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## **REMADE Scotland**

REMADE Scotland is a major initiative which seeks to stimulate, develop and strengthen recycle material markets in Scotland. The recycling programme was launched in August 1999 and has a fundamental part to play in bringing about change, and improving Scotland's recycling performance by supporting an emerging recycling collection and reprocessing infrastructure in Scotland, encouraging a more sustainable waste management approach. Supported by the public and private sector in a unique partnership, the programme is developing strategies for priority materials such as plastic.

## **RECOUP**

RECOUP – Recycling of Used Plastics Limited, is the UK's leading authority on household plastics recycling. RECOUP has been active since 1990 in promoting and researching the recycling of plastic bottles and has played a major part in encouraging and assisting local authorities, waste management companies and voluntary organisations who have set up and operated plastic bottle collection and sorting operations. RECOUP's services company buys and offers a haulage service for collected baled plastics. Recoup Services also project manages a number of plastics collection activities and undertakes specialist consultancy work.

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## Executive Summary

### Key issues

Scottish households generate over 200,000 tonnes of plastic products as waste each year. Currently the best opportunity for post-consumer plastics recycling is through the recycling of plastic bottles.

Recyclable plastic bottles with a potential sales value of over £6.5m make up almost 60,000 tonnes of this quantity.

By 2010 if plastic bottle recycling remains at current low levels, the cost of disposing of the plastic bottles in Scotland's dustbin waste to landfill will rise to over £3 million per year.

The choice for a council is not whether or not to collect plastic bottles. Councils in Scotland already pay to collect 58,000 tonnes of them each year as a high volume component of dustbin waste, occupying around 10% of space in refuse collection vehicles.

Where plastic bottles are collected and delivered to a recycler rather than a landfill, revenue is generated and costs of residual refuse management can be reduced.

We believe that by 2010 ongoing expenditure of over £1.5m/year can be avoided, local enterprises and employment can be developed that contribute to the economy, and considerable environmental gains can be achieved as a result of recycling plastic bottles using the approaches outlined in this report.

This report sets out a vision of efficient, sustainable household plastics recycling in Scotland by 2006 that generates a x25 increase on current plastics recycling levels, creates infrastructure for further substantial growth and attracts viable reprocessing/recycled plastic product manufacturing enterprises to Scotland.

The report identifies strategies to accelerate growth from the current levels and achieve a sustainable waste management system that collects a significant proportion of plastics waste for recycling rather than for landfill. Specific objectives and priorities are identified, and indicative costings provided. The report has been produced following research, workshops and interviews covering 34 relevant stakeholders, including detailed discussions with 20 Scottish councils.

### Current activity

43% of councils in Scotland offer some kind of plastic bottle collection programme. Currently there are 11 bring schemes in operation covering 86 sites, and 5 kerbside programmes that include plastic bottles covering 89,000 households. In total these schemes generate an estimated 278 tonnes per annum of plastic bottles for recycling, a recycling rate of 0.5% of all plastic bottles - a low capture rate from the current infrastructure.

We believe that in many cases the current performance of plastic bottle collection schemes could be more than doubled by the introduction of sustained awareness raising initiatives. Research recently carried out by MORI in England showed the public often do not know about the availability of local recycling programmes or how to use them, and this is a barrier to increasing participation.

### Planned growth

If all current plans are funded and implemented, and assuming reasonable scheme performance, by 2006, 3,520 tonnes pa of plastic bottles will be collected by kerbside from 880,000 households in Scotland. A further 880 tonnes of plastic bottles will be generated from bring bank collections on approximately 420 sites. This growth is dependant on the success of current bids to the Strategic Waste Fund. If only current commitments are funded and performance of schemes remains at current levels the total collection level will be approximately 2200 tonnes by 2006.

The experience of household plastics recycling in Scotland has to date often been the result of relatively small initiatives that are not particularly representative of the potential for the future.

Scotland can benefit from 20 years of experience of plastic bottle recycling in the US, Europe and other parts of the UK, resulting in over 1 million tonnes of plastic bottles now being recycled globally per annum. The best way to benefit from this experience is to invest in current best practice, rather than travel up the same learning curve. A step change in thinking and in infrastructure planning is required to achieve this.

The availability of a Strategic Waste Fund and the structured approach to waste management, evident in The National Waste Plan 2003, provides an excellent opportunity for the adoption of best practices for recyclables collection and handling. We believe that a well planned approach will enable plastic bottles to be integrated in large scale, comprehensive recycling schemes at little or no additional cost to councils.

### **Challenges to significant performance improvement**

All participants questioned noted concerns over affordability of collection systems. The lack of local outlets - either reprocessors or simply bulking and baling centres was the next most common concern. The barriers associated with proximity of markets were most prominent for councils outside the central belt of Scotland.

The main barrier to progress relates to real and perceived costs of plastic bottle collection. We use the phrase 'real and perceived' to highlight the fact that a number of councils in the UK are now able to collect large volumes of plastic bottles for recycling without incurring significant additional expenditure, whilst others will experience high costs.

It is notable that the Audit Commission in England has found almost no correlation between recycling rates and waste management expenditure. The key to success and affordability is therefore in the design of the collection scheme. Integration of the waste management and recyclables management systems achieve cost savings and enables increased recycling.

Moving to an alternate weekly collection of dry recyclables and residual refuse has proved to be a particularly successful method of introducing high volume, light weight materials such as cans and plastic bottles into kerbside schemes at practically no extra cost. Councils such as Daventry are achieving a 41% recycling and composting rate at low cost as a result of this approach. Weekly collection of recyclables and residual refuse using split bodied vehicles is also proving effective in many areas.

There is a strong argument for including plastic bottles in multi-material kerbside collections, as it has been demonstrated that this increases the quantity of the other materials collected. For example, Bracknell Forest ran a three month trial collecting plastics with cans in an established fortnightly box kerbside system. Participation during this period increased from 10.8% to 28% and the tonnage of cans collected with plastic increased by 53%.

Services to tenements and flats present particular challenges in some of Scotland's cities. A number of councils highlighted this as an area of interest. We are confident that there is potential to offer integrated mixed recyclables and waste systems to these areas, but more work is required to identify best practice.

### **Outlets for collected bottles**

The lack of facilities to efficiently bale and store collected plastics is a major barrier to the development of post-consumer plastics collection in Scotland. Baling allows vehicle loads of 15-20 tonnes of plastic bottles to be achieved prior to any significant transport. This considerably improves the efficiency of the recycling system and maximises sales values achieved.

It is vital that baling equipment is fit for purpose. Poor choice of equipment will result in poor quality plastic bales, a highly labour intensive baling process, lower sales values and increased transport costs.

We recommend that councils investigate availability of baling facilities locally. In particular, paper merchants may be able to provide a contract baling and vehicle/container loading service for collected plastic bottles. A charge of £35-45/tonne is not untypical for this service.

### **Markets for baled bottles**

Plastic bottle recycling is supply-limited. Over 500,000 tonnes of post-consumer plastic containers were recycled in 2002 across Europe. The plastics recycling industry trades at an international level. Global demand significantly outweighs supply.

Collected bottles can either be sold once sorted by polymer type (which commands the highest value) or can simply be marketed as a mix of all types of bottle. The key factors for maximising income are: quantity of non-bottle contamination, tonnage commitment and tonnage shipped per load (a function of bale density and loading arrangements).

The average sales value of sorted baled plastic bottles (PET & HDPE) over the last five year period has been £123/tonne. Councils or contractors supplying good quality, baled bottles will be able to secure commitments to purchase from recyclers. Typically these can be 1-5 year contractual commitments to purchase with staged price reviews.

The business opportunity for a plastic bottle reprocessor to locate in Scotland is currently very limited because of the low levels of collection. UK plastic bottle recycling capacity is already under-utilised.

### **Strategies to achieve growth**

We believe that the key to the sustainable growth and improving efficiency of plastics recycling in Scotland is through a staged approach, led by increasing collection levels through comprehensive, integrated kerbside collections.

We believe that the prioritisation of investment into 'best practice' integrated recyclables collection schemes will build investment confidence in councils, communities and the commercial sector. The availability of local evidence of efficient operation and growth of high performing recycling infrastructure will accelerate improvements in the remaining traditional council refuse management systems.

We believe that as collection levels of plastic bottles increase, plastic bottles will be profitably sorted by polymer type at a small number of large throughput automated sorting centres at MRFs or at the front end of a reprocessing plant in Scotland.

We believe as collections approach 10,000 tonnes per annum, reprocessing and product manufacturing capability will be attracted to Scotland.

We have identified a series of 16 projects that will all contribute to aligning stakeholders in Scotland to the vision of affordable plastic bottle recycling. These projects combine research, communication, planning and infrastructure projects. We believe that most rapid development of plastic bottle recycling levels will be achieved by moving a focussed programme of activities forward during 2003/4. Such an approach would create a much greater profile for the issues identified and help to build expertise and an agreed strategy that is relevant to Scotland.

We believe the immediate priorities should be to:

- agree a common vision of plastics recycling in Scotland with national and regional government
- inform the implementation of waste plans by highlighting how the inclusion of plastic bottle recycling can be made affordable
- provide expert resources to support council planning and feasibility assessment of such schemes.
- secure commitments to finance priority infrastructure & projects using comprehensive, integrated collection of recyclables and residual refuse
- inform and stimulate efficient local baling capacity for plastic bottles
- build investment confidence by providing sustained information detailing how to sell and maximise the value of baled plastic bottles

## Plastics recycling in Scotland

The Waste Strategy for Scotland aims to provide 85% of Scottish households with appropriate local collection systems for recyclables and compostables by 2010. The growth needed to achieve the 2006 target will require over half of Scottish households to adopt effective kerbside collections. If plastic bottles formed part of the recyclables stream collected from these households, then the total tonnage of bottles collected during 2006 would be over 7,000 tonnes. By 2010 we believe that the collection levels could grow to 30,000 tonnes as a result of embedding a recycling culture and widespread provision of plastic bottle collection as part of the overall waste management service in both the domestic and commercial waste streams.

There is a limited window of opportunity to incorporate and demonstrate the plastics collection and handling infrastructure that can achieve the vision we have described. The Strategic Waste Fund is phased over the next 3 years. It is essential that this work is taken forward as a matter of urgency. If plastics recycling is not one of the priorities of this investment phase, then it will be costly and difficult to change both infrastructure and public education to incorporate this material later.

Confidence will be a key factor in generating change. The importance of providing high quality information to support council decision making on changes to their waste management systems cannot be under-emphasised at this point.

Efficient recycling solutions are available to address the challenge of managing household plastic bottle waste. We believe that councils undertaking a cost-benefit analysis of adopting proposed systems and technology during the period 2003-2006 will be able to identify economic and environmental benefits, compared with continuing to landfill plastic bottles.

We believe that the Scottish Executive should consider the opportunity cost of funding current kerbside development plans in comparison to encouraging and prioritising integrated kerbside collections that include plastic bottles.

## Introduction

Scottish households generate over 200,000 tonnes of plastic products as waste each year. Recyclable plastic bottles with a potential sales value of over £6.5m make up almost 60,000 tonnes of this quantity. Despite the high potential, less than 300 tonnes of post-consumer plastics were recycled from Scotland during 2002.

Household plastic bottle recycling provides the potential for the diversion of up to 10% of the volume of household waste collected; the recycling of plastic bottles creates economic development and employment in more sustainable industries; plastic bottle recycling will add directly to the attainment of recycling targets set out in the National Waste Strategy Scotland. Progress in efficient collection and handling technology, combined with strong demand for collected post-consumer plastic bottles have created the opportunity for high levels of post-consumer plastics recycling in Scotland.

Against this background of high potential but low performance, Remade Scotland commissioned Recoup, the UK's leading authority on household plastics recycling, to research and develop strategies to overcome the current barriers to household plastics recycling in Scotland.



## Report Objectives

This report sets out a vision of widespread, affordable household plastics recycling in Scotland, as part of a wider sustainable waste management system. It aims to provide viable strategies to achieve this outcome. We hope that the ideas and recommendations generated through this phase of detailed research and analysis will be taken forward by groupings of relevant interested stakeholders, with finance made available to pump prime key projects.

The report provides a structured evaluation of the resources currently available and the real and perceived obstacles preventing Scottish local authorities from providing suitable plastic recycling facilities to all householders. Identified resources and barriers are then assessed to highlight the best opportunities to develop plastics recycling in terms of potential, cost and practicality.

We recognise that the success of recycling in Scotland depends on the involvement and collaboration of many different stakeholders - local government, the Scottish Executive, private businesses, SEPA, environmental NGOs and the communities they serve. The report suggests roles for some of these stakeholders to enable a coherent, efficient and high-performance outcome.

## **Why consider post consumer plastic bottle recycling?**

The strong, lightweight nature of plastic packaging has made it the packaging material of choice in many applications. Studies have shown that the use of plastics in packaging can help reduce the weight, volume, cost and whole-life environmental impact of packaging. These benefits are further enhanced by effective management of plastic waste.

There is a growing body of work that compares the relative environmental, economic and sometimes social impacts of different plastic packaging waste management options.

There are several good reasons for the recycling of post-consumer plastic bottles

- Environmental improvements - reduced energy consumption and emissions
- Reduction of solid waste - extension of landfill life
- Sustainable employment and economies - resulting from international markets and recycled products
- Contribution to recycling targets

These issues are detailed later in this report.

## **Methodology**

We followed a consultative process to develop the information within this report. Our conclusions are based on the outcomes of 'one to one' interviews and additional research involving 34 organisations involved in waste management in Scotland.

The majority of information has been derived from structured interviews and workshops conducted during Q4 2002. We have then undertaken a gap analysis and prioritised strategies based on the identified available resources and potential for change. More details of the methodology and individual contributors can be found in Appendix 1.

The conclusions and recommendations here in many cases reflect suggestions or address priorities of participants in the consultation process. However, for clarity, at this stage the strategies and actions represent recommendations from Recoup that have yet to be formally agreed by stakeholders in Scotland. We hope that this will occur as a next phase of the process.

## Plastics in the Scottish Municipal Solid Waste Stream (MSW)

Scotland's population of 5.1m people generate approximately 2.181m tonnes of domestic MSW annually. Plastics typically represent 10-12% of this quantity by weight and a significantly higher proportion of collected waste by volume. Plastics are widely used to produce household consumables due to their lightweight, flexible characteristics. The lightweight, high volume nature of plastic packaging products - especially bottles - reflects good resource efficiency during the pack's life - however it has presented particular challenges for efficient recycling. Later in this report we will indicate how these challenges are being overcome.

54% of Scottish dustbin plastic waste is made up of dense plastics, such as bottles, while the remaining 46% are plastic films such as refuse sacks and carrier bags.

Plastic films from MSW tend to be heavily contaminated and currently incur higher collection and processing costs than can be justified. Other dense plastics will also be present in household waste. These include microwaveable trays, yoghurt pots and margarine tubs. These items are potentially recyclable, but there are no volume markets for these post-consumer plastic packaging materials<sup>1</sup> and economics are less favourable than for plastic bottles. For these reasons the plastics recycling sector currently focuses on plastic bottle recycling.

Currently the best opportunity for post-consumer plastics recycling is through the recycling of plastic bottles. This is due primarily to a combination of well established markets for collected bottles and ease of sourcing good quality material from the domestic waste stream.<sup>2</sup> There were approximately 58,000 tonnes of plastic bottles generated from Scottish households in 2002. The trend is for increasing use of plastic bottles in the future.

We recommend focussing on plastic bottle collection to maximise the opportunity to develop sustainable markets for plastics in Scotland.

The majority of household plastic bottles are made from one of two types of plastic; either Polyethylene Terephthalate (PET) or High Density Polyethylene (HDPE). A small percentage is made up of a combination of other polymer types, mainly PVC. Figure 01 below indicates the total quantities of the potentially recyclable plastic bottles, by polymer type, found in household dustbins in Scotland.

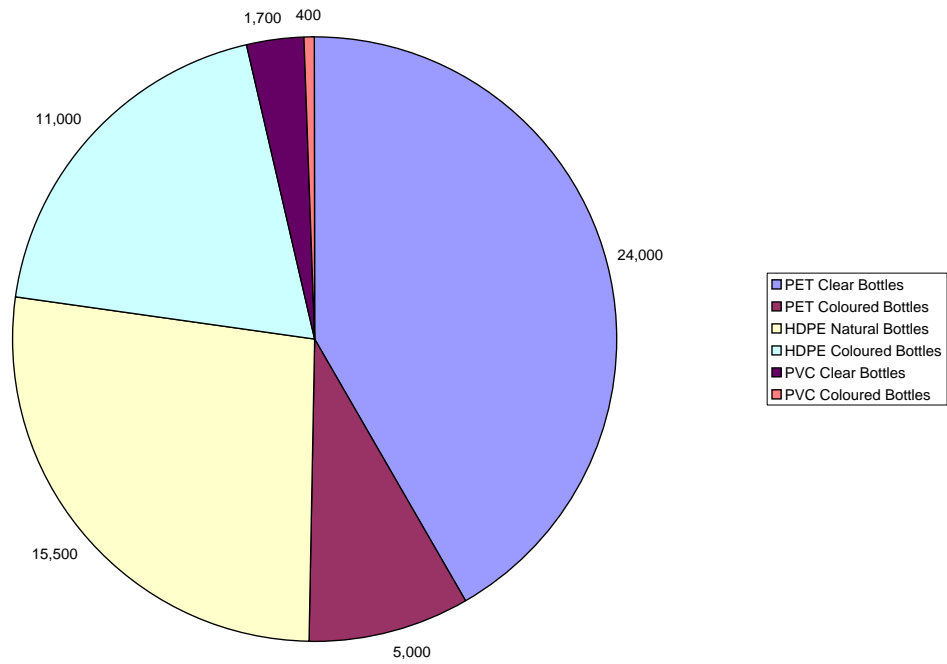
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<sup>1</sup> Mixed plastics recycling processes, such as feedstock recycling or the use of plastics as a reducing agent in steel or cement manufacture offer potential solutions for a broader plastics wastestream. To date processes have been uneconomic in the UK, however current R&D work is improving economics and the potential for these processes should be periodically reviewed.

<sup>2</sup> We note that although this report is focussed on household plastics recycling, there are large markets for used post-commercial and industrial plastics, especially distribution films, crates and foamed polystyrene packaging. In the UK over 350kt of plastic packaging from these sources was recycled during 2002. We imagine that there will be good opportunities for more recycling in the C&I sector, and in the agricultural film sector, although the latter activity is likely to remain reliant on subsidies.

## Plastics recycling in Scotland

Figure 01 – Currently recyclable plastic items in household dustbin by tonnage



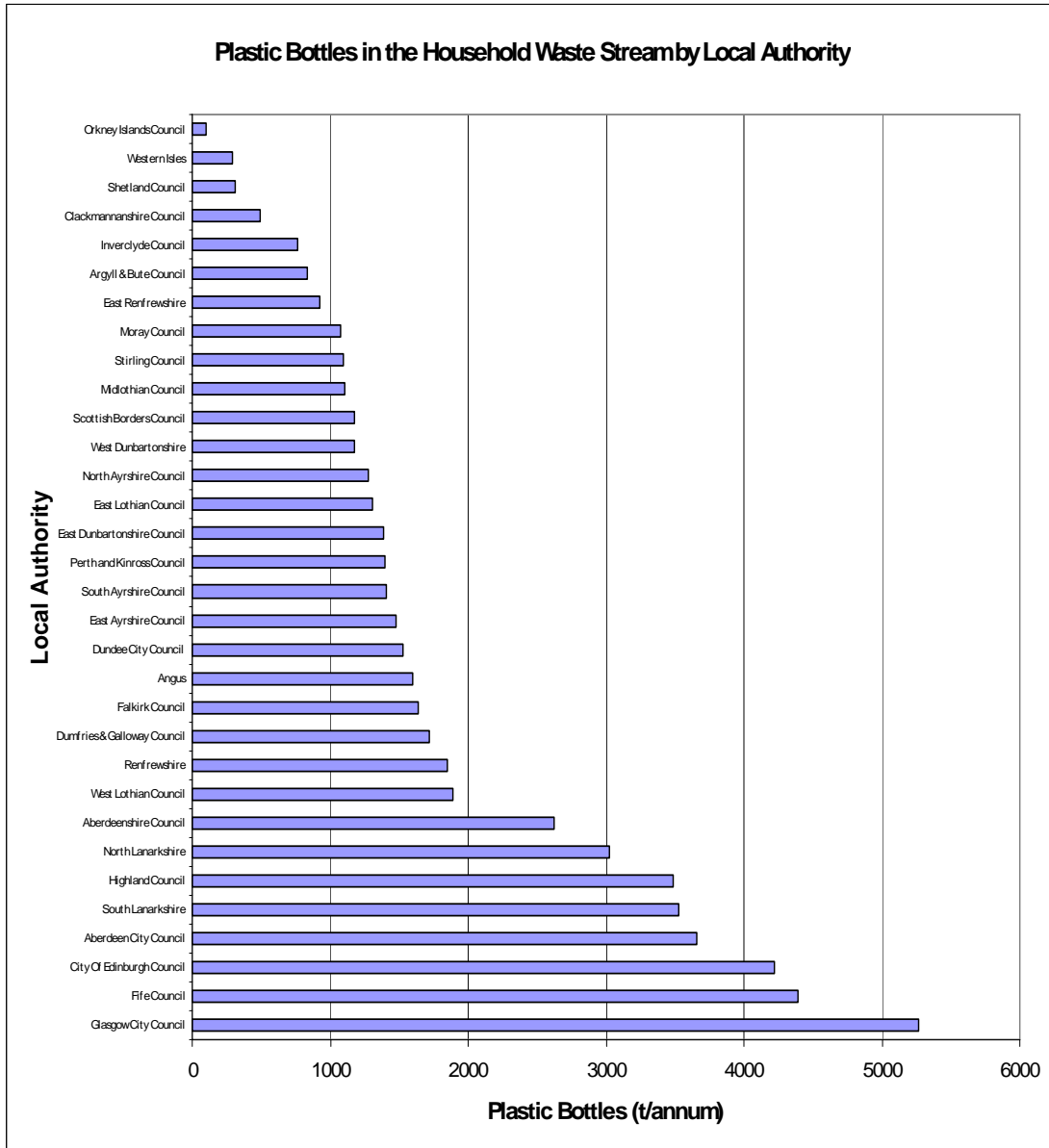
The best prices are paid for bottles sorted by polymer type, although there are substantial markets for mixed plastic bottles.

A more detailed analysis of plastics in Scottish MSW can be found in Appendix 2.

Figure 02, below, details the quantities of plastic bottles currently generated from each local authority area. The majority of the plastic bottles are generated in the Central belt and therefore it is likely that most infrastructure - and in particular local markets - will develop in this area.

Plastics recycling in Scotland

Figure 02 – Plastic bottles in Household Waste Stream by Local Authority



## Plastic bottle recycling in Scotland - where we are now?

### **Collection infrastructure for household plastic bottles**

There were 14 local authority areas that confirmed that they operate a post-consumer plastic bottle collection scheme. There are 11 bring schemes in operation, and 5 kerbside programmes that include plastic bottles. In total these schemes generate an estimated 278 tonnes per annum of plastic bottles for recycling, a recycling rate of 0.5% of all plastic bottles. The UK average is 3%, and this is substantially lower than many other European countries and the USA, as detailed later in this section.

Collected bottles are delivered to a limited number of handling centres, ranging from small baling facilities to large materials reclamation facilities. The baled plastic bottles are then sold to reprocessors in the UK, Europe and Asia.

The collection infrastructure at January 2003 is summarised in figure 03 below.

*Figure 03 - plastic bottle collection schemes in Scotland at January 2003<sup>3</sup>*

Local Authority	Households in council area	Scheme Type	Number of Bring Sites	Kerbside Household Coverage
Aberdeenshire	91,000	Bring	3	
Angus	46,000	Bring	9	
Argyll and Bute	38,000	Bring & kerbside	6	2850
Dundee	66,000	Bring	1	
Edinburgh	207,000	Bring	12	
East Dunbartonshire	42,000	Bring	4	
Fife	150,000	Bring	24	
Glasgow	274,000	Bring & kerbside	10	40000
Inverclyde	37,000	Kerbside		36000
Perth and Kinross	57,000	Bring	8	
Renfrewshire	77,000	Kerbside		2500
Stirling	34,000	Bring	5	
West Lothian	64,000	Kerbside		7500
Western Isles	11,000	Bring	4	
TOTALS	1,194,000		86	88850

Although approximately 43% of Scottish local authorities offer 'a scheme', the low collection rate demonstrates that many of these are limited in number of facilities, participation or coverage.

The bring schemes generally utilise wheelbins, banks or skips at relevant public sites, where other material recycling containers already exist. The kerbside collection systems vary, ranging from simple 'carrier bag' schemes as conducted in Inverclyde, to the use of three wheel bins - one for mixed, dry recyclables - as utilised by West Lothian.

West Lothian currently service 7,500 households with a 3 wheel bin system. A grey bin is for general refuse, brown bin for green waste, and a blue bin for mixed recyclables including paper, cans and plastic bottles. The bins are collected on a four weekly cycle as follows; week 1 = grey bin, week 2 = brown bin ; week 3 = grey bin; week 4 = blue bin. The glass is collected through a separate network of approximately 30 bring sites. This is the first Scottish scheme to demonstrate a truly integrated system with the emphasis on recycling, and it is hoped that others will adopt similar integrated strategies.

<sup>3</sup> Based on discussion notes, council websites and Recoup Survey 2002 responses

### **Evaluation of currently planned developments**

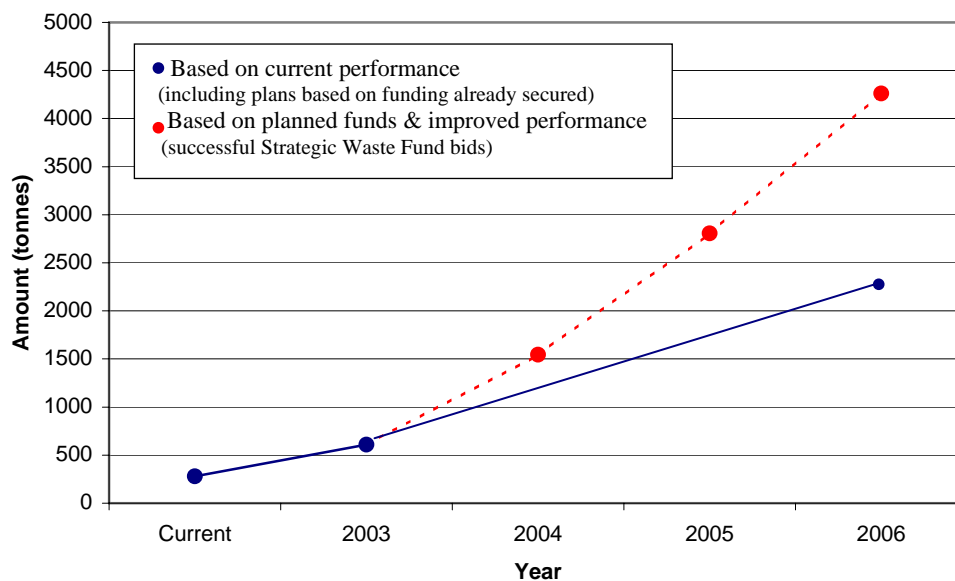
We have made estimates of the current growth of household plastics recycling in Scotland based on the infrastructure that currently exists, and plans identified from our stakeholder research<sup>4</sup>. Based on declared current plans we predict the growth in post consumer plastic bottle collections in Scotland to over 4,250 tonnes (7.3%), as set out in figure 04<sup>5</sup>.

On the basis of information provided, and assuming both all plans are funded and achieve good performance, we estimate that by 2006, 80% of the plastic bottles collected will be through multi-material kerbside systems. The remaining 20% will be sourced from bring facilities. 3,520 tonnes of plastic bottles will be collected from 880,000 households in Scotland. This equates to 40% of all Scottish households; 880 tonnes of plastic bottles are expected to be recovered from approximately 420 bring sites across Scotland.

**We note that in most cases the predicted growth below is still contingent on successful bids for finance from the Strategic Waste Fund and timely implementation.** The research shows that the area waste planning process has provided focus for household recycling, and the strategic waste fund has allowed more local authorities to realistically consider plastic bottle recycling.

**If only current commitments are funded and performance of schemes remains at current levels the total collection level will be approximately 2200 tonnes by 2006.**

Figure 04 - Projected collection of plastic bottles for recycling



The projected growth rate would be an encouraging increase on current recycling levels in Scotland. However, it would still reflect only a 7% recycling rate for plastic bottles. To put this into a European context, the tonnage generated would be very modest compared to the achievements of many other European countries.

Figure 05 below illustrates current and projected collection levels of PET bottles only across Europe. The graph shows that countries with comparable consumption levels of plastic containers, e.g. France and Italy, are achieving significantly higher performance whilst many other smaller nations are far

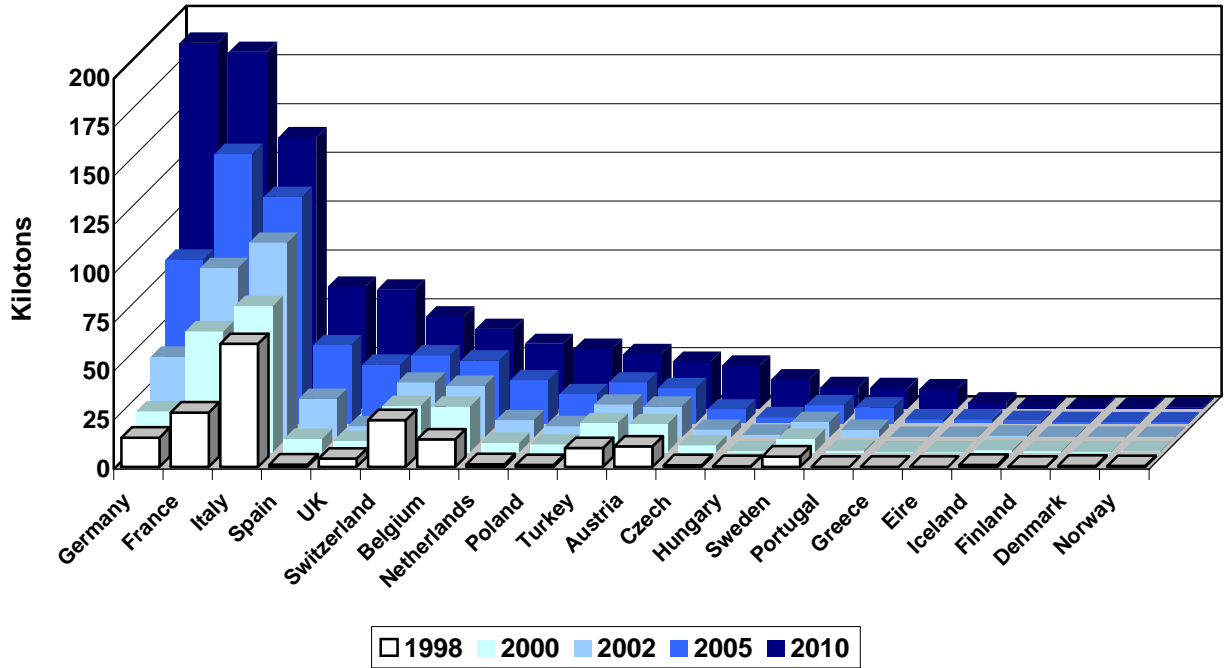
<sup>4</sup> We note that this position is likely to represent a 'minimum' scenario as the development of strategic funding bids is ongoing. We hope that the information relating to this project will stimulate bids that will provide for increased plastics collection and handling within wider, efficient programmes.

<sup>5</sup> The detailed working that generate this summary are shown in Appendix 3



exceeding the total UK performance. We have included this to emphasise both the substantial international nature of the plastic bottle recycling industry, and to highlight that the UK is significantly under performing in comparison to its continental neighbours.

Figure 05 - Current & projected collections of post-consumer PET bottles in Europe



## ***Current sorting & handling infrastructure for post-consumer plastics in Scotland***

Bottles collected by these schemes are baled at a limited number of handling facilities before sale to specialist recyclers either in England and overseas. There are currently no reprocessors for post-consumer plastics in Scotland - primarily as a result of the limited availability of material. In some cases the plastic bottles are sorted into polymer types prior to baling, although this is not necessary to market the collected bottles.

Recyclables handling facilities can vary from simple storage and baling centres that have limited capacity, up to state of the art mechanised handling facilities that have the ability to handle in excess of 50,000 tonnes of dry recyclables a year.

There are baling and sorting facilities in Scotland to absorb the flow of recyclables generated by local authority recycling operations together with commercial waste handling contracts. The greatest capacity is based in central belt locations with a particular concentration of such facilities in and around Glasgow. These include Shanks Waste Solutions, William Tracys, and Glasgow City Council MRF's. All have the ability to handle recyclable household waste. The Shanks and Glasgow Council facilities currently handle material from a number plastic bottle recycling schemes in Scotland.

Elsewhere, Macglass of Edinburgh have expanded a successful glass collection business to collect other materials such as plastic bottles from surrounding local authorities. Surface Control (Glasgow) Ltd is a member of the Snowie Group specialising in the recycling of plastics, paper and timber materials recycled at specialist premises in Grangemouth. There are other manual MRF facilities in Scotland that will also have the capacity to store and bale plastic bottles. These include Fife, Angus and Aberdeen.

We believe that the lack of appropriate handling facilities - in particular the lack of facilities to efficiently bale and store collected plastics - is a major barrier to the development of post-consumer plastics collection in Scotland.

More localised storage and baling sites will be required to handle the predicted increases in Scottish plastics recycling. Local baling facilities can efficiently handle a range of recyclables and create particular opportunities for plastic recycling. Local baling allows vehicle loads of 15-20 tonnes of plastic bottles to be achieved prior to any significant transport. This considerably improves the efficiency of the recycling system.

**It is vital that baling equipment for these facilities is fit for purpose as poor choice of equipment will result in poor quality bales, a highly labour intensive baling process, lower sales values and increased transport costs.**

## 0.5% recycled - why isn't more happening?

The research and stakeholder workshops highlighted a number of issues and obstacles. These are summarised below and addressed in more detail in the following sections. In many cases the issues raised by Scottish local councils and contractors as barriers to new activity can be overcome, by improving information provision and communication. In other cases they can be significantly overcome by appropriate decisions made during the planning and implementation of collection and handling infrastructure. Undoubtedly there will need to be some pump priming of the infrastructure for plastics recycling in Scotland - however we believe that this will lead to impressive and sustainable recycling performance.

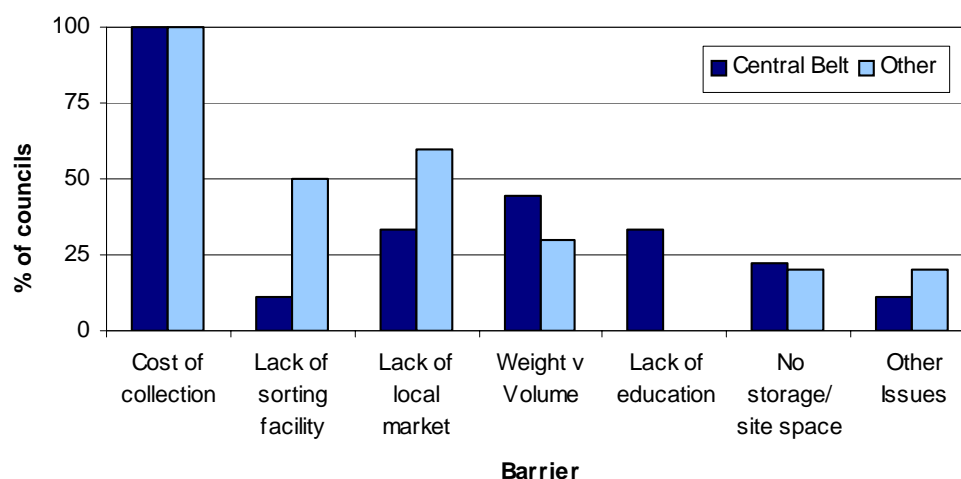
### *Main issues raised by stakeholders in Scotland*

- Uncertainty of benefits of recycling post-consumer plastic bottles
- Uncertainty of and low confidence in markets for collected post-consumer plastics
- Concern that the lack of a Scottish recycler for plastic bottles means distance to market is a major barrier to collecting
- Limited and inappropriate baling facilities and bulking sites for post-consumer plastics
- Perception that plastics collection schemes do not represent value for money, often with high costs of implementation
- Uncertainty in how to affordably add plastics collection to a new kerbside programme
- Relatively low participation rates within existing collection schemes
- Perception of 'complexity' and 'difficulty' of plastics recycling

The workshops and associated research did highlight that post-consumer plastics recycling can be affordably and successfully implemented, when this forms a planned element a comprehensive waste management programme. By contrast, where plastics collections are added at a small scale and as an 'add on' service, there is a greater likelihood that these schemes will result in high costs, operational difficulties and relatively poor performance.

Figure 06, below, shows the generic barriers to increased plastics recycling that recycling managers spontaneously identified. Appendix 3 provides a more detailed breakdown of this information.

*Figure 06 - Main reported barriers to developing plastic bottle recycling by Scottish Councils*



The experience of household plastics recycling in Scotland has to date often been the result of relatively small initiatives that are not particularly representative of the potential for the future. We in no way criticise those who have already pioneered activities, motivated communities and developed the presence of plastics recycling. Our point is that, as a result of the Strategic Waste Fund, Scotland now has the opportunity to invest in high performance recycling programmes that can include substantial

## Plastics recycling in Scotland

quantities of post-consumer plastics at minimal additional cost and with a series of wider community benefits. A step change in thinking and in infrastructure planning is required to achieve this. We set out our vision of appropriate infrastructure later within this report.

The following section comments on the key barriers identified during the research phase, and aims to provide answers to main questions raised.

## Common questions & concerns

### *"What are the benefits of recycling plastic bottles?"*

Environmentally the case for mechanical recycling of plastic bottles with low material contamination is well demonstrated.

The energy used in plastic packaging recycling systems, from collection to production of pellets or flakes that substitute virgin requirements are significantly lower than virgin production energies. For example, the virgin production energy for bottle grade PET is 78.8MJ/kg (Boustead 2001<sup>6</sup>); the production energy to produce recycled PET flake ranges from 8-30MJ/kg (Matthews 1998<sup>7</sup>). The potential energy saving here by use of recycled materials is so significant - a reduction of 62-90% (71-49MJ/kg) that even given the need for some further processing of the flake to achieve a virgin equivalent specification, the issue is clear cut in terms of energy conservation.

Transport and sorting of plastic packaging waste has, therefore, relatively limited impact on the ecological burden of the overall recycling system (Wollny and Schmied 2000<sup>8</sup>). It is important to recognise the relative infancy of plastics recycling systems from MSW. Improvements in the efficiency of collection, handling and reprocessing technology will further reduce ecological burdens. An increase in the volumes of plastic packaging waste collected will also improve the proximity of processing and manufacturing industries, creating more localised resource sufficiency and improving relative environmental performance to landfill.

Plastic bottles have a low weight high volume ratio, with approximately 20,000 plastic bottles in a tonne. This has put plastic recycling at a disadvantage due to weight based targets, yet it is of primary importance when looking to prolong the life of current landfill facilities through the removal of high volume materials.

There is a strong argument for including plastic bottles in multi-material kerbside collections, as it has been demonstrated that this increases the quantity of the other materials collected. For example, Bracknell Forest ran a three-month trial collecting plastics with cans in an established fortnightly box kerbside system. Participation during this period increased from 10.8% to 28% and the tonnage of cans collected with plastic increased by 53%; the trial has been extended (Bracknell Forest Council 2002<sup>9</sup>).

Moving to an alternate weekly collection of dry recyclables and residual refuse has proved to be a particularly successful method of introducing high volume, light weight materials such as cans and plastic bottles into kerbside schemes at practically no extra cost. A growing number of UK local authorities have proved that this type of integrated waste management system increases performance levels and household participation.

One of the most significant considerations to assess the environmental benefits of recycling relates not to collection and processing, but to how the recycled plastics are used in new applications. The greatest benefits are demonstrable where recycled plastics substitute virgin polymer at a ratio of 1:1 and achieve an equivalent performance. For example, this is typically the case in recycling of plastic bottles into new plastic bottles. Recycled plastic may also be mixed with virgin polymers and other material to produce new products. A variety of products are manufactured using recycled plastics including fleece clothing, fibre for sleeping bags and anoraks, new packaging, industrial strapping, fence posts, benches and so on.

For further information a set of Recoup factsheets, looking in more detail at the benefits of recycling plastic bottles and the applications, are contained in Appendix 4.

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<sup>6</sup> Boustead I (2001) *Recycling PET & HDPE*, Petcore & APME

<sup>7</sup> Matthews V (1998) *Life Cycle Assessment - LCA & the PET Bottle*

<sup>8</sup> Wollny V and Schmied M (2000) *Assessment of Plastic Recovery Options*, Oko-Institut e.v.

<sup>9</sup> Bracknell Forest Council (2002) *Report on the status of the kerbside green box recycling scheme and associated initiatives in Bracknell Forest*, Bracknell Forest Council

*"Are there reliable markets for plastic bottles?"*

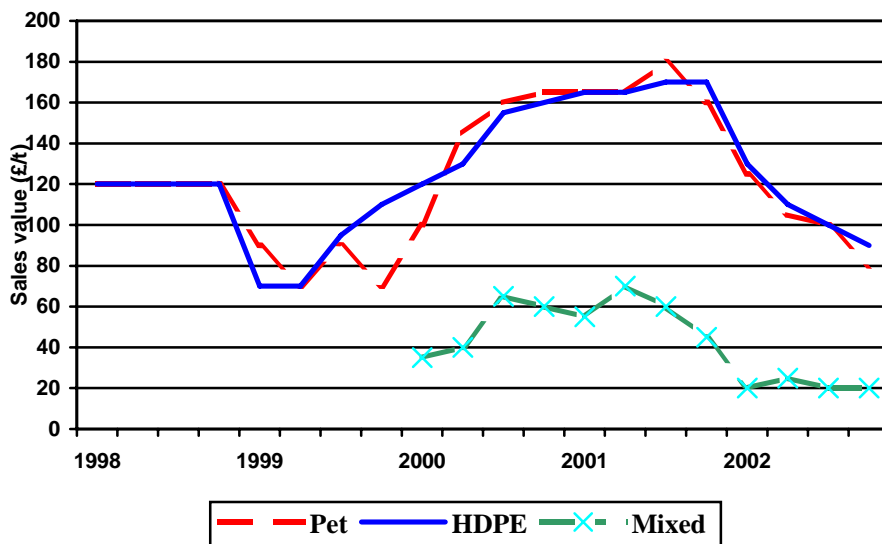
Well over 500,000 tonnes of post-consumer plastic containers were recycled in 2002 across Europe. The plastics recycling industry trades at an international level. Global demand significantly outweighs supply. There is strong demand from existing markets in the UK, Europe and the Far East for good quality, baled plastic bottles. The bottles can either be sold once sorted by polymer type (which commands the highest value) or can simply be marketed as a mix of all types of bottle. The key factors for maximising income are: quantity of non-bottle contamination, tonnage commitment and tonnage shipped per load (a function of bale density and loading arrangements).

Well over 40% of the UK's household plastic bottles collected for recycling are currently sold to both European and world markets. This is a normal function of international trade and reflects issues such as relative labour costs and business regulation. A growth in plastics consumption in Asia combined with low labour costs has created particular economic incentives to sell collected recyclable plastics to these markets.

*"What are collected plastic bottles worth?"*

Like any commodity market the value of baled plastic bottles varies over time. Price fluctuations are primarily a function of virgin price movements and PRN values. Budgeting for material sales values should be based on considering long term averages rather than spot pricing. Figure 07 shows our assessment of the average quarterly prices paid for baled plastic bottles over the previous five-year period. The average value of sorted baled plastic bottles over this period has been £123/tonne. During this period the value of plastics recycling PRNs has dropped significantly, as shown in figure 07, and this has been partly responsible for the reduction in pricing since 2001. Our assessment is that plastics PRN pricing will remain weak and we would currently recommend a lower long term average be used for budgeting purposes; average pricing of £100/tonne for sorted, baled materials would appear prudent.

Figure 07 - Baled bottle pricing



Prevailing pricing information and purchase contracts can be sourced from Recoup Services (tel. 01733 390021) or other recyclers of post consumer plastic bottles. Price trends for baled bottles are published in a number of trade magazines or websites such as Materials Recycling Week and letsrecycle.com.

Spot market pricing for PRN can be found in these publications and on the electronic trading system the Environment Exchange, [www.t2e.co.uk](http://www.t2e.co.uk).

Councils or contractors supplying good quality, baled bottles will be able to secure commitments to purchase from recyclers. Typically these can be 1-5 year commitments to purchase with staged price reviews.

*"Doesn't the lack of a recycler in Scotland prevent us starting a scheme?"*

No. It is certainly preferable to reduce transport distances and stimulate local economic development - as would be achieved by the development of local recycling capacity in Scotland, but this is not necessary and will not be achieved until collection levels grow significantly.

The impact of transporting baled bottles on the overall environmental benefits of recycling plastic bottles is very low - shipping baled bottles within the UK and to more distant markets is still a significant environmental gain. Financially, the difference in costs of transporting baled bottles within Scotland, and of transporting them to other recyclers in the UK or through export of containers are relatively low. For example, the additional cost of a full trailer load from Aberdeen to the Midlands, compared to the central belt of Scotland, is £15-20/tonne shipped. We would recognise that remote communities, especially in the Highlands and Islands do have particular transport challenges and cost here will be a more significant issue. However, as figure 02 demonstrated, these communities represent a relatively small proportion of the collection opportunities in Scotland.

In any event, prices will now often be quoted 'ex-depot', and the buyer will typically manage shipment from the supplier's site, simplifying the process considerably.

*"When will we have a local bottle recycler in Scotland?"*

This is a shared goal, but for it to be commercially viable requires much more than simply an injection of capital to fund a recycling plant. A recycling business must be able to secure sufficient, competitively priced plastics and be able to distribute its products competitively. The typical capacity of a European commercial plant is over 20,000 tonnes per annum. The business opportunity for a plastic bottle reprocessor to locate in Scotland is currently very limited because of the low levels of collection.

We believe that once there is clear evidence that 5,000 tonnes of a single polymer will be available from Scotland, investment will follow. Current UK plastic bottle recycling capacity is already under-utilised. We believe that the collection of approximately 10,000 tonnes of mixed plastic bottles in Scotland would encourage a major reprocessor to develop a local facility. These issues are considered in more detail later.

*"Can we afford to collect plastic bottles?"*

The main barrier to progress relates to real and perceived costs of plastic bottle recycling. We use the phrase 'real and perceived' to highlight the fact that a number of councils in the UK are now able to collect large volumes of plastic bottles for recycling without incurring significant additional expenditure, whilst others will experience high costs. It is notable that the Audit Commission in England has found almost no correlation between recycling rates and waste management expenditure. The key to success and affordability is therefore in the design of the collection scheme.

There are a number of factors that impact on determining affordability - the operating costs of the scheme, direct revenues, avoided costs and the value of 'external' benefits.

The most significant influence on affordability is the ability to integrate the waste management and recyclables management systems, and achieve costs savings on the residual waste handling. When asking whether a council can afford to collect plastic bottles for recycling, it is worth noting that they already provide and pay for the infrastructure to collect all the plastic bottles as part of dustbin waste:

currently these costs are hidden in the overall waste management budget. If collected and delivered to a MRF rather than a landfill, net revenue is generated and costs of residual refuse management can be reduced in certain circumstances.

Well-integrated kerbside collection schemes enable plastic bottles to be collected weekly or fortnightly with a range of other recyclables for little more than the current refuse collection cost. Typically this can provide a comprehensive kerbside collection system delivering over 20% recycling. It will recover glass, paper, plastic bottles and can material, for no more than a 20% increase in current refuse collection and disposal costs. We believe that the trend is for these extra costs to reduce as a result of increased disposal avoidance benefits and continuing improvements in collection and handling technologies.

Services to tenements and flats present particular challenges in some of Scotland's cities. A number of councils highlighted this as an area of interest. We are confident that there is potential to offer integrated mixed recyclables and waste systems to these areas, but more work is required to identify best practice.

Where schemes are simply an 'add on' and residual refuse collection and disposal cost savings are not realised, then overall waste management costs will be considerably higher. In broad terms, a bottle bank collection scheme is likely to result in a net operating cost of £200-250/tonne. The addition of plastic bottles to a non-integrated kerbside collection where materials are sorted at the vehicle can add about 30% to overall kerbside scheme collection costs, due the high volume of the plastic bottles. Whilst these non-integrated approaches do result in growth of plastic bottle recycling, the relatively high costs can and should be avoided as they undermine the sustainability, performance and value of the scheme.

We believe that non-integrated collection scheme design also discourages promotion and performance improvement - since additional plastic bottles recycled increase the scheme costs significantly.

More details on the operational parameters and costs of schemes are available from Recoup. Although information on integrated collections is less widely available, further relevant data is currently being recovered to support integrated systems. A number of helpful documents are included in Appendix 4.

### *"We do not have a local MRF - what can we do?"*

Plastic bottles should be baled before shipping significant distances. However, the lack of a fully specified MRF need not be a barrier to local collection. Bottles do not need to be sorted by polymer type to be sold, and so the simplest requirement is for access to a suitable baling facility. An efficient plastic bottle recycling system requires baling equipment capable of achieving 15-20 tonne loads, either on a trailer or container.

The type of baling machine is critical to the economics of the scheme. Horizontal baling presses exerting pressures of 40 tonnes or more are recommended. Vertical baling machines are not recommended: bales produced on vertical balers are typically much less dense and prone to collapse. In addition the costs of operating a vertical baler are significantly higher, as the baling process is much more labour intensive.

Although it is not recommended, it is possible to market bales of lower densities. It should be noted that loads of under 15t will often require rebaling before export, and so the value is reduced considerably. Loads of under 8t will probably be characterised by loose, unstable bales that present stacking and handling problems. The value for this kind of material is very much reduced.

We recommend that councils investigate availability of baling facilities locally. In particular, paper merchants may be able to provide a contract baling and vehicle/container loading service for collected plastic bottles. A charge of £35-45/tonne is not untypical for this service. Once baled, buyers will often arrange collection from the local site. Typically, the current sales value for high density bales of mixed bottles exceeds the contract baling and loading charges.

Greater access to appropriate baling facilities will undoubtedly be required to grow plastic recycling in Scotland. This issue is considered in more detail later.



*"Running a plastic recycling scheme is particularly complicated"*

We believe this perception is the result of two factors: first it reflects the struggle that some smaller operators have experienced initiating plastic collection schemes, and secondly it reflects insufficient communication and lack of time to consider what has typically been a lower priority issue.

In reality, the operation of a plastics bottle recycling programme is no more involved than operating a can or paper recycling scheme: it requires collection, some central handling and preparation of materials to a market standard.

We do recognise that a number of authorities in Scotland have found it difficult to gain the right kind of information, particularly about the markets, and this is an area where recyclers need to improve. We also recognise that the details of plastic recycling are less familiar to collectors than for other materials. However much of the key information required is readily available: it simply needs to be disseminated more effectively.

*"Our current participation rates are low"*

Some current schemes noted that although they offered collection facilities, the current collection level for plastic bottles was relatively low. This is illustrated clearly by the fact that 43% of councils offer some kind of plastic bottle collection programme, yet only 0.5% of plastic bottles are recycled. For example, Glasgow City Council noted that their would benefit from increased public profile.

We believe than in many cases the current performance of plastic bottle collection schemes could be more than doubled by the introduction of sustained awareness raising initiatives. Research recently carried out by MORI in England showed the public often do not know about the availability of local recycling programmes or how to use them, and this is a barrier to increasing participation.

## **Where do we want to be? - A vision of plastics recycling in Scotland.**

*"It is 2006. As a result of investment from the Strategic Waste Fund, many councils in Scotland are now exceeding 20% recycling. Plastic bottles form a part of kerbside collections offered to over 1 million households in Scotland. These schemes, along with bank collections, have generated 7,000 tonnes of plastic bottles for recycling - a bottle recycling rate of over 10%.*

*As a result of Strategic Waste Fund investment in efficient, well integrated collection systems, the collection programmes experience little difference in waste management costs as a result of collecting plastic bottles for recycling, rather than for landfill. Councils who have followed the system of West Lothian for example, and moved to alternate weekly collections of residual refuse, recognise the benefit of moving the volume of bottles out of the waste bin. This is now providing further waste minimisation opportunities for these councils.*

*Most of the collected plastic bottles are quickly baled at multi-material handling depots without any need for sorting. The throughput of a wide range of recyclables at these centres means equipment is well utilised and handling costs are low. The operators of these handling centres have long term purchase contracts with buyers of plastic bottles, who collect the bales from the site twice a month. The average sales value of the baled plastic bottles exceeds on-site processing costs and provides a small net income stream. This net income, combined with the avoided costs of disposal compensates for the marginal additional collection costs. As landfill tax increases, and the throughput of these centres also grows, the benefits become greater. Both the environmental and economic aspects of plastic bottle recycling are greatly improved.*

*The strong growth of collection in a handful of Scotland's main cities and surrounding areas is generating well over 5,000 tonnes per annum of plastic bottles. Two of the large MRFs in these areas have invested in mechanical sorting equipment for bottles, as the throughputs of bottles now enable them to maximise their net income by sorting the bottles. Both these facilities are now actively working to increase the quantities of plastic bottles supplied into the facilities - since the increased throughput now results in increased income for the site. As a result they have recently begun to buy mixed baled bottles from some of the other handling sites in Scotland.*

*The availability of handling facilities for the plastic bottles has had another benefit - there is a growing supply of plastic bottles from large offices and schools. Such schemes are becoming more common as facilities management businesses realise they can reduce their waste management costs as a result of providing in-house recycling points.*

*An established manufacturer of plastic products that uses recycled bottle material is in negotiation to build a plastic recycling and product manufacturing line that will be sited adjacent to one of the MRFs. The plant is expected to open in early 2007 and will significantly improve the profitability of the local bottle recycling programme by reducing haulage and baling costs. As a result the MRF is planning to increase its payments for mixed bales plastic bottles.*

*The integration of sorting, reprocessing and product manufacture on the same site has removed significant costs from the system. The site operator is now keen to further boost throughputs and is able to offer the best prices to achieve this. The site is offering £70/tonne to buy mixed baled bottles and aims to boost throughput to 10,000 tonnes in 2008. Increasing collection levels of plastic bottles now results in improved efficiencies, rather than escalating deficits. The foundations for a sustainable, market-driven system are firmly in place."*

## **Is this *really* an achievable vision?**

On first reading this vision may appear incredible in a country that is current collecting 278 tonnes of plastic bottles. However, we believe that if Councils and the Scottish Executive are willing to put aside preconceptions and focus on the facts, it is certainly achievable.

Scotland can plan investment, drawing on 20 years of best practice experience gained by bottle recycling programmes throughout the world. The facts are that each of the operational practices and systems above has been proven. The trend will be for the systems described above to become increasingly cost-effective, especially as landfill costs rise. We believe that the barriers to achieving this vision are no longer technology barriers: highly efficient recyclables collection and handling systems exist and can be demonstrated; integrated recycling and product manufacturing lines are a reality. The Strategic Waste Fund can provide sufficient capital funding to drive this process forward, if properly focussed. We believe the main challenges relate to organisation and confidence to plan and implement these high-performing systems.

If you accept this analysis of current operational and fiscal drivers, then you are left with the real proposition that within the next 5 years Scotland could be selling valuable products made from 10,000 tonnes of its plastic bottle waste at lower cost than it would have spent landfilling these same bottles. Put in these terms plastic bottle recycling should no longer be seen as a peripheral issue to waste planners but as the best value option. The question becomes "how do we get there?".

## How do we realise the vision?

We believe that the vision described in the previous section will be realised by the following growth stages:

**STAGE 1:** Kerbside collection scheme operators cost the option of including plastic bottles in planned multi-material collections. Plastic bottles are then included for collection, mainly in integrated collections, because of sound, widely accepted economic and environmental arguments.

**STAGE 2:** New kerbside and 'close to home' collections of plastic bottles are agreed and scheduled for roll-out, with investment supported by the Strategic Waste Fund.

**STAGE 3:** A series of baling centres for mixed plastic bottles develop around Scotland to handle the planned expansion of collections. These vary in scale from large MRFs for household waste, to private recyclables processing businesses using spare capacity on existing equipment. They will bale a few hundred tonnes a year of plastic bottles on a toll basis. Some remote areas develop simple low-capital baling centres.

**STAGE 4:** Positive feedback - the prioritisation of investment into 'best practice' schemes builds investment confidence in councils, communities and the commercial sector. The availability of local evidence of efficient operation and growth of infrastructure accelerates improvements in the remaining traditional refuse management systems. The widespread availability of comprehensive recyclables collection infrastructure in Scotland enables branded promotion of recycling activity to be conducted at a national and regional level, further boosting diversion from landfill.

**STAGE 5:** Collections expand and plastic bottle collections rise to a level which enables mixed bottles to be efficiently sorted by polymer type at a small number of large throughput sorting centres at MRFs or at the front end of a reprocessing plant in Scotland. (Target - Over 1,000 tonnes of mixed plastic bottles handled at a MRF, with automatic sorting capacity and throughput then rising to improve operating profit).

**STAGE 6:** Reprocessing and product manufacturing capability is attracted to Scotland (Target - 10,000 tonnes of bottles collected)

## What strategies will overcome the identified barriers?

This section sets out potential strategies to move toward our vision. A range of strategies are detailed below that could address the identified barriers to increased household plastics recycling. We have commented on the suitability of the strategies and later in this section go on to assess and prioritise strategies for Scotland. A number of strategies are based on stimulating the integration of collection of plastic bottles within a broader recycling programme, and so have wider implications. We believe that many of the strategies proposed would be of general benefit to waste management practices in Scotland.

### Potential strategies to overcome major barriers

IDENTIFIED BARRIER	POTENTIAL SOLUTION	COMMENTS
Affordability of post – consumer plastics recycling	<p>Secure extra funding</p> <p>Reduce plastic recycling system costs (using methods below)</p> <p>Identify convincing 'value for money' arguments</p>	<p>The perception that council 'cannot afford' to participate in sizeable plastic bottle recycling programmes is a symptom of other factors - in particular collection scheme design.</p> <p>Without addressing the underlying causes, the only solution is simply to fund the revenue deficit - in this case a long term commitment to subsidise plastic bottle recycling at a rate equivalent to around £200/tonne would probably result in significant growth. For example, such an approach has achieved dramatic results in Belgium. However, we do not believe this is the right way forward.</p> <p>We believe a much more sound approach is to ensure that the Strategic Waste Fund is directed to projects that integrate plastics collection within the wider recycling programme. If this is undertaken from the outset and the fund provides capital for appropriate infrastructure then the additional costs of introducing plastic bottles are marginal.</p> <p>During the next 3 years we believe that systems can be arranged to be at least as affordable as the current collection and landfilling of plastic bottles as waste.</p> <p>The development of major recycling programmes including plastics relies on champions within local and national government to drive progress. These people will fail to win support if they cannot articulate a well reasoned argument for the 'value for money' of plastics recycling. We believe that although the supporting facts are now available, the case has not yet been made sufficiently coherent.</p>
Lack of local handling infrastructure	<p>Develop 'low cost' local baling operations for mixed plastics</p> <p>Seek available contract baling and storage capacity from current waste contractors.</p> <p>Develop manual plastic sorting systems within multi material MRF's</p> <p>Develop automatic plastic sorting systems within multi material MRF's</p>	<p>We believe that currently the best operational model for most councils in Scotland is to collect plastic bottles and deliver them to sites where they can be baled, without sorting, to achieve loads weights of over 15 tonnes.</p> <p>There appears to be insufficient available baling capacity for plastic bottles in many parts of Scotland.</p> <p>For relatively small schemes and those where plastics is the only material requiring baling, we believe that the most efficient method of handling plastic bottles will be through contract baling arrangements with third party operators, for example paper merchants. We recommend that availability and terms of such arrangements should be investigated.</p> <p>Where no local baling is available, there is a 'chicken and egg' problem - investment in collection schemes will not begin without a local baling centre, and there is not a requirement for a baling centre without collection. There is a role here for capital grants to kick start development. A suitable baler and conveyor feed system could be sourced for £40k and would be capable of baling over 1 tonne of plastics or other recyclables per hour. Provision of such baling equipment at a handful of strategic sites around Scotland could be financed by the Strategic Waste Fund or possibly in part through the New Opportunities Fund.</p> <p>As handling rates grow at major sites, the introduction of automatic sorting equipment will improve profitability and provide a 'local outlet' for the mixed baled bottles from other schemes in Scotland. We believe</p>

## Plastics recycling in Scotland

		<p>that is also an essential stepping stone to drive local investment in plastics recycling equipment and recycled product manufacture. Again, there is a role for capital grants to bring forward such investment and ensure that efficient sorting equipment is in place to provide local 'market pull'.</p> <p>The majority of MRF capacity expansion reported as planned in the National Waste Plan 2003 occurs between 2007 and 2020. On the basis of the plans in the Waste Plan the growth in total MRF capacity from 2003-2006 is likely to be a limiting factor to expanding collections.</p>
<p><b>Barriers to establishing appropriate collection infrastructure</b></p>	<p>Secure funding for additional collection facilities</p> <p>Demonstrate and promote success of high performance integrated systems which include plastics</p> <p>Complete in depth studies to identify most efficient multi-material recycling systems for cities (especially re. tenement housing stock) and for Scottish islands and other remote areas.</p> <p>Promote best practices and how perceived barriers can be overcome to councillors, relevant members of the community and council officers</p> <p>Lobby for obligations to provide multi material kerbside collections including plastics</p> <p>Provide Audit Scotland with best practice information and challenge affordability barriers</p> <p>Introduce challenge fund to deliver integrated collection projects</p>	<p>We believe that despite the available evidence, there is insufficient visibility of the success of current integrated waste and recyclables collection systems to drive forward widespread adoption of these techniques. During our workshops a number of councils confirmed an interest in the systems but were unsure how they could be implemented, or how their communities would respond.</p> <p>Making a substantial change to household waste collection practice is a challenge. At the moment there is little incentive for already stretched council officers to drive forward such a change in management activity - it involves extra work, public consultation and risks. Council members, more distant from the detail of the solutions, are concerned about negative reactions from their voters. Sometimes it is best to 'keep heads down'.</p> <p>We believe that if council members, officers and the local community better understood the benefits that efficient recycling programmes offered - including long term cost savings - then progress would not be driven simply as a result of externally imposed targets, but as a result of internally-motivated service and efficiency improvement.</p> <p>Good quality evidence and information to show not only technical and economic evidence, but also how the change management process was planned and implemented is required. This should be directed not only at councils and contractors but also to Audit Scotland, SEPA, The Scottish Executive and targeted community groups.</p> <p>Although there is good evidence of best practice available, it is not complete. In particular further work is required to demonstrate how integrated collection programmes could run in remote areas and in major cities. In particular there is a need to develop best practices for recyclables collection from multi-occupancy sites, such as tenements.</p> <p>A significant increase in skilled human resources is required during the planning and roll-out phase of a large new recycling programme. We believe that this should be recognised and planned for. A focussed recycling support team, such as Remade Scotland or specialist consultancies, could provide this extra skills base for a number of councils during new scheme development. Funding for such work would be required.</p> <p>We note that as a result of recent changes to the landfill tax credit scheme, there is no current designated funding source to carry out much of this vital R&amp;D and education work. We believe this is a major failure of UK Government policy.</p> <p>We believe that a challenge fund to encourage new collection vehicles and systems to incorporate plastic bottles would both provide the necessary large scale demonstrations of success, and would be an extremely effective use of funds over the operational life of the capital. The major capital investment required to increase plastic bottle recycling in the Scotland is the purchase of new collection vehicles. We note that many councils will, in any event, need to purchase new vehicles to upgrade recycling and waste management systems. We believe that the additional capital costs required to also provide for collection of plastic bottles within a multi-material scheme can be relatively marginal for integrated systems. For non-integrated collections there will be an increase of around 30%.</p>
<p><b>Lack of local market</b></p>	<p>Offer investment incentives</p> <p>Collect more recyclable plastics</p>	<p>The lack of a local market is primarily a function of inadequate local bottle collections. There are a number of ways investment in local recycling of plastics can be encouraged.</p> <p>The most important is to collect more plastics.</p>

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	<p>Promote investor interest</p> <p>Develop a detailed plan for encouraging local markets based on existing reproprocessors minimum requirements.</p>	<p>Ready availability of good quality information on collection trends and likely quantities of different polymers will be required to inform potential recyclers. As collection tonnages reach anticipated investment-trigger points, this information should be actively disseminated to potential investors, along with other information about enterprise sites, investment grants etc.</p> <p>Commitments or well designed tender processes from public sector organisations to purchase products containing recycled plastic bottle material may also form part of an investment package. For example, some recycled plastic product manufacturers supply competitive products used in parks &amp; gardens, and construction applications.</p> <p>We do not advise pump-priming reprocessing capacity for bottles at this stage: this will simply compound over-capacity in the UK market and further depress competitiveness. Available funds should be focussed on collection infrastructure.</p> <p>As collections grow we particularly recommend discussions with current plastics recyclers in Scotland, in particular Dumfries Plastics Recycling, who already have processing equipment and a product range broadly suitable for handling HDPE post-consumer bottles. If strategically desirable and commercially attractive for DPR, then some R&amp;D to accept bottles may lead to early availability of a local market.</p>
<p>Low weight of plastic doesn't contribute to weight targets</p>	<p>Quantify benefits achieved by increase in overall diversion rates of multi material schemes</p> <p>Quantify unseen volume related costs of plastics and avoidance benefits</p> <p>Highlight significance of volume to enable fortnightly residual refuse collections</p>	<p>There are hidden costs of collecting plastic bottles for landfill and hidden benefits of recycling them. As noted above these need to be more clearly demonstrated to key decision-makers.</p> <p>Surprisingly, there is still some scepticism that removal of 10% of the volume of waste from a refuse vehicle - as bottles represent - can lead to a significant saving in refuse collection and disposal costs. This scepticism is well placed if no effort is made to renegotiate or reallocate refuse collection resources. However where integrated multi-material collection systems are used, much of this saving can be realised as discussed elsewhere.</p> <p>The inclusion of plastic bottles also results in an increased diversion of other materials. Schemes have reported overall diversion rates increasing by 5-30% as a result of the inclusion of plastic bottles. This benefit is not yet well recognised.</p> <p>We recommend that a key element of developing the case for significant plastic bottle recycling is to develop a well-evidenced and compelling argument highlighting the cost-benefits of a recycling route, and the real savings on refuse collection and disposal.</p>
<p>Low public participation and engagement with recycling programs</p>	<p>Provide convenient and easy to understand operational systems</p> <p>Provide a set of inexpensive promotion ideas using established and proven methods to increase plastic recycling rates within current systems</p> <p>Provide sustained education and promotion facilities</p> <p>Highlight simple benefit messages about plastics – resources saved, new products, economic gains.</p>	<p>The current collection schemes are capturing a low level of available plastic bottles. Current plastic bottle recycling rates could be significantly increased by better use of existing infrastructure.</p> <p>The improved use of current infrastructure will primarily be a result of increased promotion of the facilities. Simple, clear messages are the key. These should take two forms - what to do (e.g. put plastic bottles in local bottle bank) and what the benefit of this will be (e.g. reducing waste sent to landfill, conserving non-renewable energy and creating valuable new products).</p> <p>We believe that the strategy should be to integrate simple, encouraging messages about plastics recycling into national and regional waste awareness campaigns. Easy to use, professional collection systems drive up performance. We believe it is important to project the recyclables collection as an added-value service. This will probably require a real change in operator mindset and increased spend on coherent marketing.</p> <p>Kerbside collection systems that minimise the activities required by the householder should be a priority. Segregation at the home should be kept to a minimum; eg - dry recyclables, compostables and residual waste. Depending on individual contractual issues it may be necessary to collect paper separately although operationally it is desirable if this can be avoided.</p>

## Prioritising actions & resources

The analysis of strategies shows clearly that the most efficient course of action is to prove the affordability of plastic bottle collections within integrated kerbside and 'close to home' systems in Scotland<sup>10</sup>. This should be combined with work to ensure growth of complementary handling and reprocessing infrastructure.

It is vitally important that the Scottish Executive seize the opportunities presented in this report. Kick starting plastics recycling in Scotland will require some specific project finance and 'joined up thinking' in relation to other waste and regional development programmes. We recommend that the issues raised in this report are discussed with the Scottish Executive and with SEPA at the earliest opportunity.

We have identified below a series of projects that will all contribute to aligning stakeholders in Scotland to the vision of affordable plastic bottle recycling. Figure 08 shows these projects with an initial estimate of costs, and the nature of expenditure<sup>11</sup>.

Each identified project will be beneficial. We believe that most rapid development of plastic bottle recycling levels will be achieved by moving these activities forward as a focussed programme. Such an approach would create a much greater profile for the issues identified and help to build expertise and an agreed strategy that is relevant to Scotland.

We believe the immediate priorities should be to:

- agree a common vision of plastics recycling in Scotland with national and regional government
- inform the implementation of waste plans by highlighting how the inclusion of plastic bottle recycling can be made affordable
- provide expert resources to support council planning and feasibility assessment of such schemes.
- secure commitments to finance priority infrastructure & projects using comprehensive, integrated collection of recyclables and residual refuse
- inform and stimulate efficient local baling capacity for plastic bottles
- build investment confidence by providing sustained information detailing how to sell and maximise the value of baled plastic bottles

The Waste Strategy for Scotland aims to provide 85% of Scottish households with appropriate local collection systems for recyclables and compostables by 2010. The growth required to achieve the 2006 target will require over half of Scottish households to adopt effective kerbside collections. If plastic bottles formed part of the recyclables stream collected from these households then the total tonnage of bottles collected during 2006 would be over 7,000 tonnes. By 2010 we believe that the collection levels could grow to 30,000 tonnes as a result of embedding of recycling culture and widespread provision of plastic bottle collection as part of the overall waste management service in both the domestic and commercial wastestream.

Figure 09, below, highlights the potential collections that could be achieved by adoption of bring and kerbside schemes across Scotland based on currently achieved levels of performance. This highlights the importance of the central belt as a likely centre for infrastructure, and also reinforces the importance of extensive kerbside collections to attract reprocessing facilities to Scotland. The detailed calculations leading to this summary graph are shown in Appendix 3.

There is a limited window of opportunity to incorporate and demonstrate the plastics collection and handling infrastructure that can achieve the vision we have described. The Strategic Waste Fund is phased over the next 3 years. It is essential that this work is taken forward as a matter of urgency.

By 2010 if plastic bottle recycling remains at current low levels, the cost of disposing of the plastic bottles in Scotland's dustbin waste to landfill will rise to over £3 million per year. We believe that

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<sup>10</sup> We have assumed throughout that councils will be unwilling to make major expansions of bottle collection schemes at a net cost of over £200/tonne and that a subsidy for this level of operating loss subsidy will not be available from the Scottish Executive.

<sup>11</sup> The budget figures here are indicative only at this stage. Once these recommendations have been discussed with key stakeholders, we envisage that a shortlist of initial priorities will be developed and planned in detail based on the level of support available and the specific needs of project partners.



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undertaking the programme identified will substantially reduce the overall costs of waste management over the period to 2010. We believe that by 2010 ongoing expenditure of over £1.5m/year<sup>12</sup> can be avoided, local enterprises and employment developed that contribute to the economy, and considerable environmental gains achieved.

*Figure 08 - Summary of proposed objectives and indicative budgets*

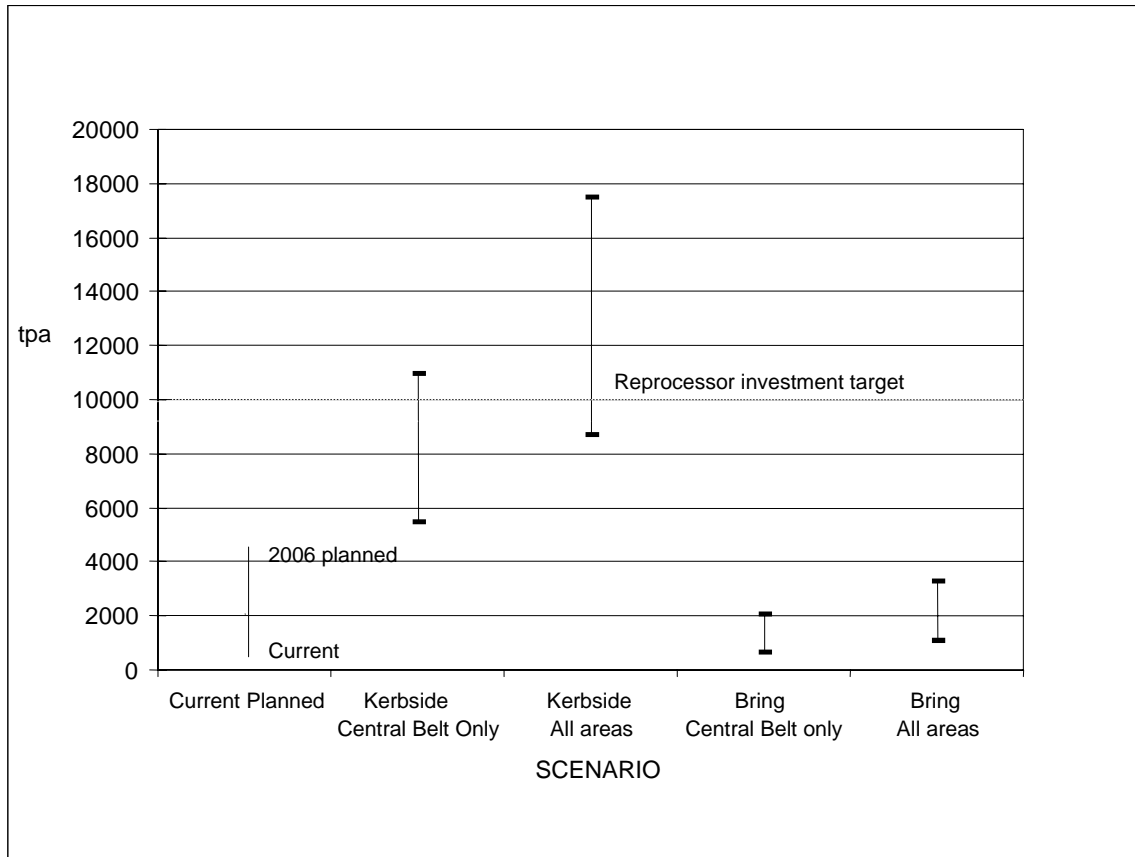
Activity	R&D / Project Management	Communication	Capital	Operational expenditure	Total project budget (£)
Develop stakeholder partnerships wishing to take forward identified tasks	10,000	5,000			15,000
Identify & promote kerbside collection best practices, incorporating plastic bottles, to councils	10,000	20,000			30,000
Identify & promote tenement & flats recycling best practices, incorporating plastic bottles, to councils	15,000	20,000			35,000
Detailed collection scheme feasibility planning - based on 5 councils	50,000				50,000
Ad hoc technical input on plastics issues as councils plan new collection initiatives - all councils	30,000	5,000			35,000
Dialogue & development work with Scottish Executive & SEPA to ensure strategies for plastics waste reflect best prevailing opportunities and secure funding for identified priorities	15,000	10,000			25,000
Offer financial incentive to integrate plastic bottle collection & research outcomes (250,000 households)	25,000	40,000	500,000	200,000	765,000
Increase awareness of markets and specifications for plastic bottles	2,000	2,000			10,000
Research & create a directory of available baling facilities in Scotland suitable for plastic bottles	3,000	1,000			4,000
Stimulate plastic collection and contract baling service development from private waste contractors using case studies of successful commercial activities in UK	6,000	3,000			9,000
Detailed feasibility planning for optimised development of baling and handling capacity for plastic bottles	30,000	5,000			35,000
Capital grant to establish 5 new 'low cost' baling operations for mixed plastic bottles & other recyclables	20,000	5,000	200,000		225,000
Capital grant to establish 1 automatic sorting line for mixed baled plastic bottles in Scotland	50,000	10,000	500,000		560,000
Disseminate existing promotional materials to collectors more effectively	5,000	20,000			25,000
Develop generic promotions package to support current plastics collection programmes	20,000	30,000			50,000
Identify and disseminate evidence of impacts of promoting plastic bottle recycling on collection rates and quality	20,000	10,000			30,000
<b>TOTAL</b>	<b>311,000</b>	<b>186,000</b>	<b>1,200,000</b>	<b>200,000</b>	<b>1,903,000</b>

We have included some further comments on the above projects, and on potential priorities and issues within Scotland in Appendix 6.

<sup>12</sup> Based on a target of 30,000 tonnes of plastic bottle recycling achieved by using the systems outlined earlier and assuming landfill tax increases to £35/tonne during the period.

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Figure 09 - Potential plastic bottle collection in Scotland based on different scenarios



## Conclusions

There is clear evidence that household plastics recycling levels can be increased significantly in Scotland. The growth in such recycling, if properly planned will lead to long term savings on waste management costs.

The vision of 7,000 tonnes of plastic bottle recycling in Scotland by the end of 2006, and of 30,000 tonnes by the end of 2010 is achievable with early investment in both expertise and infrastructure. This outcome will contribute positively to the Scottish economy, cut waste disposal volumes to landfill and reduce environmental damage resulting from waste management activities.

Progress will require urgent action. During the next three years substantial investments in infrastructure will occur as a result of the Strategic Waste Fund. If plastics recycling is not one of the priorities of this investment then it will be costly and difficult to change both infrastructure and public education to incorporate this material later.

The question should not now be 'do we recycle plastic bottles?'. The signalled changes in landfill costs and the success of plastics handling and recycling technology enable us to suggest that by the end of the decade it will be more expensive not to recycle plastic bottles. The real question for waste management planners in government is whether it is better to invest in the necessary infrastructure during the next three years, or to defer it to a later point.

Confidence will be a key factor in generating change. The importance of providing high quality information to support council decision making on changes to their waste management systems cannot be under-emphasised at this point. Confidence in the market place for collected plastics is vital and buyers of plastics should recognise that in general, the potential supplier base in Scotland is not sufficiently well aware of the extent, value or behaviour of the markets for collected bottles.

Efficient recycling solutions are available to address the challenge of managing household plastic bottle waste. We believe that councils undertaking a cost-benefit analysis of adopting proposed systems and technology during the period 2003-2006 will be able to demonstrate economic and environmental benefits compared with continuing to landfill plastic bottles.

We believe that the Scottish Executive should consider the opportunity cost of funding current kerbside development plans in comparison to encouraging and prioritising integrated kerbside collections that include plastic bottles.

## Appendices

The following appendices are available in electronic format from Remade Scotland and Recoup. You can get more information from the organisations' websites: [www.remade.org.uk](http://www.remade.org.uk) or [www.recoup.org](http://www.recoup.org)

APPENDIX 1	Background project information
APPENDIX 2	MSW arisings analysis and data tables
APPENDIX 3	Plastic bottle recycling future scenarios analysis
APPENDIX 4	Recoup factsheets - plastics recycling issue
APPENDIX 5	Remade factsheets
APPENDIX 6	Recommended strategies - detailed comment