Ltd | 1.12% |
| Rest of market | 2.54% |

Other Waste Management

Any other organisations not described in the previous sections have been regarded as operating in the 'Other Waste Management' sector. Due to the nature and weights of materials handled (i.e. largely municipal skip waste) Local Authorities play a prominent role in this sector. Of the organisations engaged in the sector Enviroco Ltd from the north east of Scotland processed the most metals in 2006, outperforming all local authorities. Enviroscoot and William Tracey Ltd, the next largest commercial organisations within the sector, were outperformed in 2006 by Perth & Kinross, Highland and Argyll & Bute Councils with regards to segregated metal consignments accepted and by Fife Council in terms of metals sent on for further reprocessing. Data are presented on market share in the tables below.

| Other Waste Management Input | Market Share |
|------------------------------|--------------|
| Enviroco Ltd | 11.93% |
| Enviroscot | 5.21% |
| Perth & Kinross Council | 5.15% |
| Highland Council | 4.54% |
| Argyll & Bute Council | 4.20% |
| William Tracey Ltd | 3.68% |
| Rest of market | 65.29% |

| Other Waste Management Output | Market Share |
|-------------------------------|--------------|
| Enviroco Ltd | 8.55% |
| Fife Council | 7.11% |
| William Tracey Ltd | 5.14% |
| Enviroscot | 4.83% |
| Highland Council | 3.95% |
| South Lanarkshire Council | 3.42% |
| Rest of market | 66.99% |

19. The Recovered Metals Market in Scotland: Local Market Issues

19.1. Price

Due to maturity of the metals recycling sector there is a very strong link between grades and prices - this is the case more so than for any other material. With a large number of material grades describing a wide range of specified levels of form, quality and contamination, consignments of secondary metals can be more easily classified and, hence, priced. Materials are, therefore, more tailored to the needs of the market, which, in turn, becomes more accessible to prospective traders – both sides of the transaction know where they stand. The attachment of strict conditions of sales (at least to most non-ferrous transactions) further reduces the possibility of inaccurate approximation and, hence, further enhances the market’s status as a fair, transparent and flexible system.

The relationship between quality and price is less pronounced for metals from a municipal source i.e. used beverage containers. For steel cans prices do not vary greatly regardless of whether consignments are loose or have been densified or baled. A slightly higher price (approximately +6%) can be obtained for aluminium cans that have been baled or densified and strapped as opposed to those that have not.

19.2. Quality

Ferrous Metals

The specification for the supply of ferrous scrap metals to the UK steel manufacturing industry are agreed by the British Metals Recyclers Association, UK Steel and the Cast Metals Federation. The last series of standards became effective from October 2006.

In all there are 32 separate specifications for ferrous metals. There are however, five general rules for all grades which must be adhered to for supply as detailed in the table below.

| | |
|-----------------------------------|---|
| Safety | All supplies should be free of pressurised containers, explosive materials, flammable materials or munitions. |
| Radioactive Material | Any delivery which includes hazardous radioactive material as defined by the appropriate legislation will be refused and the supplier notified so that the appropriate action can be taken. |
| Cleanness | All grades shall be as free of dirt, pollutants or foreign matter of any kind, excessive oil, grease, rust and corrosion as is practicably achievable in the customary preparation and handling of the particular grade involved. |
| Residuals and Other Alloys | All grades shall be as free of separate non-ferrous metals and alloys as is practicably achievable. However, certain proportions may be permitted by joint agreement. |
| Mixed Grades | No delivery shall contain a mixture of grades, unless by prior agreement with the purchaser. |

The extent to which the metals industry undertakes quality specifications is exemplified in their approach to steel cans where there are four separate grades as detailed in the table below.

| Grade | Name | Description |
|-------|---|---|
| 6C | Non-incinerated magnetically extracted steel cans - baled | Steel food, drinks and other domestic cans magnetically extracted from non-sorted and non-incinerated domestic waste at municipal and private waste treatment plants and materials recycling facilities. May have minor visible presence of other materials such as paper and plastics. Bale size and density to be jointly agreed. |
| 6D | Non-incinerated magnetically extracted steel cans - loose | Steel food, drinks and other domestic waste at municipal and private waste treatment plants and materials recycling facilities. May have some minor visible presence of other materials such as paper and plastics. |
| 6E | Clean steel cans - baled | Steel from food, drinks and domestic aerosol cans collected from the public e.g. by can banks and door-to-door ("kerbside") collection schemes. Cans should be free from excessive contamination by other materials. Bale size and density to be jointly agreed. |
| 6F | Clean steel cans - loose | Steel from wood, drinks and domestic aerosol cans, collected from the public e.g. by can banks and door-to-door ("kerbside") collection schemes. Cans should be free from excessive contamination from other materials. |

Non Ferrous Metals

The standard classifications for non-ferrous metals are issued by the British Secondary Metals Association. In all there are 54 separate specifications for non-ferrous metals not including aluminium. They are split in two sections as detailed in the table below.

Section 1

23 full specifications describing the main component metal (e.g. nickel, lead, brass etc) by form (e.g. wire, cuttings, swarf etc) along with acceptable levels of accompanying metals (if any) and descriptions of non-permitted contaminants. Occasionally size of material piece and source are included in the specification.

Example: Beech 5 - Brass, heavy yellow

May consist of heavy yellow brass castings and rod scrap in crucible size pieces. It may contain up to 15% of plated and soldered material. It must be free from manganese, aluminium, silicon and nickel mixtures, condenser tubes and iron and commercially free from any other foreign matter.

Section 2

31 shorter, more general, descriptions of grades of a main component metal (e.g. nickel, lead, brass etc) by type and form (e.g. borings, turnings, castings) along with approximate levels of acceptable contamination, if any. These grades are advised to be sold on the strength of their description, sample or assay in order to avoid disputes.

Example: Grass 33 - Brass turnings, yellow

Should be free from aluminium, manganese and any other admixture. Iron and moisture contents combined should not exceed 3%.

Along with the grade specifications comes an accompanying list of conditions of sale attached:

- Under the contract, the delivered quantity must not exceed an error of plus or minus 1% of the specified quantity.
- Under the contract, the delivered quantity must not exceed an error of plus or minus 5% of the specified quantity when the term “about” is used.
- A ton is understood to be the equivalent of 2,240lb.
- “The contract shall be deemed to have been made in the UK and shall be construed according to the laws of that country.”

Separate standard specifications exist for aluminium scrap as shown in the table below. These have been issued jointly by the Association of Light Alloy Refiners and the British Secondary Metals Association.

Section 1

10 full specifications describing the aluminium by size, form and cleanness along with acceptable levels of accompanying metals (if any) and descriptions of non-acceptable contaminants.

Example: Acorn - aluminium cast

Shall consist of whole or broken commercial quality aluminium alloy castings. It must be free from brass and iron and commercially free from any other foreign matter, but may contain up to 3% of oil, grease and paint combined.

Section 3

7 specifications using code words only.

Example: Hawks - Aluminium alloy forgings and extrusions, new

20. Key Issues Arising in the Recovered Metals Market

20.1. Quality and Price

The recovered metals industry is a mature and well established sector, and as such has a well defined, managed and stable market position with regards to quality of materials. There are a large number of materials grades issued by industry trade associations which describe a wide range of specified levels of form, quality and contamination. As a result materials are tailored to the needs of the market, which, in turn, becomes more accessible to prospective traders. The result is a fair, transparent and flexible system where the quality of the product is linked strongly to price – more so than for any other material.

20.2. Market Structure

The metals reprocessing market capacity is dominated in Scotland by enterprises that count scrap metal dealing, exporting or re-processing amongst their specialist services. Over 94% of segregated metals consignments in 2006 were received by such companies. Within this sector two companies dominate the market (RM Supplies and John Adam & Son) sharing just under half of the scrap metals sector market share. Only nine companies account for approximately 88% of the segregated metal consignments received in the scrap metals sector in Scotland in 2006.

20.3. Market Segmentation

Due to the many sources of secondary metals in Scotland there are a relatively large number of market segments e.g. the scrap trade, WEEE compliance schemes, the construction and development sector and other waste management enterprises. As a result the possibility for double-counting of tonnages is increased as materials change hands between merchants, re-processors and exporters. Doubts could and, perhaps, should be raised over the amount of secondary metals that is understood to arise in Scotland.

21. The Recovered Tyres Market in Scotland: Market Size

21.1. Municipal Waste Stream

Approximately 697 tonnes of end of life tyres were recovered from the municipal waste stream in 2005 – 2006. Not all Local Authorities collect or accept tyres with only fifteen councils reporting any recovery of tyres. Recovery of tyres was highest in the municipal sector in Fife and Highland, with comparatively high levels also in South Lanarkshire, Midlothian and Perth and Kinross. Recovery of end of life tyres is comparatively low in the municipal sector with all tyre recovery happening at recycling centres.

Of these fifteen local authorities, only seven appear to advertise their acceptance of tyres within their recycling centres: Clackmannanshire, Edinburgh, Fife, Highland, Midlothian, Perth and Kinross and West Lothian. Arisings in these areas accounted for 528 tonnes or 76% of the total tyres recovered in the municipal sector.

21.2. Scottish Recovered Tyre Market

End of life tyres are recovered at waste management facilities in two ways. Firstly they may arrive to the facility as a segregated consignment of tyres, or alternatively they may be recovered during a sorting process. Approximately 72% of tyres were delivered as segregated consignments of tyres with the remaining 28% recovered by sorting operations.

Consignments of Tyres

In 2006 approximately 8,466 tonnes of end of life tyres arose as segregated consignments to waste management facilities.

Consignments of tyres were highest in South Lanarkshire and North Lanarkshire. This is mainly due to the presence of three key companies which accept and process tyres: Anaxiom, Lowland Rubber and Greengairs Landfill.

Sorting Operations

Sorting operations at waste management facilities yielded a further 3,304 tonnes of end of life tyres. This activity was most prominent in Fife where significant additional recovery was achieved by ELV processors such as AG Watson and H Gray and Sons, and also in Moray where recovery was predominantly undertaken by Douglas J Williamson in Elgin.

Final Destination

Consignment of tyres plus tyres arising from sorting operations gives a total of 11,770 tonnes recovered arisings of end of life tyres at waste management facilities in Scotland.

From the total recovered arisings 56% of tyres entered into a stage of final utilisation, with the remaining 44% sent onto further processing locations.

Of the total recovered tyre arisings at waste management facilities 6,548 tonnes have reached their final destination for reuse or recovery/recycling applications. The key contributor in this instance is Anaxiom based in East Kilbride, although there is also a significant contribution from Lowland Rubber based in Bellshill. Both of these companies are involved in the ambient size reduction process.

In addition to the contribution from the process oriented companies some end of life tyres appear to have reached final destination at landfills such as Greengairs and Levenseat. It is thought that tyres are being used in this instance for drainage and engineering activities.

22. The Recovered Tyres Market in Scotland: Market Analysis

22.1. Reprocessing Capacity

At present the total Scottish market capacity for reprocessing of tyres is approximately 47,500 tonnes per annum. Only 26% of this capacity is taken up with the management of waste tyres from Scotland (based on estimates that the total management of waste tyres from Scotland is around 12,000 tonnes per annum).

The breakdown of market capacity is:

- Ambient size reduction: 22,500 tonnes;
- Energy recovery: 22,000 tonnes;
- Construction: 1,000 tonnes;
- Landfill engineering: 2,000 tonnes.

There are significant supply chain arrangements that assist in the utilisation of capacity in Scotland with collection agents such as Envirotyre and ATS Euromaster acting as suppliers to the tyre reprocessing industry. Nevertheless it is not clear that all end of life tyres from waste management facilities are sent to Scottish facilities – indeed it is known that a portion of this stream is sent to England for reprocessing as this can often be more economically advantageous due to lower gate fees.

To this end whilst Scotland has sufficient capacity for end of life tyres there is some concern that this capacity is presently under utilised and may need to import feedstocks in order to create sufficient economies of scale.

End of life tyres have a range of useful materials for recovery. For example the average car tyre can produce 47% rubber, 21.5% carbon black and 16.5% ferrous metal. There are three main waste management options for tyres operating in Scotland: ambient size reduction, energy recovery, and engineering.

Ambient Size Reduction

The use of recycled tyre materials in a wide range of civil engineering and industrial materials and applications is well established and has grown considerably in the last

decade. All of the commercial size-reduction of tyres in the UK is currently by means of cutting and grinding, at or above ambient temperature, into increasingly smaller rubber particles for use in a range of new end use applications. There are two key companies operating in ambient size reduction in Scotland: Anaxiom and Lowland Rubber.

Anaxiom accepts most types of waste tyres at their plant in East Kilbride which has an estimated processing capacity of 9,500 tonnes per annum. The tyres are fed into a shredding machine that processes up to 5 tonnes of tyres an hour to produce shredded pieces of between 100mm to 150mm. By weight recoverable material is approximately, 35% ferrous metal, 2% textile, and 60% rubber treated with sulphur. This produces a vulcanised rubber, a compound that is tough and durable with varied uses. The shredded pieces are then fed by conveyor into granulating machines that progressively reduce the pieces down to approximately 20mm. At this stage most of the metal is separated out using overhead and rare earth magnets to produce a vulcanised rubber shred.

Vulcanised rubber shred is a material that is used for:

- Equine and livestock use as loose surfacing;
- Pathway & drainage areas;
- Base layers for sports, playground and recreational surfacing;
- Weed control & soil preservation when loosely spread.

For smaller size rubber granules & crumb the 15mm –20mm shred is fed into another granulator, over an air table to remove textile materials and through another over-band magnet to remove any remaining metal.

Vulcanised rubber granules of different graded sizes from 10mm down to 0.5mm are typically used for:

- Surface dressing for all types of grass;
- Top layers bonded to create sports, playground & recreational areas;
- Plant reinforcement aggregate and infill;
- Many types of moulded products.

Lowland Rubber has capacity to reprocess 13,000 tonnes of tyres per annum. Lowland Rubber has ambitious plans to initiate the first cryogenic process in Scotland for the recovery of waste tyres. The input material of used tyres will be processed into different grades of rubber product. The less fine grades will be used for different markets such as playgrounds, whilst the finer grades will be used for to produce new rubber sidewalls for new tyres and as a modifier for tarmacadam, to produce rubberised asphalt and rubber tiles.

Lowland's present size reduction process has capacity to produce rubber crumb which is sold to a range of customers including, but not restricted to, equestrian centres, playground manufacturers, manufacturers of rubber backed matting, and for horticulture uses.

Due to modifications to the plant and premises instructed by SEPA the plant is presently out of production. Estimates of capacity however are approximately 13,000 tonnes per annum based on a 24 hour operation running at 2 tonnes per hour.

Energy Recovery

End of life tyres represent an alternative supplementary fuel, with the same energy content as coal, with lower percentages of sulphur compared to coal. 1 tonne of tyres are equivalent to 1 tonne of good quality coal or 0.7 tonne of fuel oil.

Whole or shredded tyres are used as supplementary fuel to traditional combustibles in cement kilns. This application utilizes all the components of the tyre. The combustible components of the tyre are incinerated for heat generation whereas other substances of the tyre – silica and steel cord – are used as secondary raw materials in the cement production replacing the natural resources glass sand and ferric oxide. Accordingly the utilization of tyres in the cement industry is characterized by a material recycling rate of about 25%.

Sapphire Energy Recovery was formed in 2001 as a joint venture between Lafarge Cement and Michelin Tyres to use end of life tyres as an alternative fuel for the cement industry. 22,000 tonnes of tyres were utilised by Sapphire in 2006. The joint venture was initiated as Lafarge Cement had a need to achieve security of tyre supply as a fuel supply for its cement works, and to allow Michelin a method of proactively meeting its producer responsibility obligations.

Sapphire manages the used tyre supply chain to:

- Facilitate collection of end of life tyres from all sources including wholesalers, vehicle dismantlers and local authority schemes;
- Collection of tyres to a Sapphire processing centre via a regional collector network;
- Sapphire produces a specific grade of chipped tyre proven to be the best size for combustion in the cement industry.

Sapphire also produces recovered tyre gravel for supply to the landfill industry. RTG50 – Recovered Tyre Gravel as 50mm chips – is a quality controlled product, derived directly from the chipping plant used to process tyres for the cement industry and offers the landfill industry an alternative material as a leachate drainage blanket saving finite aggregate resources

Engineering

Approximately 3,000 tonnes of tyres were used in construction and landfill engineering applications in 2006.

1,000 tonnes were used in tyre bales. Tyre bales are used in engineering applications; they offer significant advantages in construction projects due to, the following features:

- Permeability comparable to gravel;
- High porosity;
- Low bulk density;
- Good frictional response and stiffness.

The specific use of bales in construction is generally accepted by the waste regulators in the UK as a low risk activity. The compression of tyres into bales provides a means of reusing tyres whilst at the same time, reducing the demand for primary aggregate materials in construction.

Northern Tyre Recycling is based in Evanton, Scotland and is Scotland's only company operating in the use of compressed tyre bales in construction projects.

The tyre bales (named URRO blocks) can be used in a variety of applications such as:

- Road sub bases;
- Retaining Walls;
- Gabions and Waterway Control;
- Flood Control;
- Mud Slide and Erosion Control;
- Soil Elevation;
- Shock Absorption for Foundation Walls, Firing Ranges and Bunkers;
- Sound Barrier along Motorways and Railways;
- Impact Barrier for Motorways and Racetracks.

The unique selling points of tyre bales in place of conventional materials (such as aggregates and concrete) are:

- Lighter weight and lower earth pressure;
- Greatly improved drainage

- Excellent thermal insulation
- Pre compressed material;
- Uniform size of block allows for easy building and placement
- Use of a recycled material;
- Lower overall construction cost.

URRO Blocks have been used successfully in several major projects involving road construction, land erosion and wall construction and further projects await approval including roads for wind farms, riverbanks, ponds and dam construction.

22.2. Scottish Private Market Structure and Segmentation

The tyre reprocessing market capacity is dominated in Scotland by energy recovery with circa 48% of available reprocessing capacity and ambient size reduction with 49% of reprocessing capacity.

It is significant that there are few players in the Scottish market and given the low tonnages presently recovered and the significant capital investment required to initiate a facility it is unlikely that Scotland will see further growth in capacity without additional legislative or regulatory drivers.

Segmentation of the market gives rise to some concerns over monopoly as each of the market segments has only one or two players in Scotland and competition for materials is strong. With no single company operating near their capacity from purely domestic sources it is likely that any company that can offer lower gate fees to waste managers will proceed to dominate the marketplace. As such it is likely that there will be a single dominant market segment / waste management option that prevails.

23. The Recovered Tyres Market in Scotland: Local Market Issues

23.1. Quality

Ambient Size Reduction

PAS 107 has been prepared by The British Standards Institution (BSI) in collaboration with WRAP to provide a specification for producing grades of size-reduced tyre rubber of consistent and verifiable quality.

PAS 107 sets out a formal material specification system and defines minimum requirements for the initial storage, production and final storage of size-reduced, tyre derived rubber materials intended for a range of applications in existing and emerging secondary end markets. The introduction of PAS 107 harmonizes the various independent specifications across the industry in the UK. PAS 107 does not cover the by-products of the size-reduction process, namely steel and textile fibre.

There is reference in the PAS to emerging new technologies to produce size-reduced rubber, such as cryogenic treatment and water jetting. Finally, PAS 107 excludes processes such as pyrolysis or microwave treatment which have yet to be commercially proven in the UK.

Engineering

A Publicly Available Specification, PAS 108, has been prepared by The British Standards Institution (BSI) in collaboration with WRAP to provide a specification for producing compact tyre bales of a consistent and verifiable quality and dimension.

PAS 108 sets out to provide a specification that can be adopted by suppliers for producing tyre bales such that potential customers will be assured that they are procuring a construction material of consistent and verifiable quality. PAS 108 primarily addresses the production, handling, storage, transport and placement of standardized tyre bales. In addition, guidance is given on engineering properties and typical construction applications.

23.2. Disposal Costs

The market price for disposal of tyres for recycling via ambient size reduction or through baling varies throughout the UK. Research undertaken by WRAP in 2007 identified that the range throughout the UK is between £35 and £85 per tonne. Regional variations in price are set out in the table below.

| Location | Low | High |
|-----------------------|-----|------|
| North East | £35 | £45 |
| North West / Midlands | £45 | £75 |
| South East | £60 | £85 |
| Wales | £45 | £75 |
| South West | £45 | £75 |
| Scotland | £50 | £65 |

The main concern to the Scottish market is the lower disposal costs available in England, particularly in the North East which allow for circa £15 - £20 per tonne in transport costs before Scottish gate fees become competitive.

Less information is available on the disposal costs associated with energy recovery operations; although it is known that the tyre derived fuel markets will affect gate fees in the wider marketplace.

24. Key Issues Arising in the Recovered Tyre Market

24.1. Recovery Tonnages

Suspected and modelled arisings of waste tyres are over 30,000 tonnes in Scotland (SEPA, 2001). Present recovery tonnages in Scotland are low in comparison with arisings. It is expected that the development of the ELV marketplace will in turn increase the quantity of tyres delivered to the reprocessing marketplace, however, development in increasing arisings is considered vital to maintaining the viability of existing infrastructure.

24.2. Over capacity

Present capacity is under utilised and facilities must feed investments with imported materials. Should collections not increase sufficiently to feed facilities above the existing 26% utilisation rate it is likely that there will be significant market implications and perhaps even closures.

24.3. Monopoly

The market place has segmentation across three main recovery options with only one real player in each segment. Closure by any company in each segment could easily lead to a market monopoly for one company and one treatment method – at this stage most likely to be energy recovery.

25. The Recovered Wood Market in Scotland: Market Size

25.1. Municipal Waste Stream

There was a significant increase in wood recycled by Local Authorities in Scotland from 13,755 tonnes in 2003/04 to 34,377 tonnes in 2004/05. Yields 'tailed-off' from 2004/05 to 35,139 tonnes in 2005/06 indicating that Local Authorities are collecting as much wood waste as possible with present set-up

Fife Council yields the highest quantities of wood waste. North Ayrshire, South Ayrshire and North Lanarkshire also yielded relatively high quantities of wood waste, the majority of which is recovered via material recycling facilities.

Most wood waste arises at recycling centres with very little being collected at the kerbside. There has been an increase in the amount of wood sent to material recycling facilities - from 7,179 tonnes in 2004/05 to 14,142 tonnes in 2005/06.

25.2. Scottish Recovered Wood Market

The total recovered arisings of wood waste at waste management facilities in Scotland was between 220,000 and 260,000 tonnes, this range is given as it is unclear to what extent double counting affects the total figures.

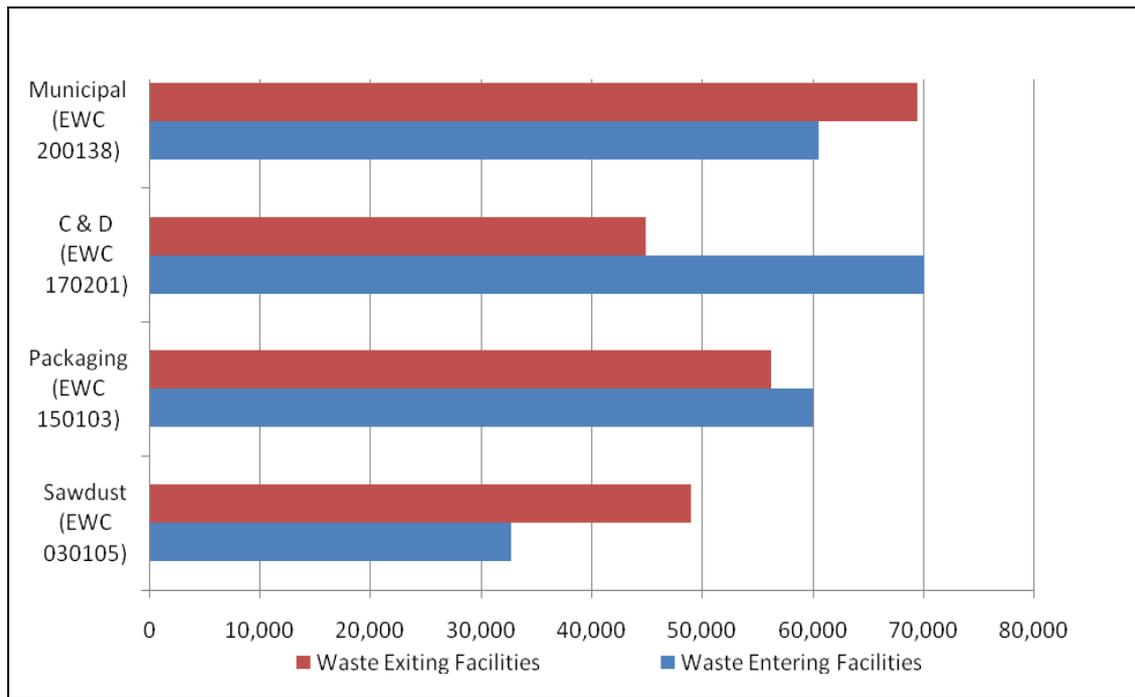
Wood from construction and demolition waste (70,076 tonnes) and municipal and similar wood waste (60,491 tonnes) comprise the largest elements.

From the total recovered arisings approximately 40,700 tonnes entered into a stage of final utilisation (made into a product); with approximately 180,000 to 220,000 tonnes sent onto further processing locations.

25.3. Intermediate Processing

It is clear from the data on waste wood management that there are a series of intermediate activities undertaken through the supply chain. This can often be as part of a product development activity such as chipping, in order to add value prior to final utilisation by another organisation or for ease of transportation.

The figure below shows tonnes of wood waste entering and exiting Waste Management Facilities:



It would appear that, from sorting activities a further 8,900 tonnes of wood was extracted from the municipal and similar stream. While possible processing of the packaging and construction and demolition streams has resulted in a greater quantity (16,200 tonnes) of sawdust than that which originally arose at facilities.

In addition to the four EWC codes highlighted in the figure above, many wood reprocessors segregate wood waste out of mixed skips;

- EWC 20 03 01 Mixed Municipal
- EWC 17 09 04 Mixed Construction & Demolition

Some of this may be of a suitable quality and may be chipped to produce material suitable for the panel board industry or animal bedding. However, some may be contaminated and will be sent to landfill. It is difficult to track wood waste from mixed skips.

The table below highlights the different sources of wood waste and processing routes and shows figures for wood waste entering and leaving reprocessing facilities. The data illustrate that approximately 4,000 tonnes of wood waste is unaccounted for; this could be due to:

- The wood being stored/utilised on-site under exemption;
- The wood waste was accepted on to site in one financial year but left the site in the next financial year.

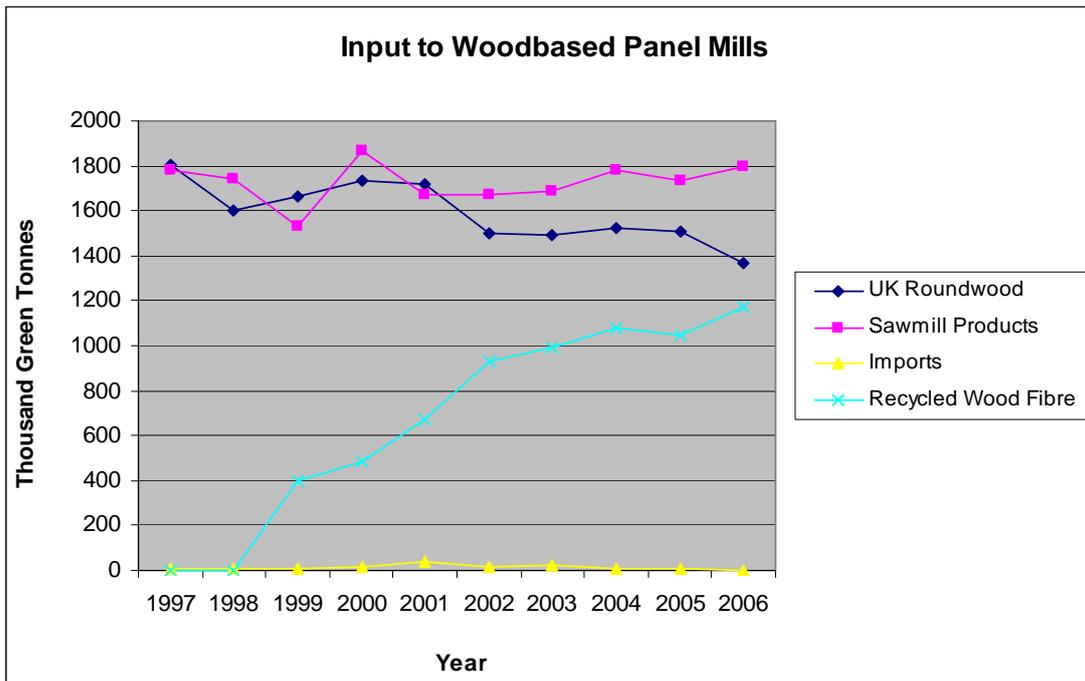
| Source | Sawdust | Packaging | C & D | Municipal | TOTAL |
|---|---------|-----------|---------|-----------|---------|
| Wood Waste Entering Facilities (tonnes) | 32,743 | 59,925 | 70,076 | 60,491 | 223,235 |
| Wood Waste Exiting Facilities (tonnes) | 48,965 | 56,176 | 44,845 | 69,409 | 219,395 |
| Difference (tonnes) | 16,222 | -3,749 | -25,232 | 8,919 | -3,840 |

26. The Recovered Wood Market in Scotland: Market Analysis

26.1. Reprocessing Capacity

Panel Board Manufacturing

The Panel Board industry has traditionally been the largest end market for waste wood in the UK. The proportion of recycled feedstock has grown significantly in the past decade, reflecting increasing virgin wood prices, reducing waste wood prices and the relatively higher energy costs to dry virgin wood. In 2006 approximately 27% of UK panel board inputs (1.2 million tonnes) were waste wood.



The figure above shows a decrease in roundwood input and a significant increase in recycled wood fibre at panel mills. Increasing wood waste content reduces utility costs associated with drying and in addition it provides panel board manufacturers with an income from Package Recovery Notes (PRNs).

There are two dominant panel board manufacturers based in Scotland both of which are accredited reprocessors of packaging waste: Egger UK and Norbord.

Egger UK is a panel board manufacturer which has 2 plants in the UK – using approximately 200,000 tonnes of waste wood per year. The company has one plant in Scotland, based in Barony, Ayrshire, which is currently working to capacity. It accepts waste wood from a number of processors in Scotland and also transports material from its waste wood processing site in Leeds. This plant, run by Timberpak (part of Egger UK), sorts and shreds approximately 4,000 tonnes of waste wood per month. The following process is carried out:

- Material is weighed on-site and then deposited into appropriate bays where it is then inspected by competent individual for quality;
- Physical contaminants are removed;
- Wood is shredded to 250mm chip size and metal contamination removed by overband magnets;
- If required, further shredding can be done to reduce chip size to 50mm;
- Material can then be screened to remove the fines if necessary;
- Further examination for contaminants is carried out prior to dispatch;
- Shredded materials are transported to Hexham or Barony plant for manufacture of chipboard.

Norbord is a multinational company. It has a number of depots throughout the UK with two in Scotland – Cowie and Inverness. In 2005 total capacity was 1085 million square feet. Currently these plants are working to capacity. All waste wood utilised in manufacture is sourced from Scotland as the company does not believe it is economic to transport from south of the border. The company will only accept a specific quality of waste wood in manufacture of panel boards.

The Wood Recycling Association (WRA) states that in 2003 the UK panel board industry produced approximately 1,107,074 tonnes of waste wood during the manufacturing process. To cut down on outgoings associated with landfill and to make use of the energy stored within the waste wood Norbord invested £2.5 million in a biomass system at the Stirling plant. This plant was unveiled in February 2008 and will process approximately 24,000 tonnes of waste wood, supplying energy to dry timber in the manufacturing process.

Surface Products

There are basically two types of recycled wood material/products being used in the landscaping and horticulture sector: non-composted wood chips and composted material containing recycled wood.

The non-composted recycled wood chips may be natural or coloured and are sold into the following end markets:

- As a landscaping mulch to suppress weeds and retain moisture in planting beds and pots;
- For laying informal paths in public spaces, golf courses etc;
- For animal bedding;
- For decorative use in exhibition areas;
- For covering play areas to protect children from injury.

The safety requirements and precise chip specification might vary depending upon which one of these end markets the product is being sold into, although most of the players in this market sell essentially the same product into one or more of the markets. Compost containing recycled wood may be sold into the following end markets:

- Peat-free/ peat-reduced growing media;
- As soil improver to be dug in/ mulched on top of growing beds;
- As an 'ingredient' in land reclamation/soil remediation projects. In this instance compost is mixed with other materials to reinstate land prior to planting out. The other ingredients might include existing spoil/earth from the site or bought-in top soil, with the compost adding nutrients.

This is a growing market. Waste wood processors are diversifying – targeting alternative 'added value' markets. The Wood Recycling Association (WRA) states that whilst the panel board industry still consumes about 75% of recycled wood, the 'added value' markets are expanding rapidly year on year. These alternative markets again require high quality materials free from contaminants. There are a number of processors in Scotland feeding into this market, e.g. Tracey Timber Recycling, AWJ Woodwaste Ltd.

The Tracey Timber Recycling reprocessing plant is located at the company's recycling centre at Linwood where it processes a variety of wood waste including pallets, packaging crates and timber from demolition contracts. The company shreds, screens and removes metal contamination to produce woodchip suitable for a variety of markets the largest being the panel board industry. However the company manufactures woodchip products for golf courses, play areas, horse arenas, and as decorative garden mulch. Tracey Timber Recycling continues to invest in new technology and intends to increase capacity in 2008.

AWJ Woodwaste Ltd has two sites in Scotland: Glasgow and Bo'ness. The company sort and process wood waste to produce quality products fit for end markets such as woodchip for riding surfaces, landscaping, bark for play areas and shavings and sawdust for bedding.

Compost Additive

Scottish Water is the only PAS 100 accredited organisation in Scotland that uses wood waste as a compost additive. To meet these standards requires specific quality of input material. This is an extremely small market in Scotland.

Energy from Biomass

The drive towards renewable energy to cut greenhouse emissions, reduce environmental damage and provide long term security of supplies is well documented and driven by both International and UK law.

The use of biomass is generally classed as a 'carbon-neutral' process because the carbon dioxide released during the generation of energy is balanced by that absorbed by plants during their growth. Energy can be derived from woody biomass sources (including forest products, waste wood and straw) using combustion systems, which can be used to heat anything from a domestic stove or hot water system to an entire community.

There are two main types of wood biomass fuels: chips and pellets. Fuel pellets have the advantage of being denser and hence take up less storage, so are more suitable for smaller installations. Increased density can also reduce transport costs (where volume is more constraining than weight of load) and is more homogenous for handling and combustion.

The choice between pellets or chips might also depend on boiler type: co-firing power stations which burn lump coal can take chips, whilst co-firing power stations which burn coal in dust form can take pellets and these may need further crushing. Chips do not crush well and would need to be resized for dust burners.

However, pellets are considerably more expensive than wood fuel chips. The Biomass industry has the opportunity of diverting low grade waste wood from landfill which is not good enough for the panel board or high value recycled wood markets.

The biomass industry is a growing market throughout the UK and has the potential to divert significant quantities of waste wood from landfill. Waste to be used as a fuel normally remains as waste until the energy is recovered by burning. One plant in Scotland is currently accepting biomass and another is still in the development stage.

Steven's Croft Biomass Power Station plant is located in Lockerbie, Scotland. The plant, which complies with the Waste Incineration Directive (WID), will require approximately 500,000 tonnes of fuel every year. According to E.ON UK the plant will use the following blend:

- 60% sawmill co-products and small round wood;
- 20% short rotation coppice;

- 20% recycled fibre.

20% recycled fibre will account for approximately 100,000 tonnes of recycled fibre. The station is made up of two adjacent sites, one which is dedicated to fuel processing and the other to the generation plant.

AW Jenkinson has secured several major contracts to supply the biomass industry- the largest contract being Steven's Croft Biomass Power Station. AWJ Lockerbie is well placed to supply this plant as it is situated adjacent to the plant.

Longannet biomass plant, when operational, will consume up to 70,000 tonnes per annum of Mixed Waste Wood (MWW) such as MDF, chipboard, demolition wood, treated timber, laminates and recycled fibres which will be sourced from commercial sources and local authority transfer stations, and recycling centres throughout Central Scotland. The highest priority will go to sources nearest the plant, e.g. Fife, Perth & Kinross, Clackmannan, Stirling, Falkirk and West Lothian. MWW will be delivered to the site both in bulk and pre-processed form.

The biomass market is extremely attractive to wood reprocessors. Treated waste wood is presently unacceptable for most purposes as it may contain hazardous materials such as copper, chrome, arsenic and creosote. A study carried out by WRAP concluded that the only viable use for treated waste wood is re-use or recovery via energy from waste in a WID compliant plant. Some processors may burn waste wood on site to provide heat/power. Providing this wood waste is not contaminated with halogenated organic compounds or heavy metals they would not be regulated under WID.

27. The Recovered Wood Market in Scotland: Local Market Issues

27.1. Quality

There are two main standards available relating to wood waste in the panel board industry:

- Publicly available specification (PAS) 104. This sets minimum acceptable standards for wood chip destined for wood based panel manufacturing.
- Guidance for the specification and control of reclaimed wood raw materials used in the manufacture in the UK of wood particleboard, MDF and OSB to control incoming wood materials (WPIF/IG/12.2005).

Currently the surface products market does not have any specific quality standards; quality is agreed between manufacturer and consumer. This was highlighted by the Technical Advisory Group (TAG) as being an issue which needs to be addressed.

28. Key Issues Arising in the Recovered Wood Market

28.1. Capacity

The majority of waste wood processors within Scotland state that their plants have additional capacity available, whilst some are looking to increase capacity. In some instances processors capacity is restricted by their Waste Management Licence, e.g. in terms of working hours. There is also evidence that waste wood is being transported from England to serve the panel board industry.

28.2. Competition from Biomass

The biomass market is somewhat limited in Scotland at the moment –Steven’s Croft Biomass Plant is the only facility accepting waste wood whilst Longannet is not in a position to accept waste wood. The panel board industry is concerned about competition from the biomass industry for clean waste woodchip. WPIF states that the biomass industry is being subsidised by the government through Renewable Obligation Certificates (ROCs). This should not be an issue in Scotland at present.

28.3. Quality

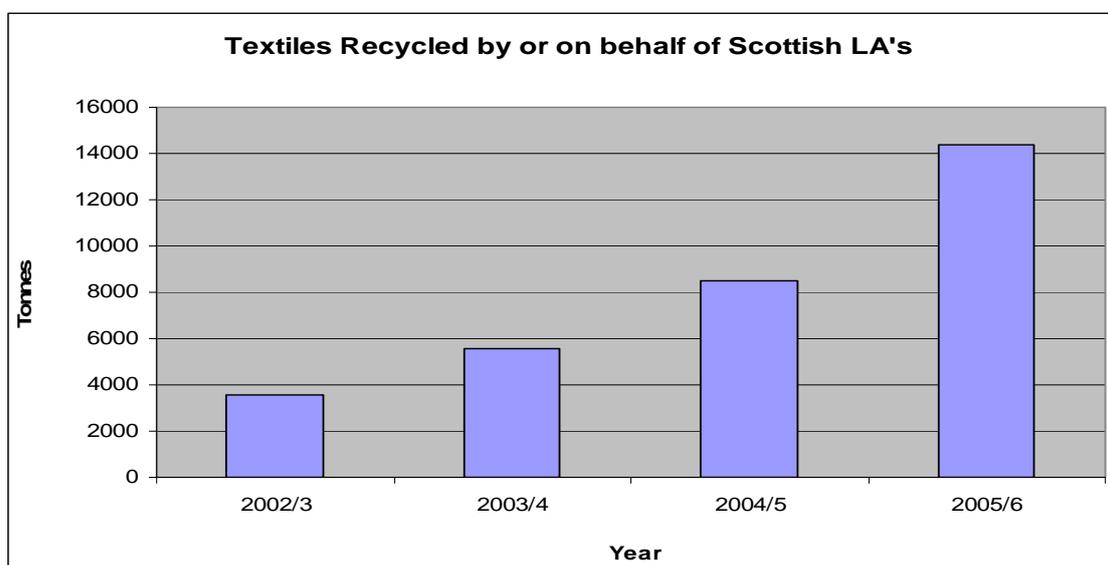
A major problem remains with respect to contaminated waste wood. The majority of this material is landfilled. There is the option of bulking (where space exists) lower grade material through exemption in the hope that there may be higher market demand in the near future. There are no common quality controls applied across the wood recycling industry. The Technical Advisory Group (TAG) recognised that the difference in input materials may mean a risk-based approach is needed for quality control measures. Further work needs to be carried out to produce robust datasets for this industry.

29. The Recovered Textiles Market in Scotland: Market Size

29.1. Municipal Waste Stream

Scottish Local Authorities collected 14,379 tonnes of textiles in 2005/6 – less than 5% of the total estimated UK recovered textile stream. The majority of recovery happens at bring sites where Fife, Argyll & Bute and Aberdeenshire has greatest provision.

The figure below shows that the amount of textile waste recycled by or on behalf of Scottish Local Authorities has increased from 3,582 tonnes in 2002/3 to 14,379 tonnes in 2005/6. In comparison to estimated textile waste arisings the overall tonnages recycled are low.



There was a 25% increase in textiles recycled by or on behalf of Local Authorities from 2002/03 to 2005/06.

The majority of Local Authorities accept textiles at recycling centres and points. In 2005/06 Fife Council, Argyll & Bute Council and Aberdeenshire Council have the highest number of sites accepting textile waste – 82, 54 and 60 respectively. Argyll & Bute Council and Aberdeenshire Council are rural councils which have low population densities in remote areas. Increasing the number of sites accepting textile waste could potentially help to capture more of this waste.

It is of strategic importance to identify councils which collect high levels of textile waste. This will pinpoint councils which are effectively capturing textile waste and will allow the government/supporting agencies to identify the councils which may need help to increase capture. The figure below shows tonnages collected for each Local Authority in 2005/06. Local Authorities can be classed into family groups; mixed, rural or urban.

| Material Flow | Tonnes |
|---|---------|
| Total Consumption | 215,000 |
| Textiles Entering MSW waste stream | 135,450 |
| Textiles Collected for Resale and Recycling | 36,550 |
| Textiles unaccounted for | 43,000 |

These figures suggest that 135,450 tonnes of textiles are landfilled in Scotland and if using a figure of 17% (as per Oakdene Hollins 2006 report) for textiles collected for resale and recycling it would account for 36,550 tonnes. Approximately 43,000 tonnes is unaccounted for and is assumed to be part of the 'national wardrobe'.

30. The Recovered Textiles Market in Scotland: Market Analysis

30.1. Reprocessing Capacity

Collection of Textiles

The majority of textile collection is undertaken by Nathan's Wastesavers, the Salvation Army, Clyde Recycling, other community organisations and charities.

According to a Remade Scotland survey the main processing organisations in Scotland are responsible for collection of approximately 32,000 tonnes per year of clothing and textile waste with approximately 20-30% additional capacity available without the need for further capital investment.

Following collection of the clothing and textiles these organisations split materials into different grades based on colour, material and quality. The majority of the clothing and textiles collected are sent overseas to markets such as Africa, Asia, Middle East and Eastern Europe. Low grade textiles which are unsuitable for reuse as clothing are used to produce products such as wiping rags for industry.

In the UK textiles are collected at the kerbside, bring banks, recycling centres and charity shops (of which there are approximately 7000). The charity shop first removes higher quality clothing and then sells the rest on at prices which can vary according to the state of the market for second hand clothes as well as that for recycling materials.

25% of Scottish Local Authorities have a kerbside collection in place (Sort-it, 2008). Many of these collections are limited in terms of number of households served. The collections may be carried out by the local authority, community group or charity. Community groups and charities tend to sort through the materials and remove the more valuable items. The community groups contacted stated that they do not send products overseas. They can gain extra income by selling these items on-line or by selling the items to market traders or recyclers. Some charities and Local Authorities

hire recycling banks from recycling organisations. In most cases the recycler services these banks and pays an agreed price for textiles collected.

Community Groups

The Salvation Army Trading Company (SATCOL) collects approximately 2400 tonnes per year of clothing and textiles in Scotland with the majority being sent to England where it is bulked and then shipped to Eastern Europe for sorting. The tonnage of clothing and textiles resold in charity shops is not quantified.

Twenty six Community Groups collect textiles throughout Scotland – collecting from kerbside, recycling banks and charity shops. Many of these groups sort the textiles and distribute to the community. Any remaining material will be sent to rag merchants. The table below shows the number of community groups which collect textiles.

31. The Recovered Textiles Market in Scotland: Market Issues

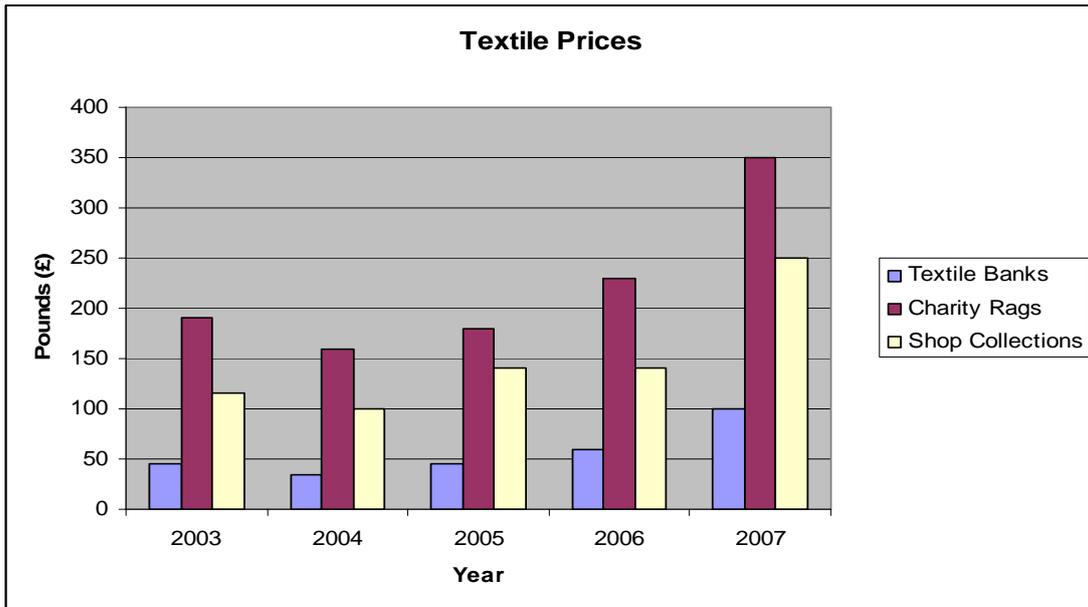
31.1. Economics

Collection services require high value sales to remain economic and therefore the drive towards value clothing could have a negative impact on collection. To maintain the current infrastructure within the UK recyclers need to be able to cover overheads and ideally to earn extra money for donation to charitable causes in the case of charities or for investment in equipment in the case of recyclers.

The current infrastructure has been driven by the value of textiles which are re-used as clothing. With the increase in 'value clothing', sales value of sorted grades is likely to be less than collection indicating a potential decline in collection of textiles.

31.2. Price

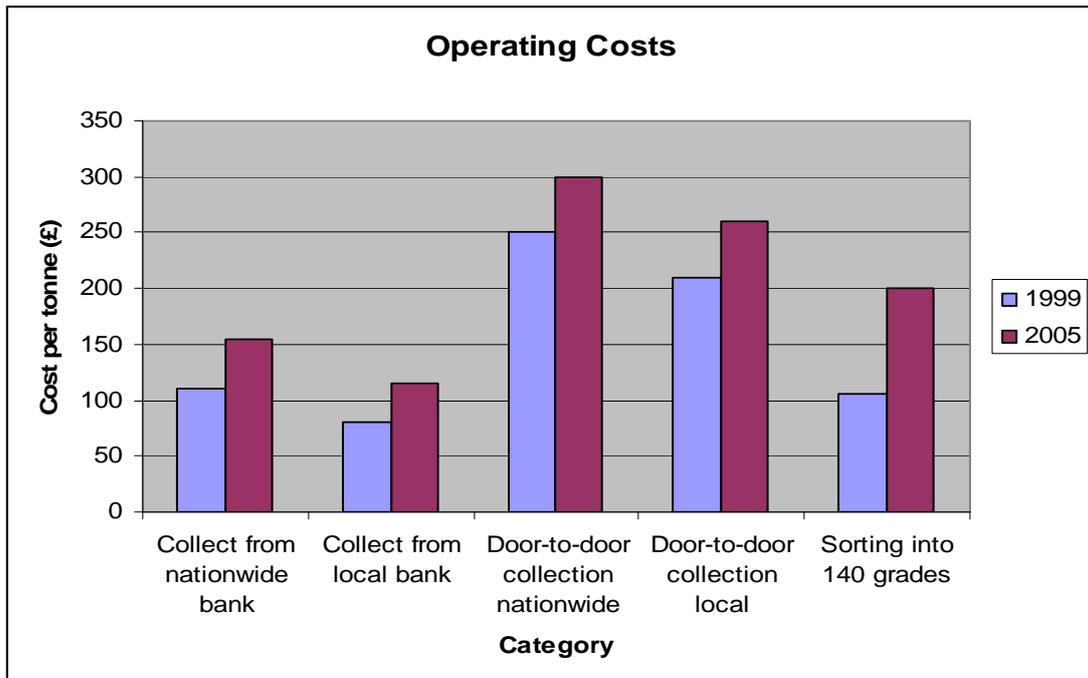
The figure below illustrates prices received for recycled textiles from 2003-2007. There has been an obvious increase in price paid by rag merchants for textile waste from 2003-2007. Price will depend on transport costs, textile bank hire and quality of materials. Market analysis seems to indicate that charity rags (materials delivered to textile recycling businesses) received favourable prices - £350.00/tonne in 2007. These materials tend to be of reasonable quality and are delivered direct to the recycling organisation; thus cutting down on transport costs. Shop collections (materials collected which charity shops have not made available for sale to the public) receive approximately £250.00/tonne from recyclers. Again, the material is of reasonable quality. The decrease in price could be due to transport costs involved. On a cost per tonne basis textile banks receive the lowest price - £100/tonne. This could be due to hire of the banks, transport involved in collections, sorting and quality of materials.



*Textile Banks – Material collected from textile banks (price normally paid to local authority)
 Charity Rags – Materials delivered to textile collecting businesses
 Shop Collections – Materials which charity shops have not sold to the public (price paid to charity shop)

Sorting and Operating Costs

The figure below illustrates that costs for collection and sorting have increased from 1999 to 2005. The largest increase seems to be in sorting required for materials. Sorting needs to be done by a competent person as the individual would have to identify different materials of different quality. This sorting may be attributable to increased labour costs and possibly on capital costs for processing equipment.

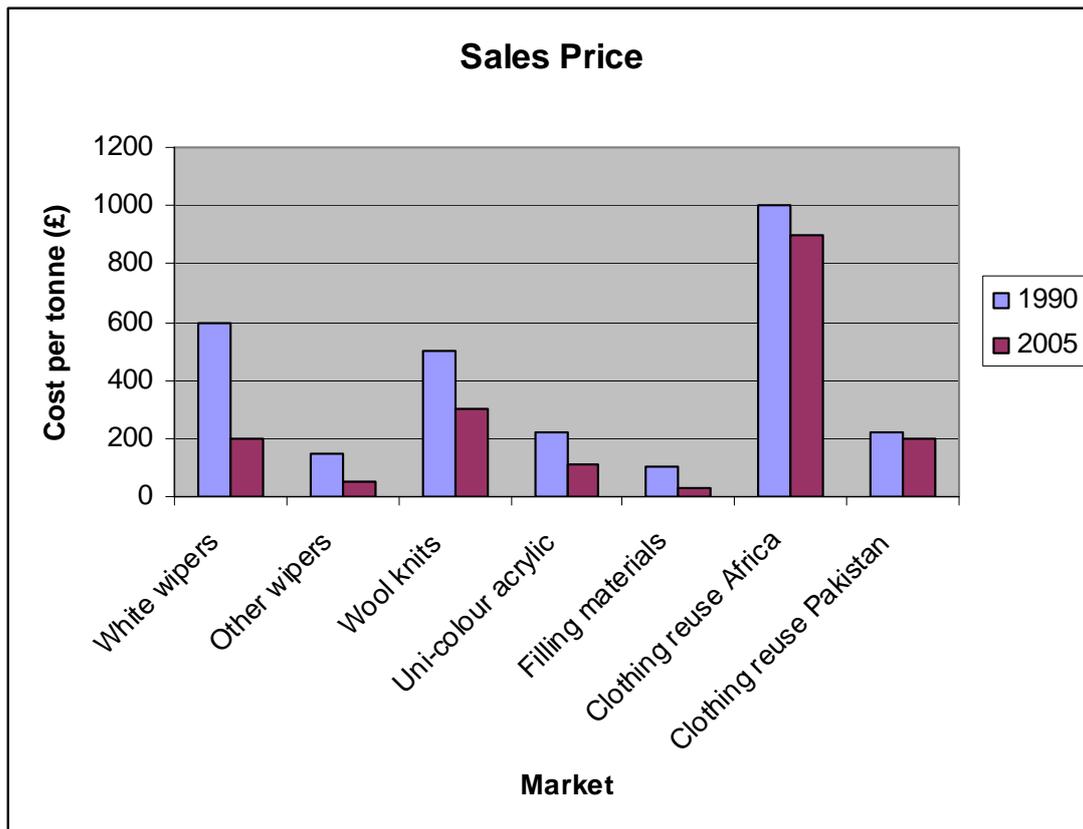


Despite the increase in operating costs across recycling organisations the industry is enjoying firm prices for used clothing. Research however suggests that this is a situation is going to be short lived. Trends indicate that larger quantities of low quality materials will enter the waste stream in the future; lower quality products are not designed to last for long periods of time. Reduction in good quality clothing may mean that current overseas markets may decline which could potentially have an impact on future collections in the UK. In addition, Defra states that overseas markets such as Africa are experiencing an influx of cheaper clothing from far eastern countries such as China and India resulting in reduced demand for second-hand clothing.

Sales for flocking or shoddy generates about 10% of collection costs (Oakdene Hollins, 2006) suggesting that there is a lack of added value markets available for recycling low grades of textiles. It seems that value in textiles reused as clothing is subsidising losses for recycling and disposal. If there is an increase in the amount of low grade waste arising it may exacerbate this situation. This could potentially result in more competition between organisations for higher quality materials and could also result in an increase in materials aiming at the flocking or shoddy markets – which could potentially lead to stock-piling as this market accepts materials from cheaper overseas sources.

Market Prices for Secondary Textile Products

There has been an overall drop in market prices for textiles in both the reuse and recycling sectors. Research is being carried out to identify alternative markets for lower grade materials. Policy intervention is required to stimulate innovation and to encourage investment in this sector. The figure below highlights the state of the market.



Prices received for low grade materials such as white wipers has decrease significantly from £600 in 1990 to £200 in 2005. In addition price, received from overseas markets for second hand clothing have seen a decrease.

31.3. Alternative Markets

To stimulate the market alternative outlets must be found for lower grade clothing and textiles. Approximately 40,000 tonnes of recovered textile waste is reused in the UK – primarily as second-hand clothing. The market for recycled textiles in the UK amounts to approximately 60,000 tonnes per annum (University of Cambridge, 2006). Recent work carried identified three main markets which accounted for an estimated 50,000 tonnes per annum (Oakdene Hollins, 2006); these were:

- Mattress/upholstery products (66%);
- Carpet Underlay (11%);
- Automotive applications (9%).

This indicates that the remaining 10,000 tonnes is used for the following markets:

- Wipers for engineering;
- Mattress spring padding;

- Shoddy manufacture.

The textile industry strategy 2007 – 2010 (Scottish Enterprise, 2006) states that more focus needs to be made on the production of more technical fabrics and aiming at niche markets. Potential markets have been identified which need be researched further (Oakdene Hollins, 2006):

- Capillary Matting;
- Automotive headliner/flooring;
- Bootliner components;
- Pre-seeded horticultural matting;
- Air filtration.

32. Key Issues Arising in the Recovered Textiles Market

32.1. Collection Infrastructure

It is of strategic importance to identify councils which collect high levels of textile waste. This identification of best practice will pinpoint councils which are effectively capturing textile waste. This knowledge can be transferred to other councils as well as helping to identify councils that need further support to increase their textiles recycling.

32.2. Market

Volumes of low grade textiles are expected to increase in the future. Given there is a lack of added value markets for this type of material there is potential for this trend to impact on the long term viability of the textile recycling industry.

In addition, the availability of cheaper clothing from far eastern countries such as China and India is resulting in reduced demand for second-hand clothing from the UK in Africa.

As a result of these drivers and the need to increase recycling rates there is a need to identify alternatives markets. As part of the Sustainable Clothing Roadmap work being led by Defra research is being carried out to identify alternative markets for textile waste. Potential markets have been identified which need to be researched further. Policy intervention is required to stimulate innovation and to encourage investment in this sector.

32.3. Market Capacity

The main processing organisations in Scotland are responsible for collection of approximately 32,000 tonnes per year of clothing and textile waste with approximately 20-30% extra capacity available without the need for further capital investment. The remainder is being collected and processed by community groups

and charities. Estimates indicate that approximately 135,000 tonnes of textile waste is landfilled in Scotland. To divert this waste from landfill significant investment would be required to improve both the collection and processing infrastructure.

33. The Recovered Green Waste Market in Scotland: Market Size

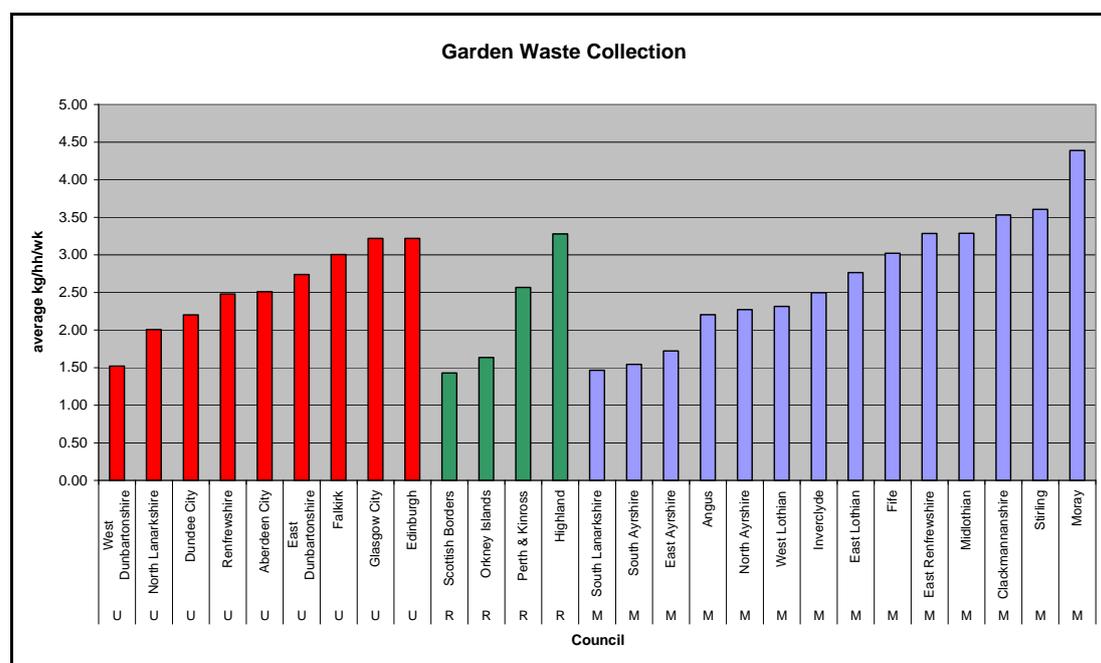
33.1. Municipal Waste Stream

The collection and composting of garden waste from households is an effective way for Local Authorities to divert organic materials from landfill working to meet both Landfill Allowance Scheme (LAS) targets and higher recycling targets recently announced by the Scottish Government. The Kerbside Best Practice Report (Remade Scotland, 2007) showed that 27 of the 29 Local authorities studied operated a kerbside garden waste collection service. Approximately 59% of households had access to kerbside collections of garden waste in 2005/06.

Clyde Valley has the highest yields of green waste from municipal sources – in excess of 80,000 tonnes. This area has high population densities and a large number of parks and gardens.

Shetland Isles, Western Isles, Dumfries and Galloway and Argyll and Bute have low yields of green waste. This is because segregated organic waste collections have not been part of their long term diversion strategy.

Local Authorities can be classed into family groups; mixed, rural or urban. The figure below illustrates green waste arising (kg/hh/wk) per Family Group. The Kerbside Best Practice report (Remade Scotland, 2007) highlighted that mixed councils provide 83% of households with a green waste collection, followed by urban at 73% and rural at 63%.



The output from garden waste schemes ranges from 1.43kg/hh/wk in the Scottish Borders to 4.67kg/hh/wk in Moray, with the average being 2.59kg/hh/wk. The reason for rural authorities collecting less material per household may well be the result of a higher proportion of households practising home composting rather than using the kerbside service.

Mixed local authorities collect on average 2.73 kg/hh/wk whilst urban and rural authorities collect 2.54 and 2.23 kg/hh/wk respectively (Remade Scotland, 2007).

Home Composters

According to a survey carried out by WRAP approximately 34% of households (with gardens) compost at home with 23% composting both kitchen and garden waste. Home composting is an effective way of dealing with organic household waste which, according to WRAP, has the potential to deal with approximately 8kg/bin/week organic waste. It satisfies reduction at source and the proximity principle.

Dumfries and Galloway Council and Scottish Borders Council supplied the highest number of compost bins to householders in 2005/06. Dumfries and Galloway Council do not provide a kerbside collection which implies that householders will be encouraged to home compost. The Scottish Borders implemented a new scheme in 2005/6 providing centralised, home composting bins, kerbside collection and bring (drop-off) composting collection which could explain the high numbers of compost bins supplied.

Total collection of organic waste from each waste strategy area is of strategic importance as it allows focus of resources on areas where yields are high. These areas may need help in identifying outlets for output material. It may also help identify areas which require assistance – for example, capital investment or improved collection infrastructure.

34. The Recovered Green Waste Market in Scotland: Market Analysis

34.1. Reprocessing Capacity

PAS 100 Producers in Scotland

Seventeen compost producers have been identified within Scotland which are either accredited or working towards PAS 100 accreditation (detailed in the table below). Eight are certified and nine are working towards certification. Two Local Authorities are PAS 100 certified with one working towards certification.

| PAS 100 Certified | Waste Strategy Area |
|-------------------------------|---------------------------------|
| Barr Environmental Ltd | Ayrshire, Dumfries and Galloway |
| William Tracey | Ayrshire Dumfries and Galloway |
| Fife Council | Fife |
| Stirling Council | Forth |
| GP Green Recycling | Glasgow and Clyde Valley |
| Scottish Water | Glasgow and Clyde Valley |
| Forth Resource Management Ltd | Lothian and Borders |
| Keenan (Recycling) Ltd | North East |

| PAS 100 Applied | Waste Strategy Area |
|-------------------------------|---------------------|
| Realm Construction | Fife |
| West Lothian Recycling Ltd | Lothian and Borders |
| Forth Resource Management Ltd | Lothian and Borders |
| Forth Resource Management Ltd | Lothian and Borders |
| AH Tucker | Lothian and Borders |
| TEG Environmental Ltd | Tayside |
| Dundee City Council | Tayside |
| Levenseat Recycling | West Lothian |

Once all organisations become PAS 100 certified there will be a prevalence of facilities in the Lothian and Borders area. There could potentially be an increase in competition if companies focus their attention on similar markets. As such there may be a need for diversification in the marketplace in terms of product outputs.

The tables below show grades of materials produced in each waste strategy area. Soil improvers predominate. Soil improvers are defined as ‘material added to soil in-situ primarily to maintain or improve its physical properties, and which may improve its chemical and/or biological properties or activity’. Results show that a range of grades are produced throughout Scotland. There will be a focus on specific markets. In the North East for example there are three main products; 0-5mm top dressing, 0-12mm soil improver and 0-40mm. Glasgow and Clyde Valley produces a variety of soil improvers, ranging from 0-10mm to 0-40mm.

| Waste Strategy Area 'Certified Status' | Grade |
|--|---|
| Ayrshire, Dumfries and Galloway | 0-25mm Soil Improver 0-20mm Soil Improver |
| Fife | 0-25mm Soil Improver 0-40mm Soil Improver |
| Forth | 0-10mm Soil Improver |
| Glasgow and Clyde Valley | 0-12mm Soil Improver 0-10mm Soil Improver 0-20mm, Soil Improver 0-40mm Soil Improver |
| Lothian and Borders | 0-10mm Soil Improver 0-40mm Soil Improver for agriculture |
| North East | 0-5 mm Top Dressing 0-12mm Soil Improver 0-40mm Mulch |

The table below shows materials due to enter the market when reaching PAS 100 certification.

| Waste Strategy Area 'Applied Status' | Grade |
|--------------------------------------|---|
| Fife | 0-10mm Soil Improver 0-20mm Soil Improver 10-40mm Soil Improver |
| Lothian and Borders | 0-6mm Mulch 0-10mm Soil Improver 0-20mm Soil Improver 0-40mm Mulch 0-40mm Soil Improver |
| Tayside | 0-10mm Soil Improver 0-12mm Turf Dressing, 0-20mm Mulch 12-18mm Soil Improver 18-40mm Soil Improver |
| West Lothian | 0-25mm Soil Improver, 0-25mm Topsoil Ingredient 10-75mm Mulch |

A number of products will potentially enter the market in Tayside – an area currently lacking in PAS 100 approved material. Lothian and Borders will see an increase in product range. It should be noted however that the majority of products in this area are produced by one company.

Market Value: Product Value

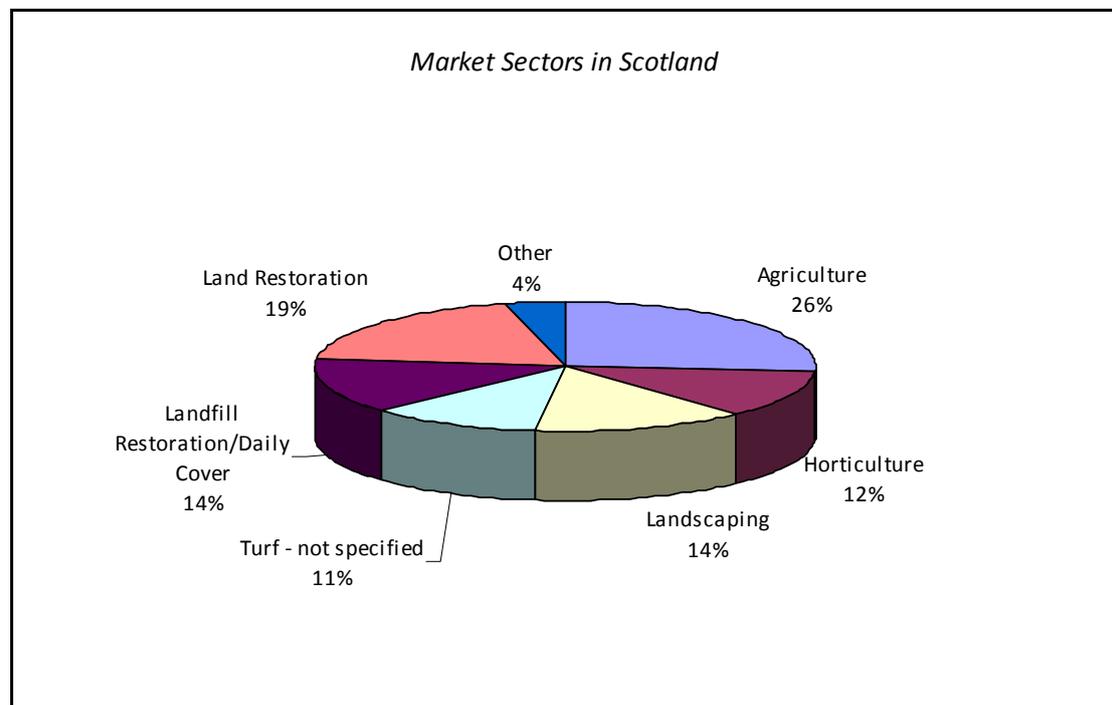
This estimated product value was calculated by establishing the tonnage of green waste collected by each LA and then applying 'market rates' from letsrecycle.com. The low value for green waste is given at £5.00 and the high value at £11.00 per tonne. This is based on 600kg per m³ produced. These estimated values are illustrated in the figure below.

There is a significant difference in terms of maximum and minimum values. Factors such as market demand and competition will play a significant role in final product value.

34.2. Product and Market Sectors

In 2005/06 27% of compost output reached PAS 100 standard (SEPA, Data Digest 7, 2007). This is set to rise and with it will come increase in competition for product sales unless processors choose to diversify output materials.

Recent Remade reports based on the Lothian and Borders and the Glasgow & Clyde Valley areas indicated that potential demand of compost is approximately 150,000 cubic metres and 95,000 cubic metres respectively. This highlights the variation in land use within these two regions. The market sectors are illustrated in the figure below.



Agriculture and Land Restoration are the largest markets for compost in Scotland accounting for 24,625 tonnes (26%) and 17,323 tonnes (19%) respectively. Recently however Quality Meat Scotland (QMS), the National Farmers Union Scotland (NFUS) and the National Beef Association (NBA) have voiced concern over the use of compost derived from green waste or food waste on agricultural land. The organisations have stated that the compost could potentially harbour pathogens and weeds which could have a detrimental effect on crops and livestock. This has the potential to cause problems for processors which rely on the agricultural market as an outlet for compost.

There is a large agricultural market in areas such as the Lothian & Borders region. However, the market is more limited in areas such as Glasgow and Clyde Valley.

To further publicise and stimulate the use of green waste compost in alternative applications, eight trailblazer projects have been funded by WRAP in Scotland which equates to 32,460 tonnes of PAS 100 material. These projects involve a range of applications from restoration of opencast mines and quarries to regeneration of areas previously populated by heavy industries.

Landscaping

This industry accounts for approximately 14% (12,785 tonnes) of the compost market in Scotland. It is common practice to import topsoil however a number of campaigns have helped to raise awareness regarding the environmental and financial benefits of green waste compost. To help progress the use of green waste compost in the industry WRAP has published specifications for the landscape industry (New British Standard Specification for Topsoil (BS3882:2007)) which is designed to drive suppliers, specifiers and users of topsoil, to take into account the intended use of the topsoil and ensure it is fit for purpose.

Horticulture

This industry accounts for 12% (10,745 tonnes) of the compost market in Scotland and, according to The Garden Industry Monitor 2006, there has been a 21% increase in the sale of peat-free compost between 2005 and 2006. Different applications require different standards of compost – users may use one standard of compost for germinating seeds and another for re-potting. Recently, in the magazine 'WHICH?', green waste compost received 'bad press' because a particular standard of green waste compost – unsuitable for the application - was used for germinating seeds. Effort should be made to raise awareness of amateur/hobby horticulturalists to this. It is known from Horticulture Trade Association (HTA) research that the majority of gardeners are not aware of the materials contained in the bags of growing media that they buy, be it peat or not. Professional growers, accounting for 4,420 tonnes of green waste compost have however in recent years been trialing peat-free growing media which have proved to be successful.

35. The Recovered Food Waste Market in Scotland: Potential Market

35.1. Food Waste in Context

The Landfill Directive has set targets and timescales for reducing the amount of biodegradable waste sent to landfill. Scotland has to reduce the landfilling of BMW to 1.38 million tonnes by 2008/09, 1.32 million tonnes by 2009/10 and 0.88 million tonnes by 2012/013.

Food waste accounts for approximately 18% of Scotland's household waste (Eunomia, 2007) and if recent commitments by the Scottish Ministers to recycling targets of 70% are to be achieved, intensive recycling programmes, including food waste collection, are needed. To collect food waste from households, treatment facilities need to comply with the Animal By Products (ABP) regulations. The regulations (1774/2002/EC) lay down health rules concerning animal by-products, not intended for human consumption, applied in member states from May 2003. The regulations control the collection, transport, storage, handling processing and use or disposal of animal by-products. This placed a ban on the use of landfill as a disposal route for most animal by-products. Animal by-products fall into three categories – Category 1 posing most risk and Category 3 carrying the least risk to animal or human health. Category 3 material includes ABPs from processors, former foodstuffs and some catering waste. Raw meat and fish waste cannot be sent to landfill. As of 1st January 2006 some catering waste and some former foodstuffs could continue to be sent to landfill (member states have been permitted to determine which former foodstuffs can be safely disposed of to landfill).

If fully rolled out across Scotland, food waste recycling has potential to recover approximately 200kt/yr of BMW (based on collection of 2kg/hh/wk from households with a green waste service).

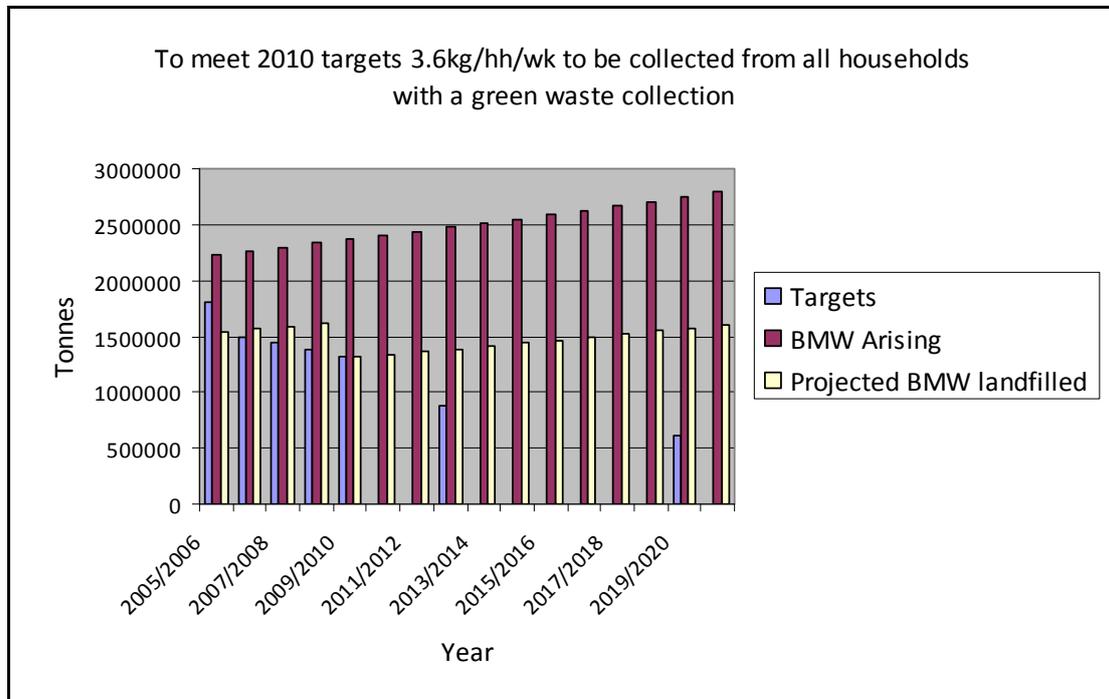
Two Scottish councils have implemented combined food and garden waste collections, Perth and Kinross Council and Western Isles. Perth & Kinross provides 1,500 households with a fortnightly collection using 240 litre bins, kitchen caddies and compostable liners. The waste is sent to an IVC plant operated by TEG Environmental Plc. The Local Authority has indicated a possible expansion to 53,000 households by 2009. Western Isles started a pilot scheme in April 2006 using 240 litre bins, kitchen caddies and paper liners. The service now serves 20,000 households and organic waste collected is sent to an AD plant.

35.2. Scottish Food Waste Trials

To assess the effectiveness of different food waste collection systems, in terms of diverted tonnage and associated economics, seven trials are proposed in Scotland. The Scottish Food Waste Trials, funded by the Scottish Government, will complement trials undertaken elsewhere in the UK which are supported by WRAP. Four Scottish Local Authorities will focus on collection of food waste and three will add to existing infrastructure, collecting food waste with the garden waste. All of the trials have proposed In-Vessel Composting (IVC) as the preferred treatment

method. The majority of the trials are dependent on one treatment facility gaining the necessary permit. Ongoing negotiations with SEPA around the details of the permit have led to some delays and as of January 2008 this is expected to be granted in April 2008.

The figure below shows the impact of collecting 3.6kg/hh/wk food waste from approximately 1.7 million households.



Assuming collection of 3.6kg/hh/wk food waste from each household with a green waste collection approximately 322,000 tonnes of food waste per year would be diverted. This would help achieve the 2010 target.

The performance of current food only waste collection schemes throughout the UK varies significantly, with yields ranging from 0.9 to 3.5kg/hh/wk (Remade Survey). Remade Scotland also found that yields for combined food and garden/paper/card waste collections range from 2.6 to 7 kg/hh/wk. For comparison, garden waste only collections in Scotland typically collect 1.43 to 4.67 kg/hh/wk, with the average being 2.59kg/hh/wk (Remade Scotland, 2007).

For combined collections, the majority of Local Authorities contacted had not carried out a waste analysis of the combined collections, thus making it difficult to work out the quantity of food waste that is captured using this collection method. Some have carried out a visual assessment of the organics bin stating that food waste accounts for approximately 10%-30% of the total bin.

35.3. Commercial and Industrial Waste Arisings

Quantifying arisings and composition within this sector is required to help support the implementation of future policies and plans in Scotland. In 2004, SEPA commissioned a survey of commercial and industrial waste producers. This survey

provided a breakdown of commercial and industrial waste in each strategy area by EWC and SIC. The EWC categorises wastes based on a combination of what they are and the process or activity that produces them. The SIC categorises businesses by economic activity.

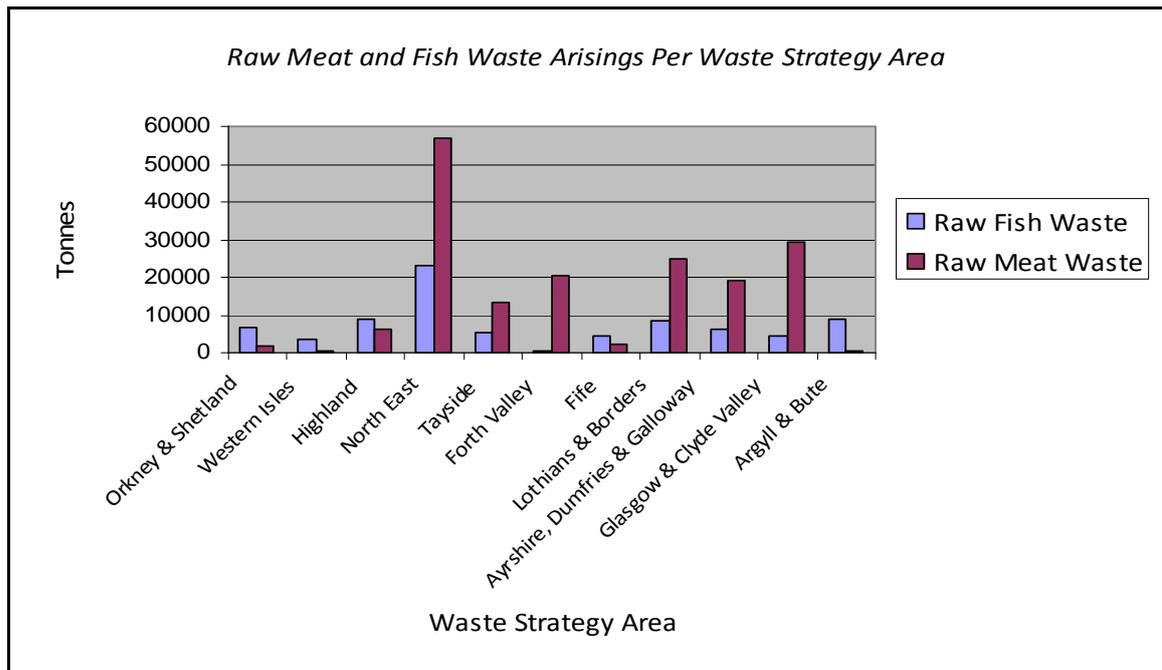
EWC code 02 is relevant to any business considering treatment of biodegradable waste. EWC 02 includes agriculture, horticulture, aquaculture, forestry, hunting, fishing and food preparation and accounts for approximately 530,000 tonnes of arisings per year. The figure below shows EWC 02 arisings per waste strategy area. The highest levels of EWC 02 waste arises in the Glasgow and Clyde Valley (at approximately 180,000 tonnes) and Lothian and Borders (at approximately 100,000 tonnes).

The specific quantity of biodegradable material within this category is unclear. However SEPA is carrying out a National Best Practice Project which quantifies raw meat and fish waste arisings from food preparation and processing waste (SEPA, 2007). The report indicates that approximately 210,000 tonnes of raw meat was generated last year in Scotland and approximately 80,000 tonnes of fish waste from the food manufacturing and retailing sectors.

SEPA indicated that there is enough capacity, equating to 310,000 tonnes in Scotland to deal with this waste. This includes composting, anaerobic digestion, incineration and rendering. Some of these materials will be classed as Category 1 or 2 which need to be rendered. Category 2 materials can be composted or digested providing the material has been rendered prior to this. Category 3 materials can go straight to composting or AD plants. SEPA has assumed that fish waste arisings are being classed as category 3 ABP as very low amounts of category 2 material reaches the fish processing and retailing sector. The raw meat sector can be split into 3 ABPR categories. The percentage arisings are shown in the table below.

| Category | Percentage of Raw Meat Waste Generated by APBR Category |
|------------|---|
| Category 1 | 15% |
| Category 2 | 31% |
| Category 3 | 54% |

Composting and Anaerobic Digestion facilities can accept and treat raw meat and fish waste providing the facility complies with the Animal By-Products Regulations. In Scotland there is approximately 100 tonnes capacity available to treat source segregated Animal By-Products. These facilities however will also be taking green waste which indicates that capacity for ABPs will be reduced. To improve confidence of investors it is of strategic importance to identify areas which yield highest tonnages. The figure below shows fish waste and raw meat waste arisings per waste strategy area.



Yields of raw meat and fish waste are highest in the North East, Glasgow and Clyde Valley and Lothian and Borders. There is one ABPR facility in each of these waste strategy areas.

In Scotland there are eight ABPR composting facilities and three ABPR biogas facilities. Four of the licensed composting facilities are run by Shanks Plc under Public Private Partnership (PPP). Mixed municipal waste is treated at these sites as segregation is not part of the long term strategy for biodegradable diversion. These facilities would not be able to achieve PAS 100 accreditation as waste is not source segregated.

There are currently two mainland ABPR approved anaerobic digestion facilities in Scotland. The third facility is located on the Isle of Lewis. The plants are small-scale facilities and have no free capacity available to take other materials. These particular facilities should be designed for specific input materials; adding additional materials could upset the balance in the digester which could potentially lead to lower methane yields and possible contamination issues. WRAP has provided capital funding to facilities wishing to capture ABPs. This accounts for approximately 50,000 tonnes per year capacity.

If Local Authorities were to collect approximately 320,000 tonnes of food waste and if all raw meat and fish waste was to be collected from the food preparation and processing waste sector then an additional 300,000 tonnes capacity would be required to treat this.

36. Key Issues Arising in the Organics Waste Market

36.1. Collection and Treatment Systems

Research is required to provide a clear understanding of the effectiveness of different food waste collection and treatment systems in terms of diverted tonnage from residual waste stream and the associated economics. Collection infrastructure for wet wastes such as food waste and food processing waste needs to be addressed.

36.2. Capacities

To meet 2010 diversion targets Scotland needs to increase diversion of biodegradable waste. If relying on diversion of food waste to meet the target then approximately 322,000 tonnes of food waste needs to be collected. If 322,000 tonnes of food waste from households and 290,000 tonnes of raw meat and fish waste from the C&I sector is collected then the extra capacity required equates to approximately 300,000 tonnes. Currently, investment in reprocessing facilities is seen as high risk due to the lack of available data in terms of material arisings in each region, collection infrastructure, associated costs, competition, treatment type, operational expenditure and revenue.

36.3. Market

Processors need to diversify; developing products which meet the needs of markets. In order to identify the key markets in specific waste strategy areas an in-depth analysis of competition, potential end-markets and land-use is required. Improving confidence in green/food waste compost is needed to ensure continued expansion of the sector. There is a need for effective and affordable methods for monitoring Scottish soils, which are compatible with UK and European Union monitoring schemes.

37. The Recovered WEEE Market in Scotland: Market Size

37.1. Municipal Waste Stream

A Scottish Executive (2001) study, estimates the WEEE production in Scotland for the period 2000-03. Extrapolating the figures from the data sets used in this study, it is calculated that the WEEE grew at a rate of 7.6% per year for the period 2003-06. According to these calculations, the amount of WEEE generated in Scotland in 2006 is estimated to be 66,000 tonnes.

LAWAS show that in 2005/06 14,444 tonnes of WEEE were collected by the Scottish Local Authorities. The collection was made at the recycling centres, now Designated Collection Facilities (DCFs) and through the kerbside scheme, operated in the Local Authority areas by the special collections of bulky waste services offered to the householders (SEPA, 2006).

37.2. UK and Scottish Recovered WEEE Market

A review of the WEEE Directive (United Nations University, 2007) showed that the WEEE arisings in the UK were 1,385,000 tonnes in 2006. WEEE waste arisings in Scotland in the same year were 66,000 tonnes, equivalent to nearly 6% of the total UK waste arisings.

115,826 tonnes of WEEE were collected in the first quarter of the implementation of the WEEE regulations (Environment Agency, 2007). This would equate to approximately 463,000 tonnes of WEEE being collected per year in the UK. This estimation is limited as no data are available for Northern Ireland or Wales. 14,000 tonnes of WEEE were collected in Scotland in 2006 (SEPA, 2006), equating to nearly 3% of the total WEEE estimated to be collected in the UK.

38. The Recovered WEEE Market in Scotland: Market Analysis

38.1. Reprocessing Capacity

Producer Compliance Schemes (PCSs) need to establish commercial relationships with Approved Authorised Treatment Facilities (AATFs) to ensure all WEEE is treated and reprocessed in accordance with the WEEE Regulations. The Settlement Centre has been appointed to record producer responsibility evidence for WEEE, by monitoring producer performance against their obligations. Glasgow business and IT consultancy Real Time has been appointed by BERR to operate the Settlement Centre for the WEEE. The Settlement Centre will record all exchanges of treatment evidence for WEEE between AATF and PCS. A PCS will be required to provide the Settlement Centre with documentary evidence of the amount of electrical waste they have handled and treated on behalf of their members. The Settlement Centre will also allow Local Authorities to recover any money they spend treating electrical waste themselves, if they have not managed to arrange clearance from their sites by a producer compliance scheme (BERR 2007b).

The table below shows the twenty AATFs approved by SEPA on July 2007. The majority of the companies operating in Scotland are specialised in Categories 3 and 4. Three of the AATFs are scrap metal companies and two companies are specialised on the recycling of lighting equipment. Another two companies, Shore Recycling and Grangemouth Enterprise, take fridges and freezers. The former is the biggest WEEE recycling company in Scotland, the later is a charity that refurbish and reuses second hand white goods and fridges and freezers for Scottish families with low income.

| Name of company | Size | Categories of WEEE recovered |
|--|--|-----------------------------------|
| Burnhouse Discount Appliance Company | Up to 400 tonnes | -- |
| CCL North Limited | Up to 400 tonnes | 3, 4 |
| Christie and Son (Metal Merchants) Limited | Up to 400 tonnes | 1 (Specialised in scrap metal) |
| Computer Recycling Services Limited | Up to 400 tonnes | 3,4 |
| Concorde Metals Recycling Limited | Up to 400 tonnes | 1 (specialised in scrap metal) |
| Datec Technologies Limited | Up to 400 tonnes | 3 (Specialised in circuit boards) |
| Easdale Environmental Development Limited | Up to 400 tonnes | 3 |
| ER3 Solutions Limited | Up to 400 tonnes | 3 |
| Grangemouth Enterprises (S&M) Limited | Up to 400 tonnes | 1,3 |
| Holden Environmental Limited | Up to 400 tonnes | 3,5 |
| ILM (Highland) | Up to 400 tonnes | -- |
| MGH Scotland Limited | Up to 400 tonnes | 3,4 |
| Mooch Environmental Solutions Limited | Up to 400 tonnes | 3 |
| Restructa Limited | Up to 400 tonnes | 3,4 |
| RM Supplies (Inverkeithing) Limited | Up to 400 tonnes | 1 (Specialised in scrap metal) |
| Shore Recycling Limited | More than 400 t | 1,3,4,5 |
| TES-AMM (Europe) Limited | More than 400 t | Specialised in metal recovery |
| WEEE Solutions Limited | Up to 400 tonnes | All |
| Environcom Ltd | Operator of an AATF located in England | All |
| Sims Group UK Ltd | -- | All |

Some treatment facilities are not AATFs but they can still receive and treat WEEE if they are Authorised Treatment Facilities (ATFs). However, they cannot issue evidence of compliance to producer compliance schemes if they are not approved. Some examples of ATFs operating in Scotland are Stewart Recycling, Envirolite and The Bulb Eater.

WEEE that is collected through the in store take back schemes offered by some distributors, can be returned directly into the system. The distributor has to contact a PCS in order to arrange to return the WEEE deposited in its store direct to an AATF or the PCS. The WEEE deposited by this way should be added to the account of the relevant PCS and evidence issued accordingly.

AATFs located in Scotland were contacted in order to obtain figures for operational capacity. Responses were received from Shore Recycling, PC-Recycling and Restructa as shown in the table below. Shore Recycling, the biggest WEEE recycler in Scotland, expects to process fewer electronics items than they can technically accept at their premises in Perth during 2008. Smaller companies operating in Scotland, PC-Recycling and Restructa, specialised respectively in “IT & telecommunications equipment” and “CRTs” have the capacity to reprocess the WEEE collected at the moment. PC Recycling is operating below capacity whereas Restructa is at the limit of its capacity for processing CRTs. In the short term, recycling companies have the capacity to deal with an increase in WEEE collection.

| Reprocessing Company | Expected Tonnage | Maximum Tonnage |
|----------------------|------------------|-----------------|
| Shore | 38,500 | 58,000 |
| PC Recycling | 300 | 4999 |
| Restructa | 400 | 400 |

Reprocessing capacity for Categories 3 and 4 is the most readily available in Scotland. There is a lack of recycling companies that specialise in small WEEE. The majority of companies are specialised in handling large household appliances, IT equipment and CRTs. Computers contain precious metals in their circuit boards, which make IT equipment profitable to recycle. In recent years CRTs have begun to be replaced by LCD technology, resulting in a large amount of this WEEE stream entering the marketplace, and hence making it economically favourable to recycle. However, this is just a temporary situation because once all householders have replaced their old CRTs with other screen technologies there will not be the equivalent volume of CRTs to be treated.

There are several large companies taking white goods for the scrap metal but their main income is not from MSW white goods given that they accept a broad range of products such as vehicles, machinery, engines or steel cans.

Since there is currently only one company that recycles lighting equipment in Scotland, this does not provide enough capacity to handle fluorescent tube arisings and hence there is a need for greater capacity in the future.

38.2. Recovered WEEE Exports

It is widely known that there is a strong demand for electronic appliances in developing countries. However, Transfrontier Shipment regulations limit the types of equipment that can be legally exported and the destinations permitted to receive them. Regulations allow export of WEEE for recovery or recycling but prohibit exporting WEEE for disposal.

It is difficult to quantify the amount of domestic WEEE that has been exported for re-use or recycling outside the UK. Specific data for Scotland is not available at present but it is anticipated that recovery of data on exports from Scotland to the EU and Asia will be possible through analysis of the new Annex VII forms that must accompany all Transfrontier Shipments of Waste.

ICER (2004a) identified around 28,000 tonnes of household WEEE (over a million items) that were exported from the UK in 2003 to developing countries. However, there is evidence to suggest that export of equipment containing hazardous waste, such as refrigeration items or CRTs, could have been much higher due to the lack of control of these activities. Increasingly WEEE is being exported as reusable equipment to developing countries such as Nigeria, China and India. However, the working condition of this equipment is not always checked.

The WEEE Directive aims to control the WEEE being exported for re-use or recycling outside the UK, forcing the exporters to report records of the items exported. In July 2007 SEPA and the Environmental Agency approved the list of Authorised Exporters (AE). AEs have to submit to the regulator quarterly returns, including tonnage of material exported and the country of origin/destination. The table below shows the list of the AEs in Scotland. Apart from John Lawrie (Aberdeen) Limited, all of the companies are also AATFs.

| Name of company | Size | Categories of WEEE exported |
|--|------------------|-----------------------------------|
| Christie and Son (Metal Merchants) Limited | Up to 400 tonnes | 1 (Specialised in scrap metal) |
| Datec Technologies Limited | Up to 400 tonnes | 3 (Specialised in circuit boards) |
| John Lawrie (Aberdeen) Limited | Up to 400 tonnes | 1 (Specialised in scrap metal) |
| RM Supplies (Inverkeithing) Limited | Up to 400 tonnes | 1 (Specialised in scrap metal) |
| Shore Recycling Limited | More than 400 t | 1,3,4,5 |
| TES-AMM (Europe) Limited | More than 400 t | Specialised in metal recovery |

39. The Recovered WEEE Market in Scotland: Local Market Issues

39.1. Materials

WEEE is a complex waste stream that comprises several materials. The main ones are metals, plastics and glass.

“Large household appliances” and “electrical tools” material composition is mainly metals and, in a smaller proportion, plastics. In contrast, “small household appliances”, “IT equipment”, “telecom devices” and “radios, TVs & musical instruments” contain a large proportion of glass.

The table below show the main recovered materials by WEEE category.

| WEEE Category | Ferrous | Non-Ferrous | Glass | Plastics |
|--|---------|-------------|-------|----------|
| Large household appliances material composition | 74 | 9 | 3 | 14 |
| Small household appliances material composition | 3 | 1 | 68 | 28 |
| IT equipment material composition | 18 | 36 | 40 | 6 |
| Telecom devices material composition | 14 | 0 | 60 | 26 |
| Radios, TVs & musical instruments material composition | 1 | 19 | 40 | 40 |
| Electrical tools material composition | 45 | 8 | 0 | 47 |

WEEE is a waste stream that comprises a diverse range of material of widely varying value and toxicity. Technologies to process wastes into useful materials and markets are only just forming.

Metals

These are the highest value components within the WEEE stream. There are established markets in the UK that find value and use of the metal depending on the purity. The metals found on WEEE are ferrous and non-ferrous.

Ferrous metals typically occur in large household appliances such as cookers, washing machines and fridges and freezers. The UK has well-developed businesses handling ferrous metals.

Non-ferrous metals that can be found in WEEE are aluminium, copper and tin. There is also a well-established business supporting the recovery of value from these non-ferrous metals in the UK.

Further information on the recovered metals market in Scotland can be found in Sections 13 to 16.

Precious metals can be found in many components of the electronic equipment, especially in the circuit boards. Precious metals commonly found are gold, silver and platinum.

Plastics

WEEE can contain many types of plastic in order to achieve the required physical and cosmetic properties in the finished item. Generally, the plastics used in EEE are engineering thermoplastics (ETP), including High impact polystyrene (HIPS), Acrylonitrile Butadiene Styrene (ABS), Polycarbonate (PC), PC/ ABS blends and Polyphenylene Oxide blends (PPO).

Some of the plastics which can be found in the WEEE contain halides or fire retardants and therefore they are subject to additional restrictions on their safe disposal/treatment.

Virgin ETPs are often high-value specialised polymers. Therefore, recovered ETPs have the potential to attract a high price in line with virgin prices if reprocessed to the required specifications. Over the last few years, the consumption of ETPs in the UK has grown by about 140%. Growth is predicted to continue, but not at such a dramatic rate. The UK now consumes approximately 16% of the plastics for EEE in Europe, equivalent to 240,000 tonnes. However, the current level of recycling post-consumer ETPs in the UK is very low. This is due to the potential contamination from other plastics, and the costs of sorting, segregation, grinding and testing can make using recycled plastic uneconomic compared to using virgin polymers.

Glass

Glass is found mainly in CRTs and small WEEE (e.g. mobile phones or iPod screens). However, production of CRT glass is decreasing due to LCD production, which means that the capacity to absorb this kind of glass will rapidly diminish. At the moment, the principal streams emerging from WEEE are metals and plastics (DTI 2006). It is not clear yet if any real markets exist for the glass stream coming from the WEEE.

Hazardous materials

Some of the hazardous materials that can be found in the WEEE are described below:

- Mercury can be found in mercury lamps. There are very few companies that currently recycle mercury and sodium lamps in the UK, two of them are in Scotland.

- Lead is found mainly in CRTs (TVs and computer monitors). There are several companies in Scotland that specialise in CRT recycling.
- Cadmium is mainly found in batteries and plated parts.
- Flame retardants found in some plastics. Typically 50% of the plastic found in WEEE has been treated with flame retardant.

39.2. The Reuse Market

The WEEE directive calls for the prioritisation of whole appliances for reuse and refurbishment. PCS are encouraged to develop relationships with reuse organisations. The recent WEEE (Amendment) Regulations 2007 aims to stimulate, among other issues, the re-using of EEE. Under the revision in the legislation, the nationwide charity Furniture Re-use Network (FRN), which assists charitable re-use organizations across the UK, has made agreements with producers and compliance schemes in order to stimulate the re-using of WEEE.

DSG group, which provides in store take back for WEEE, will start to ask their customers whether the product that they are replacing is still functional. In that case, they will pass the item onto the local FRN organization to be refurbished. At the moment the group is taking between 70 and 200 items per week, therefore it is expected that a considerable quantity of items will be re-used per year in the UK via this system. Also REPIC, a compliance scheme which represents mainly white goods manufacturers has also made a partnership with the FRN in order to develop a more effective reuse service (letsrecycle.com, 2007).

In a study undertaken by Remade Scotland (Remade Scotland, 2006) it was concluded that 14% of the recycling centres in Scotland have a reuse system in place. Generally, reuse systems are operated by local charities that accept all sorts of furniture and electronic household items that are subsequently given to Scottish families in need. The table below shows some of the reuse systems and the community group that reuse the WEEE in Scotland.

| COUNCIL | Recycling Centre | Community groups |
|------------------|-------------------|------------------------------|
| Clackmannanshire | Forthbank (Alloa) | Grangemouth Enterprises |
| Edinburgh city | Braehead | Four square |
| | Seafield | |
| Highlands | Alness | Blythswood |
| | Dingwall | Lochaber Environmental Group |
| | Fort William | |
| | Inverness | |
| | Kingussie | Newstart Highland |
| | Nairn | |

| | | |
|--------------|----------|-----------------------|
| | Thurso | Homeaid Caithness |
| | Wick | |
| Renfrewshire | Erskine | Recycle Renfrewshire |
| | Linwood | |
| | Renfrew | |
| West Lothian | Whitburn | Home Aid West Lothian |

These community groups are developing strong markets for reusing large household appliances; however limited WEEE reuse is taking place for small WEEE items, such as small household appliances, tools or toys.

There are some health and safety requirements for the sale of second hand EEE through private sales, second-hand shops and charity shops. An electrical safety test is required before selling this kind of EEE in order to avoid defective items. However, second hand electrical appliances which are sold on public websites, such as e-bay, do not currently have to undertake these tests.

There are also some organisations that refurbish computers in Scotland. However refurbishment involves more than the electrical safety test before the electronic goods can be re-sold.

Markets for re-use/ refurbishment of second hand EEE are dependent on the age, brand and model of the old equipment. Part of the refurbishment process may result in dismantling of computers to release components that can be used to refurbish other computers. Therefore WEEE may be generated from the refurbishment process depending on the criteria for accepting the incoming WEEE.

40. Key Issues Arising in the Recovered WEEE Market

40.1. Data Issues

At the time of writing accurate data on WEEE recovery was not available. However, the approval of the ATFs and AEs force recycling companies/exporters to complete evidence forms every four months. In these quarterly returns tonnage data from the household and non household WEEE which has been received for treatment, recovery or reuse must be reported to the regulator. PCS also have to report to SEPA the amount of EEE that they put on the market. Therefore, it is expected a better and higher accuracy in the WEEE data reporting during the next years, once all the data systems are fully functional.

Current data sources are unclear about which types of WEEE have been taken into account when generating figures. The Defra figures for England use a very simple classification of WEEE; white goods & scrap metal and fridges & freezers. On the other hand, Scottish LAWAS reports count White goods and WEEE in the same

category. Future figures on WEEE collection/recovery should be detailed taking into account the ten WEEE categories described in the WEEE directive.

40.2. Small WEEE

There is a lack of information about smaller WEEE. Small appliances, with few exceptions, are close to zero per cent collection, leaving the UK substantial room for improvement.

40.3. WEEE Collection Systems

Although a large proportion of the retailers have chosen to offer in store take back, the main collection via of household WEEE is at the Local Authority recycling centres. Scotland had already a very well developed network of recycling centres throughout the country that, in some cases, started to collect the WEEE before the regulations came into force. Householders have rapidly engaged with the new service being offered. However, this trend may change once the public knows about the advantages of the in store take back system.

41. Findings

The key findings of the review highlighted a commonality among most materials in terms of the key market issues.

41.1. Quality

Quality issues are still prevalent in the majority of materials with only metals, tyres and organics presently operating with well defined, clear national guidance on what quality parameters are expected and accepted by the reprocessing industry.

Quality specifications are set to become *the* critical aspect of the recycling market as supply and demand begin to reach an equilibrium in the UK as more material is recovered from the waste stream.

The metals industry has a well defined and managed “quality – price – acceptance” regime that is of reasonable transparency – it is our feeling that this offers some opportunity for transfer into other high value dry recyclates.

41.2. Prices

Prices for recyclates continue to be a major concern in Scotland as it has become increasingly evident that market rates are lower than reported in the UK as a whole.

Lower prices can be a factor of either quality or sales volume and further works are required to establish the reasons behind this pricing discrepancy.

41.3. Capacity

There are significant reprocessing capacity shortfalls in plastics and organics, with treatment capacity for food waste of primary concern.

There are concerns surrounding over-capacity (under – utilisation) of reprocessing facilities for wood – where some panel board manufacturers are importing materials; tyres – where only 26% of capacity appears to be utilised and textiles – where additional capacity of around 20% - 30% of existing throughput exists.

41.4. Competition

Competition for materials is likely to become a significant issue in the coming years as targets require more recyclates to be recovered from the waste stream.

Low levels of competition, where one or two players control the majority of the market, can have a significant impact on prices, material utilisation, exports and capacity growth.

Materials such as paper, glass, tyres, organics, metals and wood are controlled by one or two market leaders, albeit it is unknown at this stage if this will increase or decrease competition for materials in the long term.

41.5. Markets

For core materials such as paper, metals, glass and tyres the markets are mature, fairly well defined and understood with little room for innovation or new applications.

For materials such as organics, textiles, wood and plastics however, more work will be required to encourage diversification of material usage as existing markets either reach a saturation point or existing market requirements (such as quality or price) cannot be met within existing recovery operations.

42. Suggested Actions

In order to meet the challenges of reaching Scotland's 70% recycling and composting targets by 2025 a number of actions have been developed to overcome any perceived barriers related to the key issues highlighted by our analysis. These suggested actions are summarised below.

| | |
|--------------------|---|
| Quality | There is a requirement for a consistent quality development programme for recovered materials supplied by Scottish local authorities. |
| Prices | More research is required to ascertain the core reasons behind price disparity to ensure that local authorities are receiving comparable prices from the market. |
| Capacity | Further information is required on market capacity. Market capacity will be examined in closer detail for a range of materials in the Remade 2008 programme. A report on <i>Treatment Capacity Requirements</i> will be completed in December 2008. |
| Competition | There is a need to acquire a greater understanding of service provision at a regional level and understand the competition for recovered materials in greater detail. The Remade programme for 2008 will address this issue in the <i>Material Flows</i> project. |
| Markets | Markets for certain materials are still being developed. For core materials market development is based on economic analysis: for materials such as organics and textiles more research on diversification will be required. |

43. References

To be inserted for final version.