

Markets for Recyclable Materials & Recycled Products

**A Review of the implications arising from the predicted
growth of recyclate materials recovered by LA's in the
short to medium term**

June/July 2005

*A joint paper prepared by
WRAP and Remade Scotland to the National Waste Plan Programme Board*

Executive Summary

With the allocation of the first stage of the Strategic Waste Fund and the implementation of a wide variety of recycle collection schemes throughout Scotland designed to recover 25% of MSW, Remade & WRAP have conducted an assessment of the materials likely to be recovered and the implications for the markets for these recycles.

The primary conclusions of this review are that :-

1. There are to all intents and purposes markets or outlets for virtually all recycle material potentially recovered. (so we shouldn't be in the position of ending up landfilling recycle)
2. The real issues relate primarily to the value that the LA's recycle will achieve, which is affected by:-
 - accessible end markets and
 - quality of recycle collected.
3. Development of the markets is largely about creating diversity of outlets and stimulating market demand that help improve the recycle value.
4. There will be and are already new jobs associated with this approach, but this is a secondary benefit.
5. Ongoing monitoring of the quality of recycle recovered from various schemes is required – linked to value received. (e.g mixed glass, cheaper collection but lower value compared to colour segregated collection which is more expensive but can command better prices and access to a broader range of stable markets)
6. Scotland would benefit from expanding the focus on MSW, to include non MSW recycle
7. LA's could benefit from improved contractual arrangements perhaps associated with joint or consortium selling
8. Reprocessors should focus economics of their market, particularly developing markets (e.g for compost, encourage processors to consider output as a product).
9. Scotland should continue to take action to stimulate both supply and demand in a balanced way thus work across the whole supply chain.
10. The market development programmes should continue to develop their market understanding by measuring and forecasting demand.
11. To stimulate end markets the Public sector should be encouraged to adopt green procurement strategies, which can be helped by the setting of targets for % recycled content.

1 Introduction

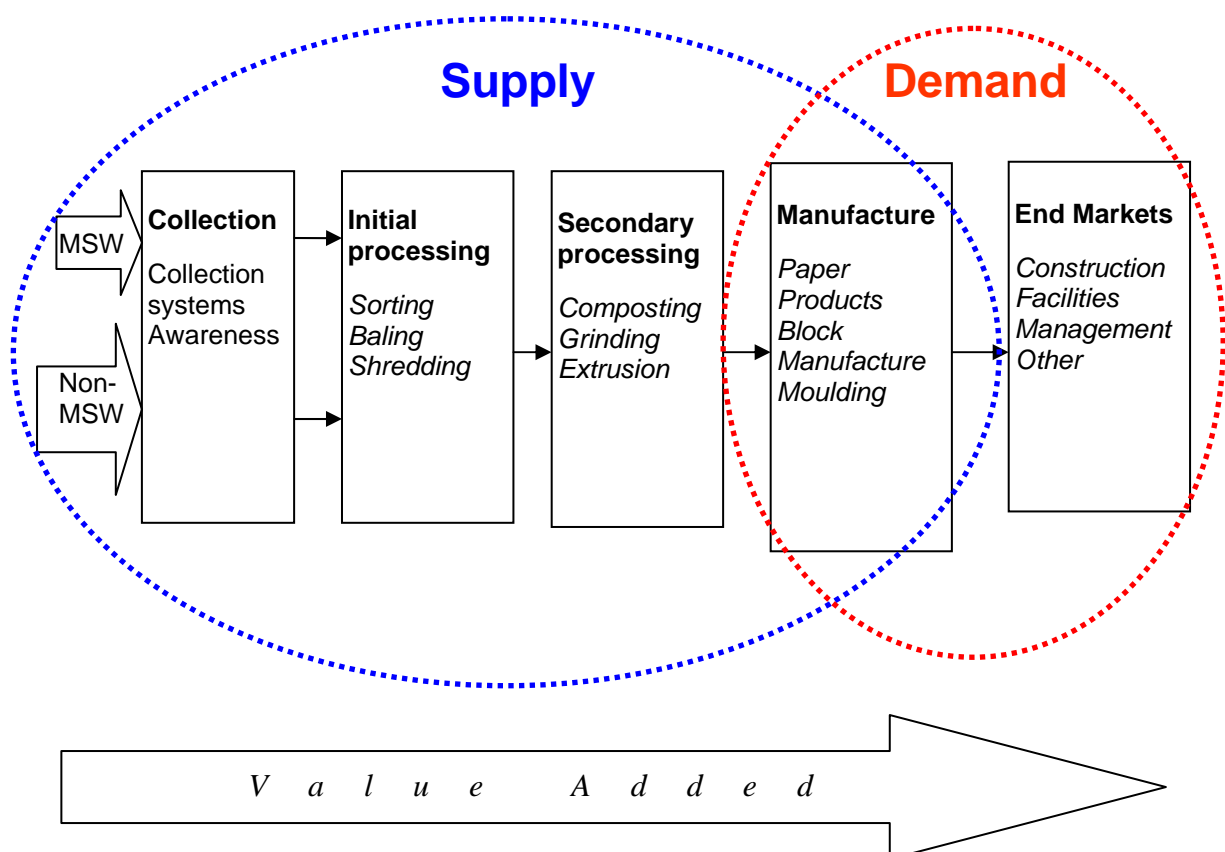
The aim of this report is to assess the current and predicted recyclate arisings in Scotland and to assess the implications on the markets for each of the materials recovered. The key questions to be addressed are :

- 1) Current state of markets in Scotland/UK and how this links into reprocessing capacity.
- 2) Current market capacity and future market capacity, compared to likely future levels of supply of recyclate.
- 3) Current problems/issues and likely or possible future problems.
- 4) What is being done/could be done to tackle these problems.
- 5) What actions can local authorities take to get the best returns for their recyclate.

2 Market Overview

Before considering the specific issues above, it is worth making some general observations about markets and market development.

The following diagram illustrates the flow of materials



2.1 Comments

There are markets or outlets for all recyclate materials which could be collected from household waste stream and there should be no need to landfill recyclate. The real issue relates primarily to the value that the LA's recyclate will realise, which is affected by:-

- accessible reprocessing markets
- demand from end markets stimulating the supply chain and increasing demand for the recyclate feedstocks
- quality of recyclate collected.

There are two key demand points:

- One after the secondary processing has been completed and the recycled material, effectively a commodity, is competing against conventional raw materials
- One after the manufacturing has been undertaken and the products are competing in the end markets. Whilst some of the products may be 100% recycled, many will just have a recycled component

Due to the nature of materials and their intrinsic values, some markets such as compost and aggregates will operate on a local level whilst others such as paper and plastic operate at an international level

Some markets are reasonably mature such as conventional paper, others are evolving such as some of the new markets for glass

There is an opportunity to contribute to the Market Development Plan being prepared by the Scottish Executive.

There will be and are already new jobs associated with market development, but this is a secondary benefit.

Market Development involves developing the supply chain, stimulating demand and increasing diversity all of which will help to improve the value associated with recycled materials.

3 Supply

Using the cost modelling tool developed by Remade, the following table quantifies the current and predicted arisings of recyclate and estimates that recovery of most materials is set to virtually double between 2004 and 2010.

Total Recycled Tpa	2004	2005	2006	2007	2008	2009	2010
Paper	104,897	153,218	182,486	191,535	196,235	200,966	211,223
Cardboard	46,735	69,801	85,335	89,331	91,805	94,309	100,610
Plastic	8,946	11,868	17,110	18,704	19,776	20,885	25,238
Non Ferrous	16,384	22,890	31,534	33,161	33,864	34,560	37,891
Ferrous	15,768	24,203	31,573	33,556	34,227	34,891	36,805
Glass	44,315	62,102	72,262	75,673	76,946	78,194	83,732
Green	146,787	214,101	250,020	265,849	279,315	288,076	306,883
Textiles	9,906	16,541	21,271	22,773	23,595	24,439	27,272
Total	393,738	574,724	691,590	730,582	755,764	776,320	829,654
Total + other	545,699	751,755	888,368	932,948	961,029	984,490	1,045,703

Table 1. Remade Cost Model predictions of material arisings

There are a number of issues around collection type, associated cost and potential contamination. A wide variety of collection systems being used:-

- 3 bin system using existing collection fleet – minimises collection costs but material collected to be sorted at an MRF attracting a gate fee. Possibly obtain rebate, also greater chance of contamination
- 2 bin system using existing collection fleet, plus box system using caged vehicles or kerbsider with material sorted at kerbside requiring minimum sorting and attracts an income. Weekly, fortnightly, monthly etc
- And almost every variation and combination

It is not yet clear which system or combination of elements will provide the most appropriate quality and tonnage of materials at optimal costs (including income where appropriate). It is recommended therefore that ongoing monitoring of the quality of recyclate recovered from various schemes is required – linked to value received. (e.g mixed glass, cheaper collection but lower value compared to colour segregated collection which is more expensive but can command better prices and access to a broader range of markets)

4 Material Arising

The potential impact on markets of increasing levels of recyclate varies depending on the material recovered and the following section seeks to analyse the consequences for each recyclate i.e

- *Glass*
- *Plastic bottles*
- *Green Waste/Composting*
- *Paper*
- *Steel and Aluminium*

Four sources of data were identified for tonnages of waste collected for recycling by local authorities in Scotland. These were the

1. Waste Data Digest (SEPA),
2. Local Authority Waste Arisings Survey (LAWAS) (SEPA)
3. Remade Scotland Materials Collection and Arisings Survey 2004.
4. Remade Scotland Cost Modelling data

The Remade Scotland Materials Collection and Arisings Survey 2004 involved staff from Remade contacting and visiting all of the local authorities in Scotland to assess their tonnages of collections for recycling in the year ending 2003. There were slight variations in the values recorded for this period which are indicated in each of the material analysis sections but are not generally significant.

4.1 Glass

4.1.1 Estimates of Scottish Local Authority Arising

Depending on the source of data, Remade has identified three different estimates of glass recycling in Scotland from Local Authority Sources. For 2003/2004 these vary between 42,579 tonnes and 46,380, a variance of around 8%.

	Waste Data Digest 2002/2003	LAWAS	Remade Survey 2003/2004	Remade Model
<i>Kerbside</i>		1,446		
<i>Commercial</i>		11,066		
<i>Industrial</i>		80		
<i>Bring</i>		33,788		
<i>Total</i>	36,950	46,380	42,579	44,315

Table 2. Various estimates of glass recycling in 2003/2004

4.1.2 Colour Separated versus Mixed

The Remade Survey in 2003/2004 of glass arisings also sought to identify the tonnages of material recovered colour separated and mixed colour. Of the 42,579 tonnes reported by councils in this survey, 6,957 tonnes (15%) was reported to be recovered as mixed colour. Councils reported also that this proportion of colour mix was likely to continue as they developed their collection programmes with funding from the Strategic Waste Fund.

Applying this % to the three sources of 2003/2004 data, provides an estimate of colour separated and mixed colour as follows:-

		LAWAS	Remade Survey	Remade Model
Colour Sep	85%	39,423	36,192	37,668
Mixed	15%	6,957	6,387	6,647
Total		46,380	43,197	44,315

Table 3 . Estimates of LA separated and mixed colour glass arisings

Using the Remade model data and typical industry values of the relative colour mix in the waste stream of 49% green, 40% clear and 11% amber, provides an estimate of the various glass colours likely to arise in 2004 and 2010.

	2004	2010
Clear	15,067	28,469
Amber	4,143	7,829
Green	18,457	34,874
Total Sep	37,668	71,172
Mixed	6,647	12,560
Total	44,315	83,732

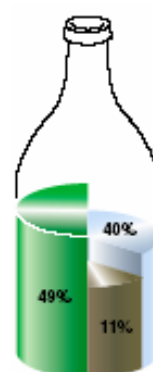


Table 4. Estimate of glass colours

4.1.3 End Market Use

Colour Separated. United Glass in Alloa, remain the primary user of colour separated container glass in Scotland. The facility has recently completed refurbishments to its reprocessing plant and now has the capacity for 75,000 tonnes of cullet per annum, a 50% increase. The plant's capacity may increase further to accommodate 100,000 tonnes in the future. UG report that in 2003/2004 they used a total of 73,000T of glass from sources as shown.

Glass Processed by United Glass	
Sourced from England	18,500
Scottish Industrial	4,000
Scottish collectors (including Mac Glass & Berryman with mixed LA & commercial thus also incl commercial)	50,000
Total	73,000

Table 5. Glass Processed by United Glass 2003/2004

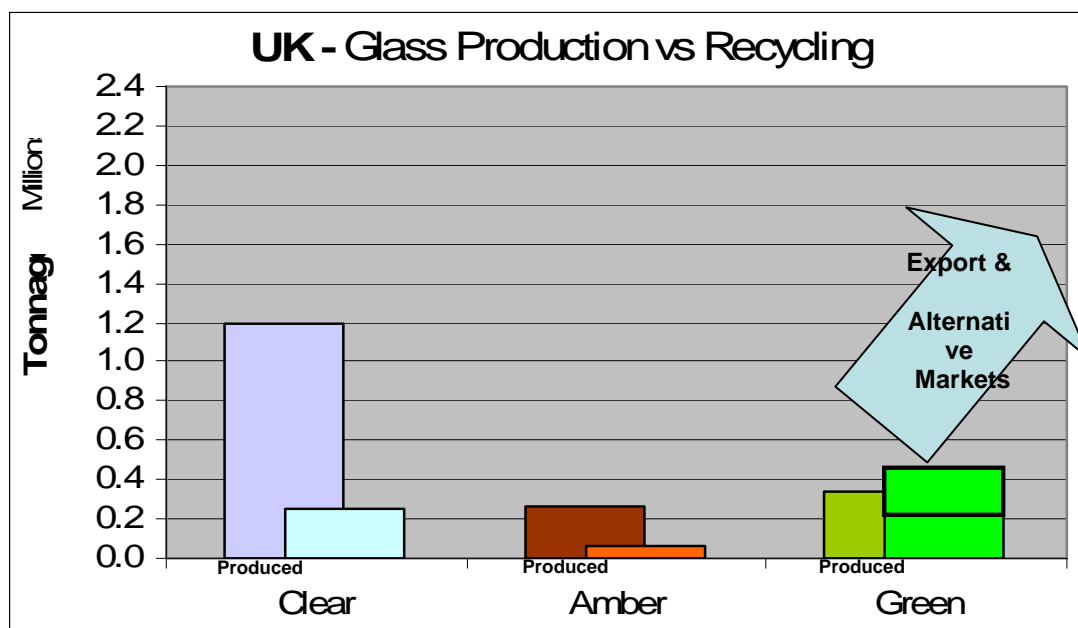
With around 36,000 to 39,000 tonnes identified from LA's this leaves an additional 14,000 to 11,000 colour separated glass arising from Scottish Collectors, which it is presumed has come from the two main private collectors *All Glass* and *Mac Glass*. Unfortunately no direct data is available from these companies on the detail of their glass arisings.

By 2010 the additional arisings of clear and amber glass from 2004 levels based on the Remade model would be a further 17,000T (see also table 4), which given UG's existing requirement for 25,000T should mean that there is a ready market for this material as it becomes available.

	Arisings	Capacity
Clear	13,402	
Amber	3,685	
Total	17,087	≤ 25,000

Table 6. Additional Clear & Amber arisings in 2010

In fact this high demand for clear and amber by the remelt sector is confirmed by British Glass in their recent analysis of production and recycling. A further concern for British Glass is that the trend in English and Welsh Local Authority recycling schemes is one of mixed colour collection, further strengthening the Scottish position.



Graph 1. British Glass assessment of glass production and recycling levels

Rockware

Rockware currently utilise 40,000 tonnes of cullet per annum, representing 32% of total production at the Portland plant in Irvine. The cullet collected from bottle banks, kerbside collection schemes, manufactures and licensed premises all in England is processed at the companies plant in Knottingly from where it is transported by road to Irvine. Scottish cullet is not directly utilised in the plant other than that traded with United Glass.

Mixed Colour Outlets

All Glass and Mac Glass are also the main recipients of mixed colour. In the recent Scottish Executive Capital Grant Scheme, ALL Glass predicted using 3,686 tonnes of mixed colour bottle glass in 05/06 and 5,715 tonnes every year thereafter for their Glass Micro sphere Manufacturing Plant. This may represent the majority of mixed glass All Glass receive for processing. Thus leaving around 3,000tonnes of mixed glass to Mac Glass. Potentially for use in sand alternatives including shot blasting and water filtration. Superglass in Stirling are currently a major user of flat glass cullet but have plans to use more container glass sourced by Viridor/MacGlass.

There is additional mixed colour glass collected by *Mac Glass* and a few other collectors from commercial sources (pubs and clubs). There is little accurate data on these arisings, with British Glass advising that 90,000T was recovered in 03/04 throughout the UK which with a 10% Scottish estimate providing a further 9,000T for Scotland. (this is a very rough estimate which requires further investigation).

In an effort to estimate the additional arisings of container glass from the commercial sector, Table 17 in the Waste Data Digest was examined which advises that 97,246 PRNS were issued i.e 97,246 tonnes of packaging glass. SEPA advised (telecon 11 May 05) that the following companies were approved issuers of PRN's but that they could not provide detailed figures by company due to issues of Data Protection and could only advise if they were

1. small – issuing less than 400 PRN's or
2. large - issuing more than 400 PRNS

Company	PRN's issued	Known Glass Reprocessed
All Glass	≥ 400	
Mac Glass	≥ 400	
RMC Russell	400 ≤	
Rockware	≥ 400	40,000
United Glass	≥ 400	68,500
Shetland	400 ≤	
Western Isles	400 ≤	
Total	97,246	108,500

Table 7. PRNS issued in Scotland

However the known amount of container glass processed from UG and Rockware alone exceed the total number of PRN's issued – and hence it is not possible to estimate the tonnages of commercial glass recovered and processed by these other companies.

4.1.4 2010 Mixed Glass arisings and potential outlets

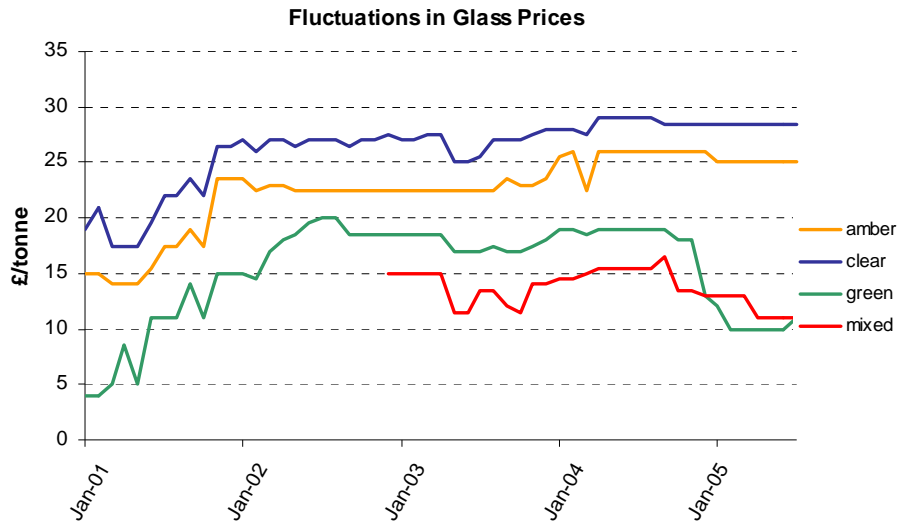
Green & Mixed Colour	
Potential Markets	Arisings
Fibre Glass	12,000
Abrasives	3,000
Filtration	9,000
Bricks	15,000
Sports Turf	4,000
Aggregates – Concrete	5,000
Aggregates – Other	19,000
Fibre Glass	
	188,000 > 22,300

As can be extrapolated from Table 4. above, there will be a potential *additional* 22,300T of green and mixed glass arising in 2010. Using 10% of the UK figures supplied by WRAP for alternative markets would suggest that Scotland could potentially have outlets for 188,000T. However work is still required to ensure these markets do develop as anticipated.

Table 8. Markets & arisings for green and mixed colour glass

4.1.5 Glass Prices

The demand for clear and amber glass based on price over the previous 4 years confirms the analysis that the market is readily available but highlights that the value may have settled and it may be difficult without significant demand from elsewhere to influence this. The trends for green and mixed however do show that over time, as the quantity recovered has grown that the prices have shown a downward trend.



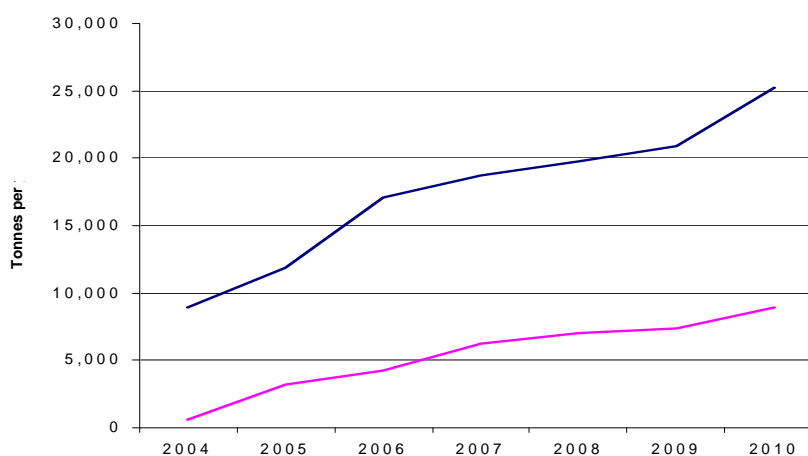
4.2 Plastic Bottles

4.2.1 Estimates of local authority arisings

There has been a significant increase in the recovery of plastic bottles for recycling in Scotland from 626T in 2003 to a predicted figure by Recoup of 3,250 T for 2005 based on annualised data for the first 3 months of the year. The following graph represents potential upper and lower limits of plastic recovery until 2010.

The upper figure is based on the predicted figures developed by LA's in their SWF bids and incorporated into the Remade model. However to reach the 25,000T this would require all councils to be recovering around 10kg/hh/yr.

Although this is being achieved by South Ayrshire and Falkirk councils such a recovery rate is generally recognised to be at the top end of council performance, with averages throughout the UK being closer to 4.5kg/hh/yr.



Recent work by Recoup on behalf of Remade Scotland, suggests a lower but nevertheless still significant increase in recovery rate of up to around 10,000T/yr by 2010.

4.2.2 End Market Use

Markets for PET, HDPE and mixed plastic bottles remain under-supplied. Demand remains strong in the UK, the EU and the Far East for collected bottles baled to specifications. Strong consumption of recycled plastics in Asia combined with low labour and freight costs provide a structurally competitive market for recyclable bottles from Europe.

Historically high virgin plastic prices are being sustained and PRN prices have increased at the end of 2004 and moving into 2005. This is feeding through into higher prices for recyclable plastic packaging. Bottle prices have moved up in the last quarter of 2004 and further increases are likely in Q1 2005.

In the UK the main plastic bottle recyclers are JFC Delleve, Baylis Recycling and Linpac Plastics Recycling, with Centriforce Products also purchasing HDPE. Knotwood Wood Composites, a potential HDPE buyer, has ceased independent trading and is now part of JFC Delleve.

Reflecting the increasing supply of plastic from LA's throughout the UK, Baylis Recycling has recently entered the plastics recycling market and has opened an HDPE plastic bottle recycling plant near Slough. The company has a background in paper recycling and has sites in a number of locations in the UK, including Scotland. The HDPE line includes equipment that was previously operated at Milton Keynes in a partnership between moulding company Plysu, Milton Keynes Council and Shanks but which was mothballed shortly after Plysu was purchased by NAMPAK. Once the compounding line is operational (enabling the production

of HDPE pellets from washed flaked bottles) the company will be able to issue PRNs following accreditation by the Environment Agency.

JFC Delleve Plastics Ltd with support from WRAP have also recently embarked on a major capital investment programme at St Helens, Lancs, with a fully automated plastics sorting unit (both PET and HDPE as well as colour segregation). The plant has a capacity of 20,000T/yr and Delleve are actively seeking further sources of recovered plastic. Scotland therefore does not currently recover sufficient tonnage to attract recyclers although as we approach the higher figures predicted for 2010 this may change.

The plastics lumber market is growing at a high rate fuelled mainly by public sector procurement, with delivery time for some suppliers now around 5 months. Supply of material and extrusion capacity in the UK remains tight.

There are also a number of other companies buying plastic bottles on behalf of EU and Asian recyclers.

4.2.3 Plastic Prices

The following table summarised prices reported through public price guides provided by MRW and Letsrecycle.com for the last 3 months in 2004.

	Oct-04				Nov-04				Dec-04			
	Letsrecycle.com		MRW		Letsrecycle.com		MRW		Letsrecycle.com		MRW	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
clear and light blue PET	60	90	100	130	70	100	100	130	80	120	100	130
coloured PET	60	50			35	60			40	65		
HDPE natural	65	95	100	120	70	100	100	120	80	120	100	120
HDPE mixed colour	60	70	80	90	60	80	80	90	60	90	80	85
PVC	10	28	15	30	10	25	15	30	10	25	15	30
Mixed bottles	5	23	45	65	10	30	55	65	20	50	55	70

Table 9. Variations in market prices of plastics Oct – Dec 2004

The prices are based on material meeting established quality and form specifications. Both sources state that pricing is delivered to re-processors in the UK or overseas. Data from other sources corroborates the MRW price range during the period, with trades at the top end of the price range reflecting good quality baled material in 20 tonne shipments. Most traded volumes would be for the categories of mixed plastic bottles, clear/light blue PET and mixed coloured HDPE. Limiting trading occurs for coloured PET and PVC, due to the low volumes and value.

Ex-works pricing for sellers in Scotland will vary considerably depending on location, shipment weight and quality of material. As a guide, shipments from the central belt of Scotland to UK plastic bottle recyclers may typically vary from £25-£70/tonne depending on the bale density and tonnage shipped, with lowest costs relating to loads exceeding 20 tonnes. Some further efficiency may be achieved by back-hauling arrangements. Shipments from more northern areas of Scotland will experience higher shipping costs, and so good bale density is essential to maximise revenues.

Sales for Asian export markets may need to be re-baled if densities are low – e.g. loads under 18 tonnes – and this will incur additional costs that will be deducted when buyers provide ex-works pricing. Lower pricing in the ranges quoted above may reflect a deduction for re-baling by a third party.

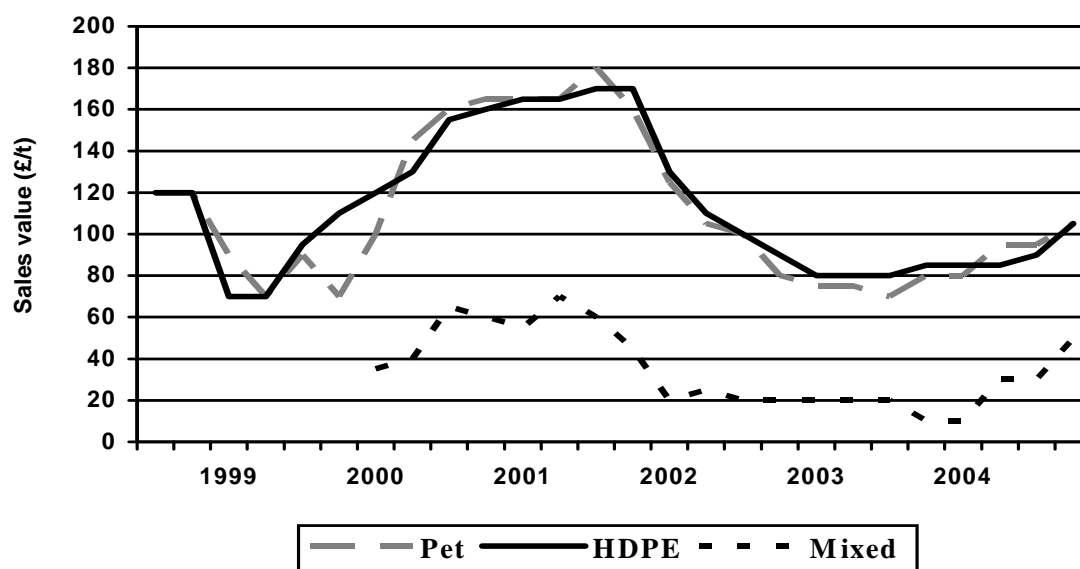
Price Indicator Summary Table

On the basis of review of available information, the guide prices below reflect ex-works prices from Scottish Central-belt locations for material meeting established quality and form specifications available in 20 tonne baled loads, loaded on a trailer or into a shipping container.

	July – September 2004	October – December 2004
Clear and light blue PET	70 - 95	80-105
Coloured PET	25 - 40	35-55
HDPE single colour	70 - 90	80-105
HDPE mixed colour	65 - 80	75 - 95
PVC	0 - 10	5-15
Mixed	10 - 30	30 - 50

Table 10. Variations in Market Prices for Plastics 3^d and 4th Quarters 2004

The recent market position, in the context of long term pricing is shown below. The fall in value since 2001/2 is in part attributable to reduction in the values realised by plastic PRNs. The increases at the end of 2004 are also likely to be attributable, in part, to PRN value. The following graph shows the Post consumer Market 5 year Price Trend – based on 20T loads.



Virgin plastics pricing. The price of virgin polymers continued to track upward during the period, in part reflecting increased feedstock prices and shortage of supplies – especially in polyethylene – resulting from virgin plant shutdowns. PET remains at historic high levels. HDPE virgin prices have risen to typically over £700 per tonne at the year-end. This will improve the ability of re-processors to market recycled materials. The impact of these price increases has now been filtering through to baled bottle prices in the UK, with prices rising across the board, as predicted.

PRN pricing. The PRN market for plastics PRNs became increasingly nervous that supply would be short in the final quarter. Trades increased from a range of between £15-25/tonne in the previous quarter to over £50/tonne, with some trades in the last weeks of the 2004 compliance year in the £75-105 range on the Environment Exchange - although this was at relatively small volumes.

The market for 2005 has settled down somewhat but prices are up on last year with current bids in the range of £23-50/tonne. This increase in prices should also filter through to suppliers of recyclable plastics packaging in this quarter, although the underlying market level required to hit targets in 2005 remains uncertain.

The likely position on the availability of plastics PRNs for 2005 will become clearer once DEFRA publishes the full results for 2004. On the basis of trading continuing until the last days of the 2004 market, it is possible that there may be a shortfall in PRN availability for 2004 – although most of the major compliance schemes recently issued statements that they had met members' obligations for 2004.

Work is currently underway with DEFRA and representatives of the industry to develop improved protocols in the plastics packaging recycling industry to minimise accidental or fraudulent issuing of PRNs. A DEFRA report last year, encouraged by the plastics recycling industry itself, noted that at least 80kt of PRNs were likely to have been wrongly issued, creating a false impression of the level of plastic packaging recycling. At least four police investigations associated with these wrongly issued plastics PRNs are currently underway, with one prosecution going before the courts in February 2005. Better regulation of the market will lead to more stable PRN market and – probably – better prices for collectors in the medium term.

4.2.4 UK Commercial trials of food-grade PET

A series of commercial trials to assess the use of recycled PET plastic (rPET) in retail packaging is being funded by WRAP (the Waste & Resources Action Programme). Involving a number of the UK's leading brands and retailers, it is the first time that rPET will be used in such a large number of high profile, high volume product lines.

Coca-Cola Enterprises Ltd, Marks & Spencer and Boots are among the big name companies involved in the programme. London Remade, in partnership with Closed Loop London, will be leading the Marks & Spencer and Boots projects. Over 2,500 tonnes of rPET is expected to be used in the initial trials and each partner is planning to continue using the material after the trials have ended, providing the results are positive. The final conclusions will be publicly disseminated and the successful outcomes will be used to promote the wider adoption of rPET in retail packaging.

Two of the three trials involve food and beverage packaging. Adhering strictly to food contact regulations, these are designed to prove the safety and suitability of rPET, which is regularly used in food contact packaging in other countries but only to a very limited extent in the UK. The recycled material will be thoroughly tested for both performance and consumer appeal over a six month period, during which the products will be on national distribution. The trial packaging will be on shelves during 2005. The project will be completed in March 2006 and the results made publicly available by early Summer 2006.

There are some lines packaged in PET bottles that already use food grade recycled material PET in the UK but volume uptake has been limited to date. This project should accelerate uptake of R-PET from UK post-consumer bottles into the food grade packaging market. The work will also support efforts currently underway by London Remade and commercial partners to develop a large scale food grade PET bottle recycling process to London which may create additional capacity for bottle recycling in the UK.

4.3 Composting

4.3.1 Estimates of local authority green waste arisings and collections

Two main sources of estimates of green waste arisings¹ are presented in the following table and are derived from:-

1. The Remade model figures for green waste (column 2) and
2. SEPA's estimates (column 3) from *The Level of Composting Activity in Scotland 2004* (RAK Szmidt, SEPA).

It can be seen that there is a reasonable correlation between the two. The SEPA report also identifies the potential composting capacity anticipated (column 4) which suggests that there will be no shortage of treatment capacity in Scotland although the report does indicate that the facilities are not necessarily all planned to be located where they are required.

Year	Remade Scotland Arisings	SEPA Arisings	SEPA Composting Capacity
2004	147	112	284
2005	214		
2006	250	210	502
2007	266		
2008	279		
2009	288		
2010	307	290	804

Table 11. Estimated Levels of Composting Green Waste in Scotland

4.3.2 End Markets – Example of the Glasgow & Clyde Valley

Remade has recently completed a review of the market potential for green waste compost in the Glasgow and Clyde Valley. (*Glasgow and Clyde Valley Regional Compost Market Research, Remade May2005*).

The Glasgow and Clyde Valley region, while only accounting for slightly over 10% of the land area in the country, contains over 35% of the population. There are approximately 1,765,000 of Scotland's 5 million people living within region. Typically, regions possessing similar population densities will generate large quantities of organic residuals, while possessing only a limited number of viable waste management options.

Composting in general, appears to be under going a renaissance away from its industrial roots and towards a higher standard of living and affluence for its citizens. These are favourable conditions for the development of compost markets. Residents should have more time and income to spend on landscaping both their homes and businesses, and a local supply of organic amendments can help meet that need. They will become more aware of the environmental benefits of using a renewable source of material, such as compost, instead of products such as peat.

The region is also undergoing a significant amount of development. Industrial sites are replacing farms, and the housing that must support the workforce needed to staff these

¹ Kitchen waste estimates have not been included as Scottish councils have so far not taken any decisions whether to introduce collection of this material for composting or whether it will be processed with residual waste in MBT or energy for waste plants.

businesses must grow accordingly. It is estimated that there are only 100 - 200 acres of high value (vegetables, flowers, etc.) agricultural land still being farmed in the region. Some of this includes crops grown ‘under glass’, in greenhouse operations. There is still an undermined amount of pastureland in service, but this was not included in this study (since compost is not usually purchased for use on lower value crops). Essentially, land has become too valuable for its development potential, to be placed into agricultural production.

The following table summarises the main market outlets identified for the Glasgow & Clyde Valley area. Landscapers are still a significantly untapped market even in the Clyde Valley where at best there is 22% market penetration. Current use of compost is around 15,000T with a predicted potential market of 52,000 T. This estimate is a conservative one and the value could potentially be 2, 3 or even 4 times as large. This estimate also does not include land remediation of vacant or derelict land or landfill restoration (eg Ravenscraig alone could use 19,000T).

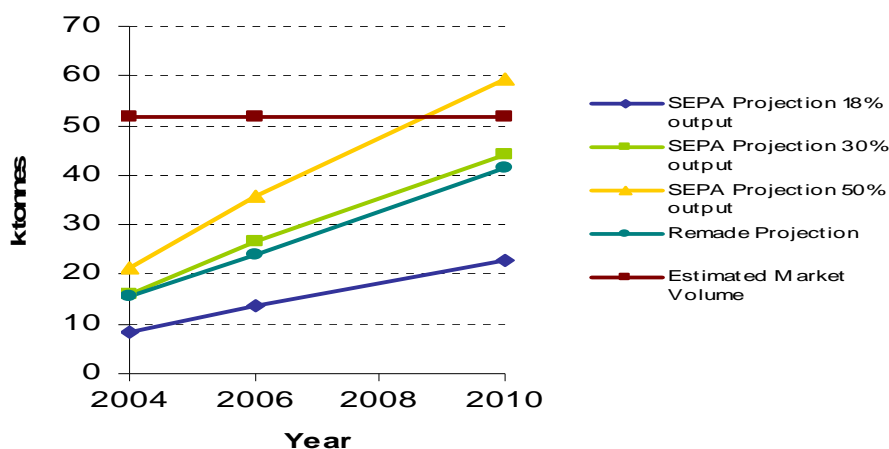
	Estimated Current Usage (T)	Estimated Market Size with Replacement Figures (T)	Estimated Gap in Market (Tonnes)
Councils/Local Authorities	7,150	9,412	2,262
Garden Centres/Retail Nurseries²	870	6,436	5,566
Golf Courses/Sports Grounds	3,471	7,002	3,530
Historic Buildings and Stately Homes/Parks and Gardens	416	462	46
Landscapers	3,799	27,051	23,251
Schools/Universities	0	0	0
Turf and Soil Supplies	0	466	466
Wholesale Nurseries	0	931	931
Total	15,706	51,760	36,052

Table 12. Existing and Potential Markets for green waste compost in Glasgow & Clyde Valley

Although the market potential is 52,000T for final product and the SEPA report on *The Level of Composting Activity in Scotland 2004* predicts there will be sufficient capacity to process the arisings, there is however a degree of uncertainty in the SEPA estimates of final composted product produced in the Glasgow & Clyde Valley. The report predicts output of composting in the Glasgow and Clyde Valley Area varying considerably from 18%, 30% and 50% of the projected input. This variance suggests that the output of final composted product (60,000T using the 50% input data) could nominally exceed the estimated available market (52,000T).

² This is perhaps currently a more theoretical opportunity as only compost with a PAS 100 accreditation is considered by SEPA to be ‘product’. However Garden centres can source their growing media from England where this restriction does not apply.

Compost Production plotted against Market Capacity for Green Compost in Clyde Valley



However as noted the potential market could be several times larger than the conservative estimate made. The impact of potential capital projects such as motorway or other large scale projects could have a significant impact on demand for compost. In addition aside from the green compost currently being used, compost has a strong potential to replace topsoil (estimated at almost 25,000 tons per year) in this market segment. Compost is not topsoil, in and of itself, and will require blending with other conventional products to produce a suitable replacement. This can be done by either the compost producer, or by a private reseller/landscape supply facility. The same may apply to the use of compost as sports pitch topdressing. It may well need to be blended with sand to make an acceptable replacement product. Remade will be working in 05/06 to access this potentially new and large scale market.

The market research study also identified that in the short term:-

- Products need to be actively sold – only one Co. producing compost was mentioned by name by potential buyers.
- Only 2 LA's are using high volumes – therefore it is important to include compost in 'green procurement' (as they could potentially could use 50-100KT alone)

In the longer term as the markets mature and composters develop their processes:-

- Composters should consider blending compost to produce topsoil, topdressing & growing media.
- Composters could consider bagging to reach mass merchandisers

4.3.3 End Markets – Implications for the rest of Scotland

The Glasgow & Clyde Valley example highlights many of the issues which are relevant for the rest of Scotland in that low value applications such as restoration etc readily exist but that work is required to ensure access to 'paying markets' for compost. WRAP & Remade will therefore need to continue to promote and encourage the use of this material in golf courses, sports grounds and landscaping applications, and this continues to form a substantial element of the Remade Programme.

4.4 Paper

4.4.1 Estimates of local authority collections and arisings

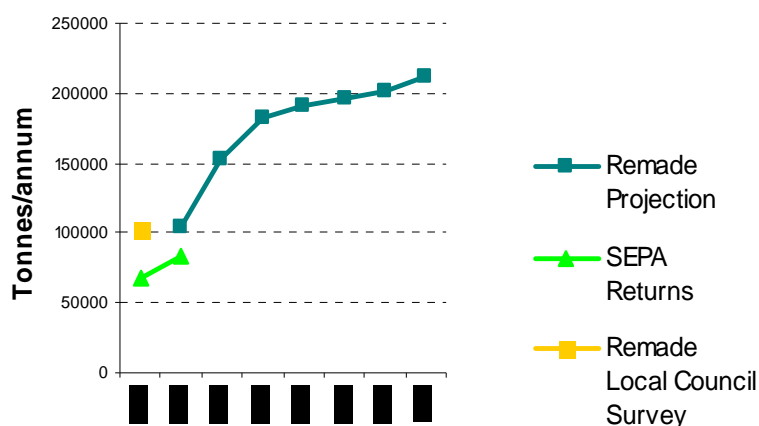
Three sources of data were identified for paper waste collections for recycling by local authorities in Scotland. These were the Waste Data Digest (SEPA), Local Authority Waste Arisings Survey (LAWAS) (SEPA) and Remade Scotland Cost Model. This data shows a general correlation in the tonnage of paper collected by local authorities and the predicted collection although there is some shortfall between the Remade prediction and the SEPA returns for 2004.

	2003	2004	2005	2006	2007	2008	2009	2010
SEPA returns	67660	84122						
Remade Survey	86248							
Remade Projection		104,897	153,218	182,486	191,535	196,235	200,966	211,223

Table 13. Collected and Predicted Tonnage of Paper for Recycling in Scotland

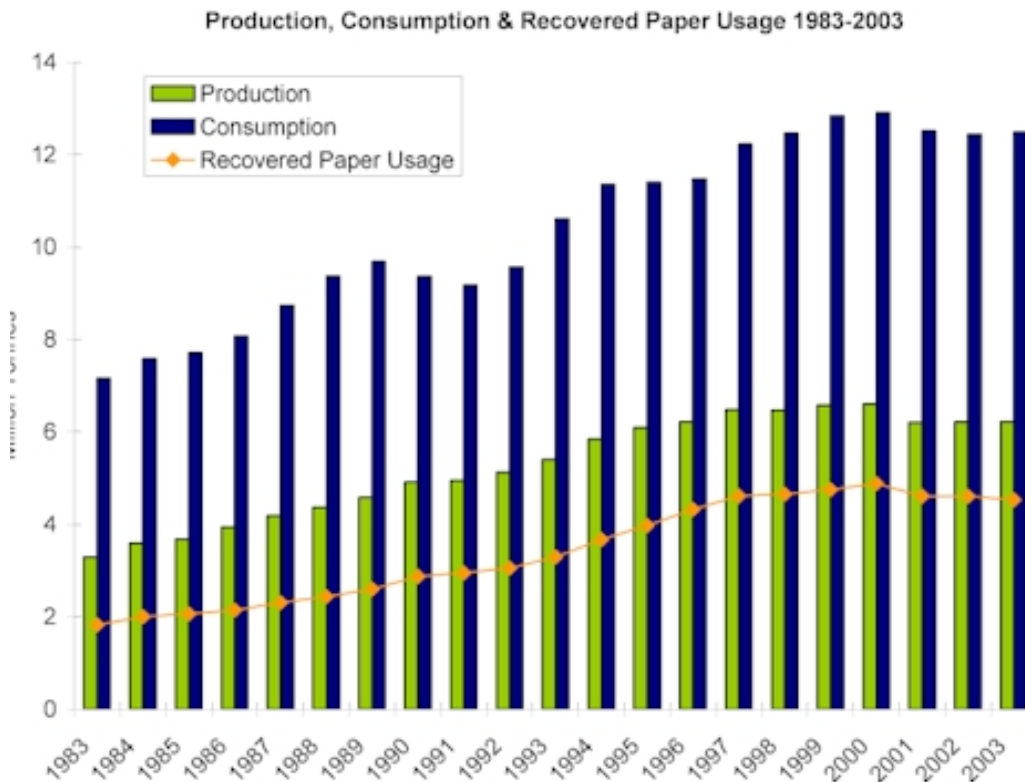
Using the Remade projections for the recycling of paper in the waste stream, there will be a recovery of over 200,000T by 2010. This will primarily be Newspapers and Magazines as well as mixed papers. With potentially a further 100,000T of cardboard

Paper Recycling in Scotland



4.4.2 State of trade

According to the Confederation of Paper Industries there has been an increase in the UK consumption of paper and board to 12.7 million tonnes in 2004, with a UK production of 6.2 million tonnes, making us a net importer of 6.5 million tonnes of paper products (equivalent to a UK production of 48.8% of the national market). These imports are considered to be stable, the majority coming from other countries in the European Union particularly Scandinavian countries.



Production, Consumption and Recovered Paper Usage
UK 1983 – 2003 (CPI)

The UK papermaking industry showed a utilisation rate of 74.5% for recovered fibre making it one of the highest users of recycled material in the papermaking process in Europe. As shown above, the UK’s utilisation of recovered fibre rose during the 80’s and 90’s from 2.0 million tonnes in 1984 to a peak of 4.9 million tonnes per annum in 2000, trending slowly downwards again to 2.4 million tonnes in 2004.

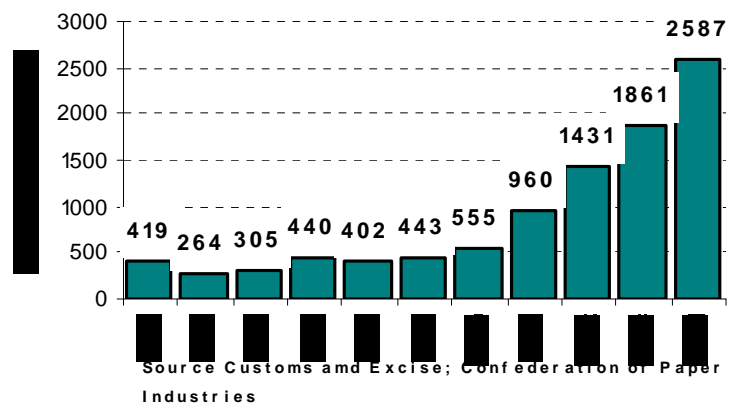
Industry expectations are that growth over the next 10 years will remain low (approx 1.2%/yr)

4.4.3 Exports

Even though paper recovery has increased dramatically over the past few years, this has not been reflected in an increase in the amount of paper being recycled in the United Kingdom.

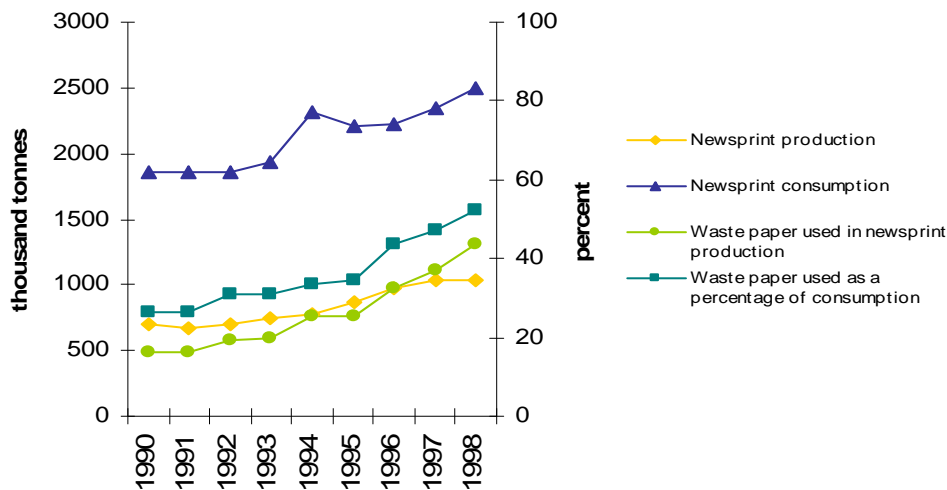
Over the last 10 years it can be seen that recovered paper exports have risen sharply from around 0.4 million tonnes to almost 2.6 million tonnes – the majority going to developing countries in Asia.

Recovered Paper Exports



Facilities for papermaking are being built in China, Taiwan and India where there are immature waste paper collection infrastructures and low per capita paper consumptions. These countries have no option in the short-to-medium term but to source their waste paper requirements from developed markets particularly in the USA and Europe. The current industry view is that as these countries develop their own recovery infrastructure that demand for recovered paper from the UK will eventually level off but will continue to provide a long term outlet.

4.4.4 Newsprint



Data from the Paper Federation of Great Britain

In the UK, the utilisation of recovered waste paper in the production of newsprint has steadily increased over the last two decades to the current rate of approximately 130%. Levels of recovered News & Pams across the UK now exceeds UK newsprint production levels. In 2003 the UK collected around 2.5 million tonnes, of which it used 1.5 million tonnes to produce 1.2 million tonnes of newsprint.

4.4.5 Scottish capacity for recycling

The following table provides an estimate of the current demand in Scotland for recycled paper. However with the exception of Smith Anderson in Fife, the majority of recovered fibre utilised in Scotland is in the production of high quality printings and writings (estimated as 35ktpa) requiring white office paper rather than newsprint as feedstock. So although while offering some potential for growth, this sector will not meet the primary requirement for news or cardboard.

Organization	Mills	Products	Production (tonnes pa)	Raw Material
Arjo Wiggins	Aberdeen,	Graphics, carbonless copy paper	62,000	90% virgin, 10% recycled
Caledonian Paper	Irvine	Coated papers	240,000	100% virgin pulp
Curtis Fine Papers	St. Andrews	High quality graphics, recycled range	30,000	80% virgin, 10% recycled (MDIP), 10% non-wood fibres (Esparto grass)
Ahlstrom Non-Wovens	Chirnside	Non-woven products e.g. sausage casings, teabags	10,000-25,000	Virgin pulp, non-wood fibres, synthetic fibres
International Paper	Inverurie, Aberdeenshire	High quality graphics	250,000	100% virgin pulp
Smith Anderson	Leslie, Fife	Packaging papers, Paper bags	55,000	95% recycled, (Brown Grades) 5% virgin pulp
Tullis Russell	Glenrothes	Graphics, coated board	150,000	98% virgin pulp 2%MDP

Paper Mills and their Capacity for Recycling in Scotland

4.4.6 Mill Closures - High Quality Printing & Writings

In addition it should be noted that in recent times there have been significant number of mill closures and reduction in capacity in Scotland for high quality printing and writings. :-

Mill	Location	Capacity Lost
Arjo Wiggins	Fort William	140,000
Curtis Fine Paper	Penicuik	10,000
Donside Paper Co	Aberdeen	50-100,000
Inveresk	Alloa, Denny & Bathgate	140,000
Sappi UK	Glenrothes	30,000

Leicester Paper Company have also closed the Kilbagie de-inking site temporarily pending a major upgrade.

4.4.7 Reduced Scottish capacity – Packaging & Board

The recent closure of the BPB Paperboard mill in Aberdeen has lost a demand for 250,000 tonnes per annum of recycle from the Scottish market. This leaves Smith Anderson as the only mill in Scotland capable of processing packaging waste. Until recently they had a capacity of 100,000 tonnes per annum but have also recently announced that this will now be reduced to 55,000 tonnes per annum.

4.4.8 Industry View of the Paper Market

In addition to the market analysis for Scottish paper recovery, several commercial collectors, merchants, re-processors and production companies (both primary and recycling) were contacted for their views and comments.

Confederation of Paper Industries - Peter Seggie

The UK shipped over 2.5 million tonnes of recovered paper last year, predominantly, to China and the far east, with European exports being steady. Papermaking capacity continues to fall in the UK so export markets are critical to the future of the recycle market unless papermaking increases. There is no doubt that in the short term if export markets collapse or slow, we will all have a problem. Particularly in Scotland if they cannot compete with other European countries economically.

Smurfit Recycling - Steven Duffy

- Presently handling 1,400 tonnes/wk commercial loose paper/card (72800 t/annum), mostly cardboard packaging cartons
- 300 tonnes of this is presently pre-baled – commercial operations with balers (Iceland, Farmfoods etc.)
- Operation involves sorting/baling and selling on to market
- Capacity 1500 tonnes loose paper-card/week (78000 tonnes/annum)
- Plans to expand to 2000 tonnes loose paper-card/week (104000 tonnes/annum)
- Smurfit has mill in Kent – too expensive to transport waste paper there
- Presently most of collection being processed in Spain (Smurfit Spain), France
- Exporting to China
- Had agreement with Severnside Recycling where Smurfit would send equal amounts of packaging to BPB mill in Aberdeen as Severnside would send to Smurfit mill in Kent.
- Expect problems with market in Scotland due to closure of BPB mill in Aberdeen – only leaves Smith Anderson in Scotland for recycling of cardboard packaging with capacity of 1200 tonnes/week (62400 tonnes/annum).

VALPAK - Duncan Simpson

Valpak has visited a number of councils in Scotland regarding the reclamation of packaging waste, especially since the BPB mill in Aberdeen declared it was going to close. Valpak has been buying material and selling on primarily to contractors in Scotland and has also been collecting waste in UK and selling directly to markets in UK, Europe and China and have recently established an office in China to deal with packaging waste – currently visiting re-processing plants to ensure quality of products and humanitarian issues such as child labour addressed.

Future – questionable whether Scotland could sustain paper-processing facility for newsprint – perhaps could sustain a mini-mill. There will always be a requirement for export – but this depends on the quality of material being sent abroad for re-processing

Cullen Packaging

Since the factory fire they are unable to use recycled paper for production of egg boxes/ protective packaging although they do intend to start a new factory in the next 1 – 2 years.

Newsprint mills

All three Newsprint mills in the UK advise that they are constantly seeking sources of quality feedstock, and are willing to offer Scottish LA's, firm long term contracts. There is concern that the majority of English authorities paper is collected mixed and is subsequently sorted through MRF's. This results in a generally lower quality material and is harder to satisfy the European Paper Standard - EN643, with its more stringent requirement for quality control and objective audit trails.

The majority of Scottish Authorities utilise kerbside sort collection with currently at least 28 source separated dry recyclate collection schemes out of 32 councils ³. This generates a higher quality paper feedstock which is more attractive to the Newsprint mills but also allows greater market streaming – i.e into newsprint or packaging mills.

4.4.9 Conclusion

The UK paper and board making industry has seen a significant number of mill closures in recent times. These closures set against higher utilisation rates of recovered paper is generally considered to mean that paper production has reached a peak and is unlikely to see significant growth in the near future. Through favouring source segregated collection schemes, Scottish local authorities are in a stronger position than their English counterparts to secure long term contracts for recovered newsprint but also to supply mixed paper or board to packaging outlets.

In addition there is continued expansion of paper production in Europe, attracting more local supplies of recovered paper, potentially reducing imports from abroad into the UK. At the same time the export market has shown significant growth, and is considered to remain healthy in the short to medium term, ultimately reaching a long term stable level.

³ Remade is currently undertaking a detailed analysis of the schemes, tonnages and contracts for recyclate recovered for all LA's in Scotland.